#### REGULAR MEETING OF THE RIVERSIDE DIVISION

#### TUESDAY, FEBRUARY 25, 2020 GENOMICS AUDITORIUM, ROOM 1102A 1:10 p.m.

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1	Minutes Regular Meeting of December 3, 2019  Action Requested: Approval of the Minutes	3
2	Announcements by the President President Janet Napolitano is unable to attend	
3	Announcements by the Chancellor at Riverside Chancellor Kim A. Wilcox will address the Division	
4	Announcements by Vice Chancellors None	
5	Announcements by the Deans or other Executive Officers  A. Secretary-Parliamentarian: Election Results	8
6	Announcements by the Chair	
7	A. Consent Calendar*  i) In Memoriam  a) Distinguished Professor Wendy Ashmore, Emerita.  b) Professor Lindon W. Barrett.  c) Professor Robert J. Beaver, Emeritus.  d) Professor Charles W. Coggins, Jr., Emeritus.  e) Distinguished Professor Robert Cort Haddon  f) Professor Joseph Norbeck.  g) Professor Josef Purkart, Emeritus.  h) Professor Rodolfo (Rudy) Ruibal, Emeritus.  i) Professor Siegfried Schaible, Emeritus.  j) Professor Henry L. Snyder, Emeritus  k) Distinguished Professor Stanley N. Stewart.	13 16 18 20 22 24 26 29 31
	B. Annual Reports of the Faculties, received and placed on file <sup>†</sup> i) Executive Committee – School of Medicine	38
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<sup>\*</sup> Approval of all items on the Consent Calendar requires a single unanimous vote called for as the first order of business under Special Orders. At the request of any member of the Division, any such item must be withdrawn and considered in its regular order on the agenda [bylaw 4.1.2].

<sup>†</sup>Reports received and placed on file "are received as presented and require no further action" [bylaw 4.1.3]. Only the reporting committee can change or withdraw these reports; however, at the request of any member of the Division, a report will be moved into its regular order on the agenda (Item 10. Reports of Standing Committees and Faculties) where it may be discussed, and motions relating to the report may be offered.

	<ul> <li>D. Regular Reports of Standing Committees and Faculties, received and placed on file<sup>†</sup></li> </ul>	
	i) Committee on Courses – Course approvals	41
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9	Report of Special Committees None	
10	Reports of Standing Committees and Faculties  A. Executive Committee of the School of Business and the Executive Committee of the College of Natural and Agricultural Sciences proposal for an Interdepartmental Graduate Program Leading to the Master of Science in Business Analytics (MSiBA)  Action Requested: Individual approval of each proposed change	65
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Febru	ary 19, 2020	
	erling, Secretary-Parliamentarian side Division of the Academic Senate	

### MINUTES OF THE REGULAR MEETING OF THE RIVERSIDE DIVISION

#### **MEETING**

The Riverside Division of the Academic Senate met on Tuesday, December 3, 2019 at 1:05 p.m. in the Genomics Auditorium Room 1102A. Chair D. Rodriguez presided. The meeting was attended by 75 members of the Riverside Division of the Academic Senate.

#### **MINUTES**

The Minutes of the Regular Meeting of May 21, 2019 were approved as presented.

#### ANNOUNCEMENTS BY THE PRESIDENT

There were no announcements by the President.

#### ANNOUNCEMENTS BY THE CHANCELLOR AT RIVERSIDE

There were no announcements by the Chancellor.

#### ANNOUNCEMENTS BY THE VICE CHANCELLORS

There were no announcements by the Vice Chancellors.

#### ANNOUNCEMENTS BY THE DEANS OR OTHER EXECUTIVE OFFICERS

Chair Rodríguez called upon the Secretary Parliamentarian to provide the report on election results. The Secretary Parliamentarian informed the Division that the results of the 2019-2020 recent elections for the Division, Colleges and Schools could be found on page 8 of the meeting agenda.

There were several positions that had no more nominees than vacancies and there were no nominations received from the floor. The Division authorized the Secretary-Parliamentarian to cast a single ballot for all open positions.

#### ANNOUNCEMENTS BY THE CHAIR

Chair Rodríguez informed the Division that the Senate will be holding a Town Hall on the UC Presidential Search alongside the Riverside Faculty Association (RFA) on Thursday, January 16, 2020 from 1-3 pm in the Genomics Auditorium. UCR's own Emeritus faculty member Dan Hare (former UC systemwide Senate Chair, and recently the Special Faculty Advisor to UC President Janet Napolitano) will be joining the Town Hall to offer perspective and context. The Senate will crystallize the feedback from this town hall in the form of a report to the systemwide UC Senate, which will include it with other campus' input in a report to the UC Presidential Search Academic Advisory Committee. Chair Rodriguez then listed the members of the academic advisory committee.

Chair Rodríguez then noted that Eddie Comeaux, Chair of the Board of Admissions and Relations with Schools (BOARS), asked Academic Council members to endorse a statement in support of California Senate Bill 206 – Fair Pay to Play Act, which allows student athletes to earn income from endorsements and the commercial use of their name, image, and likeness without losing eligibility for competitions or scholarships. Academic Council members agreed that Academic Council should ask University leadership to stand with the Senate in support of

the bill, and to express that Academic Council looks forward to engaging with the Administration as it makes plans to implement the legislation.

Chair Rodríguez noted that at the last Academic Council meeting, Interim Chief Financial Officer, Paul Jenny, noted that every UC campus will be represented on the \$2 billion GO (General Obligation) bond, PROP 13. UCOP has asked campuses to identify their top priority capital project related to seismic needs, deferred maintenance, or capacity. UCOP is reviewing the full list of proposed projects, and it plans to send a final list to the Regents in January. UC believes that by demonstrating effective use of the GO bond proceeds, the University can encourage additional investment from the state and philanthropy. He also noted that they are working with campuses to avoid campus conflicts in apportionment of potential funds.

Chair Rodríguez gave an update on faculty salaries. The President has decided to extend a 5.33% increase to the faculty salary scales (equivalent to a 4% increase on a 12-month scale), effective October 1, 2019. The President is reviewing a plan for additional augmentations over the next three years that will be adequate to eliminate the remaining UC faculty salary gap. The University's 2020-21 state budget request will include a faculty salaries component.

Chair Rodríguez gave an update on the Systemwide Senate Review of Revised Presidential Policy on Native American Cultural Affiliation and Repatriation. He noted that Council reviewed comments from Senate divisions and systemwide committees to the proposed revised Policy on Native American Cultural Affiliation and Repatriation. The Policy updates UC's compliance with the federal and state versions of the Native American Graves Protection and Repatriation Act (NAGPRA) and strengthens UC policy and practices related to the curation, repatriation, and disposition of Native American remains and cultural items in its custody. The Policy assigns responsibility for overall policy implementation and compliance to a joint systemwide committee. It also asks the six UC campuses with NAGRPA-covered holdings to establish local committees to assess campus implementation of the policy and review claims for cultural affiliation and requests for repatriation or disposition of human remains.

Senate reviewers noted that campuses could struggle to identify tribal members with five years of related experience, or faculty representatives from the list of specified academic disciplines, which do not all exist on all six campuses. Reviewers recommended incorporating additional flexibility into the requirements for the composition of campus committees and the scope of disciplines, noting that expertise should take priority over specific discipline.

Chair Rodríguez then invited Interim PEVC Smith to deliver a few brief remarks. Interim PEVC Smith noted that he is honored to be the interim PEVC this year and he will work on transparency and collaboration with the Senate. Ideas on how to achieve this would be appreciated, please email PEVC Smith or drop by his office. He then gave a few updates: This Fall UCR exceeded 25,000 students and noted that several projects are underway on campus that will help with the increase of students (The Barn, Student Success Center, North District, additional housing, classroom space, dining, etc.)

Interim PEVC Smith noted that UCR is hoping that UCOP will make an announcement for additional online courses through the Innovative Learning Technology Initiative (ILTI). Courses will be prioritized in the selection process and he encouraged faculty to have discussions in all departments about what courses would benefit having an online option. The Center for Teaching and Learning is hiring several course designers for those who would like to develop a course.

Interim PEVC Smith also noted that the Provost's office is conducting non-academic external reviews and are modeling the Academic Senate's process of reviews for Undergraduate and Graduate programs. The first to be reviewed was the Library on December 5-6, 2019. Summer Sessions and Academic Advising are also on the list.

Interim PEVC Smith gave an update on the Strategic Planning Steering groups. Workgroups include "Unparalleled Student Experience", "Research and Scholarly Distinction", "Thriving Campus Community", "Contributions to the Public Good" and "Sustainable Infrastructure Operations and Finance". If anyone has a specific ideas and/or interests, please reach out to the Chairs of the workgroups. Committees and membership can be found at <a href="https://strategicplan.ucr.edu/">https://strategicplan.ucr.edu/</a>

Interim PEVC Smith also noted that two task forces have been created:

- Graduation Task Force was created to make recommendations on where Commencement for this year and on will be held. A campus wide announcement will be sent out next week.
- 2) Graduate Finance Taskforce is looking into incentives for the Masters program and funding for the PhD programs going forward.

There were not questions/comments from the floor.

#### **SPECIAL ORDERS**

The Consent calendar was unanimously approved.

The annual reports of standing committees, annual reports of the faculties, degree reports and regular reports of standing committees and faculties were received and placed on file.

#### REPORT OF THE REPRESENTATIVE TO THE ASSEMBLY

Riverside Assembly Representative Professor Thomas Cogswell and Professor Manuela Martins-Green provided the Division with a written report from the Assembly meeting on June 12, 2019. This report can be found on page 159 of the full agenda. There were no questions from the Division.

#### **REPORTS OF SPECIAL COMMITTEES**

There were no reports of Special Committees.

#### REPORTS OF STANDING COMMITTEES AND FACULTIES

Professor Timothy Close, Chair of the Committee on Charges, introduced and moved for adoption of the proposed changes to Bylaw 8.7.1, found on page 160 of the full agenda. The motion was approved unanimously.

Professor Kevin Esterling, member of the Committee on Rules and Jurisdiction, introduced and moved for adoption of the proposed changes to Bylaw 8.21.2.2, found on page 163 of the full agenda. The motion was approved unanimously.

Professor Daniel Jeske, from the Department of Statistics, introduced and moved for adoption of the joint proposal from the Department of Computer Science and Engineering and the Department of Statistics for the new undergraduate major in Data Science, found on page 168 of the full agenda. The motion was approved unanimously.

#### **PETITIONS OF STUDENTS**

There were no petitions from the students.

#### **UNFINISHED BUSINESS**

There was no unfinished business.

#### UNIVERSITY AND FACULTY WELFARE

- A. Professor Abhijit Ghosh, Chair of the Committee on Faculty Welfare, addressed the Division and gave an update the Faculty Climate Survey administered by the committee. The survey was created and implemented by the Committee on Faculty Welfare last academic year and was open May 6-27, 2019. The data is being analyzed this year. The survey was sent to 1,123 faculty (including 243 emeriti) and a response rate of 30-32% was received. Some preliminary key points include: generally content with department leadership, but not with campus leadership; mixed picture at the level of the colleges; administration's goals for campus growth are not aligned with faculty priorities (e.g., quality instruction and research); serious concerns on administration's plans for growth without appropriate infrastructure (not enough classrooms, TA's, faculty or staff); the current approach to teaching evaluations are strongly disfavored and many faculty commented on bias against women and faculty of color; many faculty described experiences with inequality among teaching, service and retention of faculty of color and women, especially at junior level; faculty reported many instances of bullying by tenured faculty towards staff, students, and junior faculty, often without consequence; with regards to graduate students, one of the strongest complaints across different colleges is the poor funding and support (fellowship and TA) they receive; and there is a general sense across all disciplines that mentoring graduate and undergraduate students is undervalued, especially in review processes (merit, tenure, and promotion).
- B. Crystal Petrini, President of the UCR Staff Assembly, address the Division and gave an update on the Staff Assembly engagement survey results. The survey was jointly conducted with UCOP and CUCSA Council of UC Staff Assemblies by Willis Towers Watson and sent to policy covered staff and conducted every two years. This year, new questions were added on empowered culture, leadership, and organizational change and innovation. A summary of the results can be found at: <a href="https://staffassembly.ucr.edu/document/ucriverside-engagement-survey-2019">https://staffassembly.ucr.edu/document/ucriverside-engagement-survey-2019</a>.
- C. Chair Rodríguez introduced the Academic Senate General Education Review Committee. Bob Clare, Chair of the General Education Review Committee, introduced the committee members. Each workgroup gave an update to the Division. <u>Workgroup 1:</u> What is the current state of GE at UCR? Historical review and current state. What works now? What are current challenges? Why have previous attempts failed? What's broken? Group to get this perspective from departments. And related questions.

<u>Workgroup 2:</u> Input/Survey/Focus Groups/Student groups/Faculty groups visits development: for current students and alumni. What do they want/would have wanted? Also, for faculty – what should we ask faculty? Getting information and feedback from Student Affairs/Relations units on campus (Administration and student-initiated). And related questions. University Innovation Alliance. Community (employer, etc.) relationship assessment.

<u>Workgroup 3:</u> Keeping folks informed. Communications, transparency, garnering buy-in from stakeholders (faculty, students, staff). Effectively communicate progress and get feedback along the way. What are the financial and infrastructure issues and

information? Creating a communications plan that will last throughout the project (to faculty, students, staff). And related questions.

Workgroup 4: Reports/Research: State of GE at other institutions? What works? What has been successful? Not to emulate, but to learn.

Next steps will be to work on a survey to poll the faculty, students and alumni. Town Halls will also be conducted inform faculty what is happening within the workgroups and how the committee as a whole is progressing.

#### **NEW BUSINESS**

There being no further business, the meeting was adjourned at 2:39 p.m.

#### ATTEST:

K. Esterling, Secretary-Parliamentarian Riverside Division of the Academic Senate

Leondra Jacobs Recording Secretary

#### SECRETARY-PARLIAMENTARIAN REPORT TO THE RIVERSIDE DIVISION FEBRUARY 25, 2020

#### 2019-2020 RESULTS FROM THE CALL FOR NOMINATIONS

To be received and placed on file:

#### 1. GRADUATE SCHOOL OF EDUCATION

A call for Nominations was issued for the following position:

One Member, to be chosen from the Faculty at Large One valid nomination was received:

- Gregory Palardy

The results from the Call for Nominations and Elections have been posted on the Academic Senate website.

# In Memoriam Wendy Ashmore Distinguished Professor of Anthropology, Emerita UC Riverside 1948—2019



Dr. Wendy Ashmore long recognized as one of the foremost theoreticians in Maya archaeological research in the areas of archaeological settlement patterns, landscape studies, household archaeology, spatial studies and critical gender analysis, passed away peacefully on January 8, 2019 in Riverside, California after a long battle with two auto-immune diseases.

Wendy was born in Los Angeles, California at Queen of Angels Hospital on June 26, 1948; started school in Mexico City during the McCarthy years; and returned to Hollywood a year later. She received her B.A. in Anthropology (magna cum laude) from the University of California, Los Angeles in 1969 and her Ph.D. in 1981 from the University of Pennsylvania. Her dissertation, "Precolumbian Occupation at Quirigua, Guatemala: Settlement Patterns in a Classic Maya Center," was the beginning of a research and publication record that kept breaking theoretical barriers to bring a deeper understanding of the complexity of Maya settlement patterns to the global archaeological community. At the beginning of her career

she was an assistant and associate professor of anthropology and a member of the graduate faculty of anthropology at Rutgers University, The State University of New Jersey. From 1981 to 1994 she served as both Research Associate, and Consulting Curator for the University Museum at Rutgers. In 1992 she moved to the department of anthropology at the University of Pennsylvania as an associate professor and Associate Curator, American Section, of the renowned University of Pennsylvania Museum. Ashmore joined the faculty of the anthropology department at UC Riverside where she stayed until she retired as Distinguished professor, Emerita in 2016.

Professor Ashmore was a giant in the field of Mesoamerican archaeology, publishing highly influential work throughout her career. She was a pioneer in the areas of settlement patterns, landscape, and household archaeology, pushing the field to consider the importance of symbolic behavior and more humanistic archaeological narratives before such approaches were considered standard. Her breakthrough volumes include Lowland Maya Settlement Patterns (1981), Household and Community in the Mesoamerican Past (edited with Richard R. Wilk, 1988), Archaeologies of Landscape: Contemporary Perspectives (edited with Bernard A. Knapp, 1999). After working at the important sites of Quirigua, Copan, and Paraiso in southeastern Mesoamerica, Professor Ashmore co-directed critical work at the site of Xunantunich, Belize that transformed how archaeologists working in this area of the world approach social questions surrounding daily life. In 2012 she received the Kidder Award from the American Anthropological Association (the flagship association for anthropologists), the 24<sup>th</sup> recipient of this honor in its first 62 years of existence and only the third woman. There are no higher accolades than this award in the field of archaeology.

In focusing her research on space and place in relation to production and reproduction at household and community levels, Wendy was one of the first archaeologists to draw on an emergent feminist anthropology. She theorized the contexts and content of gender relations and in doing so, contributed mightily to the conceptualization of gender and its importance in anthropological research. She wanted her students to consider gender not only as a lens for analyzing social

hierarchies and relations, but as a politically charged framework for new theorization. She forged in her own work a shift from looking at gender as categorization and a marker of a static division of labor to looking at the ways that gendering actually contributed to conceptualizations of landscape, the creation of place in conditions of disruption, and the spatiality of communities and households. In her more recent work she is remembered as one of the most important theorists in the field of feminist archaeology alongside women such as Elizabeth Brumfiel, an archaeologist who raised the voice in Maya archaeology about the absence of gender analysis. Wendy's more recent work, in fact was a call to the field to actively prevent the erasure of the wider theoretical contributions of women archaeologists.

A stellar teacher and mentor, she was recognized by her receipt of the 2006-2007 UCR Academic Senate Distinguished Teaching Award and the 2008-2009 UCR Doctoral Dissertation/Mentor Award as well as her induction into the UCR Academy of Distinguished Teachers in 2013. Her textbook co-authored with Robert Sharer, *Discovering Our Past: A Brief Introduction to Archaeology* (the 6<sup>th</sup> edition was published in 2014), has been adopted for introductory courses to archaeology in numerous U.S. universities and beyond. Her mentorship was unparalleled and she is fondly remembered by the many former advisees who are now transforming the field as professionals themselves. Her legacy as a brilliant and transformative archaeologist continues through the many people whose lives she touched.

Wendy was also a central figure to American anthropology and archaeology through her service to the field. Through her nationally elected service to the American Anthropological Association (AAA) Executive Board, Committee on Scientific Communications, and Publications Committee she helped to forge the direction of the discipline and its relationship to disparate publics. She was widely appreciated for her cooperative, collaborative, and reasoned approach to volatile issues. Like her research, her service was grounded in careful preparation. Given her strong reputation for exceptional service to the field Wendy was invited to serve on the editorial boards of a dozen scholarly presses—including both Cambridge University Press and Oxford University Press. This commitment to service was also strong at all levels in the UC system, including system-wide service on the University of

California Press editorial committee and campus-wide service in the Faculty Senate. It would be impossible to overstate the conscientiousness with which Professor Ashmore approached her service work. It was beyond exemplary.

Professor Ashmore is survived by her husband, Dr. Thomas Patterson,
Distinguished Professor Emeritus, Department of Anthropology, UC Riverside, her
brother Patrick Matthews-of Los Angeles, California and her sisters, Carol Matthews
and Elizabeth Gould of Toronto Canada.

Submitted by: Dr. Juliet McMullin, Chair, Department of Anthropology and faculty members: Drs. Yolanda T. Moses, Travis Stanton, Kenichiro Tsukamoto, Karl Taube, and Christine Gailey, Emerita.



In Memoriam

Lindon W. Barrett Professor of English UC Riverside 1961-2008

Lindon W. Barrett, Professor of English at UC Riverside, 2007-8, and Professor of English and Comparative Literature and African American Studies at UC Irvine, 1990-2007, died in tragic circumstances at his home in Long Beach, CA, on July 7, 2008. He was 46.

Professor Barrett was born in Guyana on October 10, 1961, and moved with his family to England a year later, and then again to Winnipeg, Canada, in 1966. He received his B.A. at York University in 1983, his M.A. at University of Denver in 1986, and his Ph.D. at University of Pennsylvania in 1990, joining the faculty of English at UC Irvine shortly thereafter and rising to the rank of full professor by 2001.

Professor Barrett was a versatile scholar whose interests encompassed African American and African diaspora literature and culture; literary and cultural theory; lesbian, gay, and queer studies; and music, song, social dance, and other forms of popular and street culture. Though a lover of books from an early age, he insisted on the value of non-literary representations, especially music, song, and dance as records of suffering and pleasure exceeding what can be put into words. He believed it was not enough for scholars to critique current value systems and the priority accorded "rational speech"; instead, alternative values and systems had to be constructed to combat racism, sexism, and homophobia, and such work would have to involve the whole body, not just the head and heart. He dedicated his research, teaching, and service to those ends, developing his ideas in important articles and presentations on a wide range of figures and topics, from Ann Petry and Langston Hughes, to Dennis Rodman and Sylvester,

to modernity and its dependence on slavery. He also served as a consultant to Steven Spielberg and Debbie Allen on the 1997 film *Amistad*.

His first book, *Blackness and Value: Seeing Double*, appeared in 1999 and was groundbreaking in its approach to the study of voice, music, authenticity, and value (1999), anticipating new directions in scholarship on the voice and African American culture. He died before he could complete his second book, *Racial Blackness and the Discontinuity of Western Modernity*, which turns from the focus on black expressive culture in the first book to the socio-economic, historical, and philosophical origins of the slave trade in its founding relation not only to the mercantilism that preceded and prepared for capitalism but also to Enlightenment modernity. A testament to the respect and esteem Professor Barrett's work inspired, the book appeared posthumously in 2014 thanks to the editorial efforts of friends and colleagues Justin Joyce, Dwight McBride, and John Carlos Rowe. A volume of his essays, *Conditions of the Present: Selected Essays*, edited by Janet Neary, also has appeared posthumously.

Professor Barrett was a much sought-after speaker, sharing his work in numerous venues nationally and internationally. He was involved in a number of scholarly organizations, including the American Studies Association and the Modern Language Association, as well as the Critical Theory Institute at UC Irvine, and he served for three years as the associate editor of *Callaloo*, one of the leading journals in African diaspora studies. He devoted much of his time and energy to institutional change at UC Irvine and co-founded UC Irvine's Program of African American Studies with Thelma Foote in 1994, chairing it from 2003-7; it achieved departmental status in 2016 thanks in large part to their labor. His institutional work has lived on in other ways at UC Riverside, with lectures in his honor and a selective summer research institute in his name that ran from 2012-15, funded by the UC-HBCU to help prepare undergraduates from historically black colleges and universities for doctoral study.

The latter was especially appropriate because he was a charismatic and inspiring teacher, learned but witty, and with an infectious smile to which students could not help but respond. One of his UC Irvine undergraduates summed up the experience of being in a course with him on a memorial web site: "They were the kind of classes that you would actually try to get there on time for so that you could grab a seat so as not to miss any of the brilliant, poignant, and hilarious things that Professor Barrett would say."

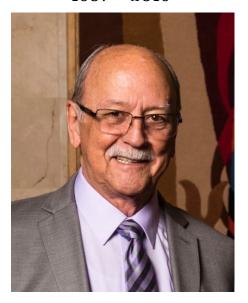
He is survived by his parents, Dorothy and Leslie Barrett, his brother Leslie (Telethia), nieces Ashley (Scott), Gabrielle, Athalia, nephews Jason and Joshua, great-nephew Josiah, Aunt Claudette, Uncle Charles, Uncle Sidney, cousins Ann, Leslyn, Carron, Andre, Kizzy, Carol and Pauline and their families, the Roberts and Vigilance families.

This memorial was prepared by Carole-Anne Tyler, Associate Professor of English, with information from the UCR Chancellor; colleagues in the UCR English Department; colleagues at UCI, where Professor Barrett taught for many years, especially Professor John Carlos Rowe; *The Press Enterprise*; the Lindon Barrett Tributes blog at

http://forlindonbarrett.blogspot.com/2008/07/from.html; and the KUCR 88.3 FM July 21, 2008 tribute, simulcast by KUCI and rebroadcast on July 28 and 29 and archived at <a href="http://kucr.org/2008/07/24/kucr-883fm-to-re-air-tribute-to-uc-riverside-professor-lindon-barrett/">http://kucr.org/2008/07/24/kucr-883fm-to-re-air-tribute-to-uc-riverside-professor-lindon-barrett/</a>.

#### In Memorium

Robert J. Beaver Professor of Statistics, Emeritus UC Riverside 1937 – 2019



Robert (Bob) Beaver was an incredibly active and valued member of the College of Natural and Agricultural Sciences and the Department of Statistics for 35 years. He earned his BS from Bloomsburg State Teachers College which is now Bloomsburg University in 1959, and taught junior high school science and mathematics for several years in Middleburg, Pennsylvania. Bob's BS degree was in secondary education, thereby laying the foundation for his strong commitment to teaching. He received his MS in Mathematics from Bucknell University in 1964, and a second MS (1966) and PHD (1970) in Statistics with a minor in Mathematics from the University of Florida.

Upon graduation, Bob joined UCR in 1970 as an Assistant Professor in the newly formed Department of Statistics chaired by F. N. David, and an Experimental Station Statistician (67% I&R and 33% OR). Bob spent his entire career as a Statistics Professor and Statistician at UCR. He lived with his family within a short walking distance from the campus. After 35 years at UCR, he became Professor Emeritus and Statistician in 2005 but continued to live with his family at their very close-to-campus home. Just prior to his retirement, the Statistics Department created the Robert Beaver Outstanding Statistical Consulting Award, given to a student who personifies Bob's care for interdisciplinary work in statistics.

Bob will be remembered in the statistics profession for his many research contributions in paired comparison experiments including the handling of tied observations and possible order effects associated with treatments. His joint research with UCR Distinguished Statistics Professor Barry C. Arnold on Hidden Truncation Models,

Skewed Univariate and Multivariate Distributions with Applications, and Rank Set Sampling made a huge impact in advancing the field. Furthermore, Bob's joint research with Professor J.N. Srivastava in demonstrating the superiority of the nested multi-dimensional block design relative to the classical incomplete block designs, made a striking impact in the field.

As a statistician of the UCR agricultural experimental station, Bob interacted with the numerous researchers and faculty members in the Departments of Entomology, Nematology, Plant Pathology, Botany and Plant Sciences, Biology, and Biochemistry. The presence of Bob in these research projects made the papers statistically insightful contributing to have strong impacts in their fields and got them published in top professional journals. Bob was also a gifted classroom instructor, teaching experimental design classes for CNAS students at the undergraduate level, and statistical theory courses for graduate students. He received the 1983-84 UCR Graduate Student Association Distinguished Teaching Award.

Bob's impact on science extended well beyond UCR. He was a bestselling author of several introductory statistics text books written jointly with W. Mendenhall and Barbara Beaver. His book, "Introduction to Probability and Statistics" (Mendenhall/Beaver/Beaver), is now in its 15<sup>th</sup> edition.

Bob was born March 27, 1937 in Mount Carmel, Pennsylvania, and he died on August 13, 2019. He is survived by wife, Barbara, of 49 years, daughter Krista and her husband Steven, son David and his wife Casey, and four grandchildren.

Written by Faculty in the Department of Statistics, UCR, with minor editorial changes by Thomas Perring.

https://www.dignitymemorial.com/obituaries/riverside-ca/robert-beaver-8822048.

#### In Memorium

Charles W. Coggins, Jr.
Professor of Plant Physiology, Emeritus
UC Riverside
1930 – 2019



Charlie was a treasured member of the College of Natural and Agricultural Sciences and the Department of Botany and Plant Sciences for many years. He was hired as a Jr. Plant Physiologist in 1957, joining what was, at the time, the Department of Horticulture. He advanced through the ranks to Associate Plant Physiologist to Plant Physiologist and to Professor of Plant Physiology and Plant Physiologist in 1975. He had a long and distinguished career working primarily in citrus, with an emphasis on the use of plant growth regulators (PGRs) to improve citrus production. He served as department chair from 1975-1982. During his tenure as chair, he oversaw the transfer of the Botany faculty from the Biology Department into a renamed department now known as Botany and Plant Sciences. In addition, he oversaw the hiring of the first female faculty into the department. Charlie was both a respected classroom teacher and major professor to MS and PhD students. His major formal class was "Citriculture" which had a laboratory. Charlie took early retirement in 1994, but returned on part-time recall basis for several years, finally fully retiring ~ 2001.

Charlie was dedicated to the citrus industry and served as Chairman of the Board of Directors of the California Citrus Quality Council for many years. In 2008, he was honored by California Citrus Mutual (CCM) for his work on plant growth regulators, and his research was credited with significantly extending the fresh market season for navel oranges and other varieties. It was said that his research on PGRs has been described as the single most economically beneficial research of the last century. At that time, CCM

established the Charles W. Coggins annual scholarship, which is awarded to an upper division undergraduate student in agriculture. In addition, an endowment in Charlie's name was established at UCR to support a CNAS graduate student working in citriculture.

During the late 1950s, Charlie found that when gibberellic acid was applied to citrus it delayed senescence - the growth phase from full maturity to death - of the rind. Under field conditions, Charlie transformed this knowledge into sound recommendations that are now standard horticultural practices used not only on oranges and lemons in California, but also in most other citrus-producing countries of the world, including Israel, Spain, South Africa, Australia, Morocco, Turkey and Cuba.

Before Charlie's discovery, the citrus industry's calendar year was divided approximately into thirds: a Valencia season, a navel season, and four months without fruit. But Charlie's recommendation of using gibberellic acid extended the growing seasons of navel and Valencia oranges from about nine months to twelve months, providing year-round employment for pickers and packing house workers, and permitting marketing organizations to maintain continuity with their customers.

Charlie is also credited with making significant contributions to both basic physiology and applied horticultural practices that are important to solving the problems of alternate bearing, rind staining, creasing, and small fruit size of the Valencia orange.

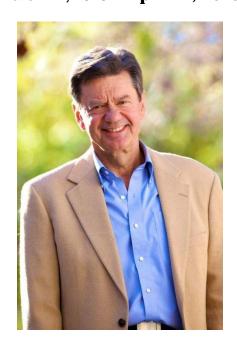
He also made a major contribution to research on naphthaleneacetic acid that resulted in its acceptance as a fruit-thinning agent for citrus. In addition, his research led to a better understanding of the maturation of dates and the development of a new avocado fruit maturity standard for California.

He was born November 17, 1930 in North Carolina and died on August 18, 2019. He was preceded in death by two sons from cystic fibrosis. He is survived by his wife Irene of 68 years, a son and four grandchildren.

Adapted from an obituary circulated by the College of Natural and Agricultural Sciences with editorial changes made by Darleen DeMason and Carol Lovatt.

#### In Memoriam

Robert Cort Haddon
Distinguished Professor of Chemical Engineering
Distinguished Professor of Chemistry
UC Riverside
March 12, 1943 – April 21, 2016



Robert Cort Haddon, Distinguished Professor with appointments in the Departments of Chemistry and Chemical and Environmental Engineering at the University of California, Riverside, passed away April 21, 2016.

Robert was born date in Tasmania, Australia. He moved to the United States to earn a doctoral degree in Organic Chemistry at The Pennsylvania State University, which he completed in 1971. He previously earned a B.Sc. degree with honors in Chemistry from Melbourne University, Australia (1966).

After completing his Ph.D. and a Postdoctoral Research appointment at the University of Texas at Austin, Robert was a Queen Elizabeth II Fellow at the Australian National University, and in 1976 he joined Bell Laboratories, which later became AT&T and Lucent Technologies. He ultimately became a Distinguished Member of the Technical Staff (1976-97). While at Bell Labs, he discovered superconductivity in alkali-metal-doped carbon-60. He went on to become world-renowned for important research in carbon nanotubes. Robert was the recipient of many significant international honors, most significantly the James C. McGroddy Prize for New Materials in 2008 for the discovery of high-temperature superconductivity in non-oxide systems. This prize from the American Physical Society recognizes outstanding achievement in the science and application of new materials.

Robert joined the University of Kentucky as a Professor of Chemistry and Physics in 1997, and he was Director of a National Science Foundation Materials Research Science and Engineering Center in Advanced Carbon Materials from 1998 to 2000. He co-founded CarboLex, a company that produces single-walled carbon nanotubes (SWNTs), and in 1998 he founded Carbon Solutions, a company that is focused on the chemical processing of SWNTs.

Robert joined UCR in 2000 to become Director of the Center for Nanoscale Science and Engineering (CNSE). In this role, he oversaw the development of two clean room laboratories at UCR, and he was central to the recruitment and development of numerous young faculty members in the sciences and engineering. His work in CNSE set the stage for UCR's establishment of a highly successful Materials Science and Engineering degree program at UCR, which involves dozens of faculty members from departments in the Bourns College of Engineering and the College of Natural and Agricultural Sciences.

Robert's other professional service included working on the advisory boards of the journals Advanced Materials, Journal of the American Chemical Society, Chemical Physics Letters, Chemistry of Materials, Molecular Crystals and Liquid Crystals, Fullerenes, and Nanotubes and Carbon Nanostructures.

Robert is survived by his wife, Dr. Elena B. Hadon, Professional Researcher in Chemistry department at UCR, and two daughters.

This memorial was prepared by Reza Abbaschian, Professor in the Bourns College of Engineering (BCOE) with the information provided by Mitch Boretz, Angela Meluski and colleagues in BCOE. Additional information can be found in: https://ucrtoday.ucr.edu/36749

#### **In Memoriam**

## Joseph Norbeck Professor of Chemical and Environmental Engineering UC Riverside November 10, 1942 – August 24, 2016



Joseph Michael Norbeck, Professor of the Department of Chemical and Environmental Engineering, founding director of the Bourns College of Engineering Center for Environmental Research and Technology (CE-CERT), and former director of the UCR Environmental Research Institute, passed away on Wednesday, Aug. 24, 2016.

Joseph was born November 10, 1943 in Philadelphia, PA and was the oldest of son of Helen and Joseph (Thornton) Norbeck. After graduation from St. James High School in Folcroft, PA, Joseph served in the United States Air Force from October of 1961 to October of 1965. Joseph received his PhD in Theoretical Chemistry from the University of Nebraska in in 1972. He then spent one year in Sheffield, England and one year in Madison, WI as a postdoctoral researcher before joining the Ford Motor Company in Dearborn, MI, as research scientist, a position he held for 18 years. Joseph then joined the University of California, Riverside as a professor in the Bourns College of Engineering. Joseph retired in 2011, but kept active as emeritus faculty until his passing.

Joseph's teaching and research involved pollution control and sustainable energy. His research spanned environmental science and engineering, including atmospheric modeling, vehicle emission measurement, advanced vehicle technology, and production of liquid and gaseous fuels from clean, renewable resources. His teaching focused on fundamentals of air pollution engineering, and technology of air pollution control. He enjoyed interactions with students in the classroom and outside, and was an excellent mentor of undergraduate and graduate students alike. Professor Norbeck was honored with the 2002-2003 Chancellor's Award to the Faculty Mentor for Excellence in Fostering Undergraduate Research.

Professor Norbeck was a leader in a major program at UCR, supported by federal, state, and industry stakeholders, to develop a new generation of technology for measuring emissions from ultra-low-emission cars and light trucks. He similarly led a team that pioneered the measurement of "real-world" truck emissions by creating a mobile lab inside an on-road trailer. This technology ultimately lent itself to other in-field measurement needs, including quantifying and characterizing emissions from ships, aircraft, construction equipment, and pipeline pumps. This body of work gave scientists and engineers a clearer picture of how engines use energy, and thus a resource for better-informed policy and manufacturing decisions. Other research concentrated on the production of alternatives to gasoline from renewable resources, such as plant waste and municipal solid waste. This work dates to early in his UCR career, when he was the lead author of the book *Hydrogen Fuel for Surface Transportation* (Society of Automotive Engineers, 1996). He published more than seventy-five papers in his career.

Among Joseph's other major accomplishments were to serve as the founding director of the College of Engineering Center for Environmental Research and Technology (CE-CERT) from 1992 to 2005, and as the founding director of the Environmental Research Institute (ERI) from 2005 to 2011. At CE-CERT for over 13 years, he created the vision and strategic directions for a research center that can serve as an "honest broker" by providing unbiased and reliable information that policy-makers and industry can use to inform decisions on how to balance public health, environmental quality, and economic considerations. This strategy built CE-CERT into the largest research center at UCR, and the model continues to guide CE-CERT's mission to this day.

Among Joseph's many awards and recognitions were his election as a Fellow of the American Association for the Advancement of Science (AAAS), a South Coast Air Quality Management District Clean Air Award, and the Valley Group Award in 1997 for Excellence in Environment and Research. He was elected as local leader for the City of Riverside and received the Regional Leader of the Year Award in 1998. He has held a gubernatorial appointment as an Air Quality Expert on the California Inspection/Maintenance Review Committee and served as a member of several other committees including the Cal/EPA Environmental Technology Partnership Task Force, the Executive Research Advisory Committee of the Society of Automotive Engineers, and Scientific Review Committee for the South Coast Air Quality Management District.

Joseph was a loving husband, father and grandfather. Left to cherish his memory are his wife of 50 years, Sharon; children Jason (Jenny) Norbeck and Allyson (Michael) Samborn; brothers William and Robert (Ruthann); sisters Helen (Greg) Uff and Maribeth (Wes) Payne; grandchildren Warren, Max and Jackson Norbeck and Ariadne Samborn; and many nieces and nephews.

This memorial was prepared by Reza Abbaschian, Professor in the Bourns College of Engineering (BCOE) with the information provided by Mitch Boretz, Angela Meluski and colleagues in BCOE, and <a href="https://ucrtoday.ucr.edu/tag/joseph-norbeck">https://ucrtoday.ucr.edu/tag/joseph-norbeck</a>.



#### In Memoriam

## Josef Purkart Professor of Comparative Literature and Foreign Languages UC Riverside 1940 – 2016

Josef Purkart, emeritus Associate Professor of German and Medieval Latin at UC Riverside, died after an illness on March 5, 2016, at the age of 76. He served the campus for 18 years, from 1970 to 1993, during which time the campus more than tripled in size and the German Department, along with the other world literature programs, merged as the Department of Literatures and Languages, now the Department of Comparative Literature and Foreign Languages, making him a founding member.

Professor Purkart was born in Wels, Austria, in 1940. He studied at Freiburg University in Germany, then emigrated to the U.S. in 1965, having perfected his English in part through his encounters with American students to whom he taught German. He received his Ph.D. in German from the University of Massachusetts at Amherst in 1971, a year after his appointment as an assistant professor at UC Riverside. His dissertation was on the role and song of the messenger in Middle High German love letters, and he continued to pursue his interest in the topic of love in that period in his later work, his signature contributions centering on the *Rota Veneris* of the 13th century Italian professor of rhetoric Boncompagno da Signa, on whom Professor Purkart was regarded as the world's leading expert. His *Rota Veneris*, a facsimile reproduction of the Strassburg Incunabulum of Boncampagno's text, appeared in 1975, with an introduction, translation, and notes, and is still the only published translation and commentary on the text. He later published essays on how sexual metaphors arising from the Christian rhetoric of love in the *Rota Veneris* make for biblical parody and on the use in it of scriptural and exegetical imagery for the comic defense of carnal love. In 1988, he decided to retire early and pursue his other passion, opening a second-hand and antiquarian bookstore in downtown Riverside, Josef's Books.

Professor Purkart was a dedicated instructor of German at all levels, and one of his fellow Germanists at UC Riverside, Georg Gugelberger, sent his own daughter to learn the language from him. The two colleagues met often to assist each other with home repairs and improvements and for conversation in their native language. Professor

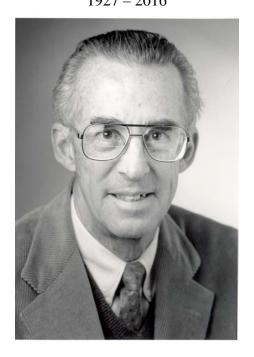
Purkart was known on campus both for his direct manner and his sense of humor, which no doubt drew him to Boncompagno, who is famous in literary history for his love of unusual practical jokes. For instance, when asked about the challenges of teaching second-language learners, Professor Purkart responded dryly that an undergraduate once translated "The student wanted the professor to offer advice" as "The student wanted the rat to bite the professor."

He is survived by his ex-wife Susan, who taught at Riverside Community College for many years, and his five children, to whom he was deeply devoted: Deborah Carpenter of San Diego, Josef Eduard ("Peppi") Purkart of Riverside, Karina Purkart of Santa Cruz, and Renata Purkart and Johannes Purkart of Los Angeles.

This memorial was prepared by Carole-Anne Tyler, Associate Professor of English, with information from UCR colleagues in Comparative Literature and other departments and *The Press-Enterprise*.

#### IN MEMORIAM

Rodolfo (Rudy) Ruibal Professor of Biology Emeritus UC Riverside 1927 – 2016



Emeritus professor Rodolfo (Rudy) Ruibal died on Aug. 30, 2016 at age 88. Rudy, one of the ten founding faculty of U. C. Riverside's Biology Department, joined UCR as an Acting Instructor in 1954, advanced to Full Professor in 1967, and retired in 1994.

Born in Havana Cuba on 27 October 1927, Rudy developed an early love of science and "herps" (reptiles and amphibians). He loved chasing the abundant *Anolis* lizards of Cuba and swimming among coral reef fish. When Rudy was 8 years old the family moved to New York City. There he took advantage of excellent educational opportunities and became the first of his immediate family to graduate from high school. In NYC Rudy briefly attended a Jesuit school and then transferred to Horace Mann Elementary, an experimental school run by Columbia University's Teachers College that cultivated independent inquiry. He thrived there and even collaborated with another student on an encyclopedia of snakes of the world!

After elementary school Rudy attended a public high school and then McBurney prep school, "a very, very good high school with very, very good teachers." With this preparation, he was readily accepted into Harvard University in 1943—at age 16—where he majored in biology and worked in the Museum of Comparative Zoology. He also interned at the American Museum of Natural History (AMNH) in New York City in the Herpetology department, where he met Irene Shamu, his wife-to-be, who was working as secretary to Charles Bogert, the department chair. Rudy's association with the AMNH continued in the 1960s when he led a group of graduate students studying spadefoot toads at the AMNH's Southwestern Research Station in Portal,

Arizona. This inaugurated a distinguished history of research that continues today and that has involved investigators from across the country.

When Rudy turned 18 and became eligible for the military draft, he "couldn't stand the indecision" and enlisted voluntarily. Assigned to the Army Medical Corps, he "learned a lot of biology" and clinical skills that qualified him to oversee an Army lab and work at a hospital as a lab technician after he left the Army. He returned to Harvard in 1948 to finish his BA, and then did graduate work at Columbia University. John Moore—who later joined the UCR faculty—was his advisor and mentor. Rudy obtained his MA in1953 and PhD in 1954, with financial help from the GI Bill.

While at Columbia Rudy also worked at City College as a teaching assistant for Herman Spieth. When Spieth became the first Chair of Biology at the newly-opened UCR in 1954, Rudy followed. As in everything he did, Rudy taught at UCR with passion and élan. But one of his classes stood out —Functional Anatomy of the Vertebrates. Rudy led "Vert" for many years with such style that he became the stuff of legend. Vert students even formed a fan club, wearing badges that featured him in the elegant suit and tie he always wore to class. As Professor Harvey Lillywhite (University of Florida) recalls from his UCR undergraduate days, "Rudy's *modus operandi* as an educator was eclectic, and he was a superb mentor for anyone interested in a solid liberal arts education." Rudy's dedication to teaching was honored with UCR's Distinguished Teaching Award in 1978.

Rudy served UC in various capacities during his 40 years at UCR. He helped to establish the Philip L. Boyd Deep Canyon Desert Research Center, the inaugural UC Natural Reserve. He served as Chair of the College of Letters and Science (1961-1964); as faculty advisor to UC President Clark Kerr during the unrest of the 1960s; and as Biology Department Chair (1979-1982). He helped to establish UC-Mexus, a program to support US-Mexico academic collaborations, and served as acting Chair (1992-1993).

Rudy's research took him to many places in Latin America, including Cuba, the West Indies, Mexico, Ecuador, Chile, Argentina, and Paraguay. He studied the ecology and evolution of Caribbean lizards, and the physiological ecology of herps more generally. He elucidated how arid-environment amphibians save water by spreading wax on their skin (*Phyllomedusa*) or secreting water-retaining "cocoons" (*Scaphiopus*), and how the structure of their foot pads allows geckos to climb vertical surfaces via dry adhesion.

Rudy served his scientific field as editor for *Copeia*, and as chief editor of *Journal of Herpetology* for nearly a decade. He precipitated transformative changes to the *Journal* and to its parent Society for the Study of Amphibians and Reptiles, opening both to non-English-speaking scientists, particularly those in South America. He was awarded a Guggenheim Fellowship during 1967-68, and was elected a Fellow of the California Academy of Sciences.

Rudy's interests extended far beyond biology, to the liberal arts writ large. The small-college flavor of UCR in the early days made it easy to interact across academic fields, and he relished this opportunity. Lunchtime gatherings at the University Commons with faculty from diverse departments were a tradition that persisted throughout Rudy's time at UCR. As Harvey

Lillywhite recalled, "I remember when I was an undergraduate at UCR, the professor of a course I took in English literature told me how much he liked Dr. Ruibal for being "a fine person" and for being much, much broader than many other scientists that he knew."

Rudy's and Irene's rich social life extended well beyond the university. Students were often invited to dinner at their house (Irene was a talented cook), where they interacted with a diverse mix of other guests, such as Tim Hays of the *Press Enterprise*, Riverside's excellent newspaper. Rudy was also very artistic. As a young man in New York City he took "life" classes with nude models, and when he took up figure drawing again upon arriving at UCR he convinced the Riverside Art Museum to shed its practice of having models wear bathing suits. Upon retirement Rudy turned wholeheartedly to pottery and jewelry making.

To artistic talent must be added athleticism. At Harvard Rudy played soccer, and at UCR he often took a bit of time off during the day to play tennis, continuing this sport well into retirement.

Rudy loved children, delighting in showing them simple Cuban animal toys constructed of everyday materials that could be made to move in realistic and interesting ways—for example, roosters made of straw that could be moved as if they were fighting cocks.

Rodolfo Ruibal was "a class act" who led "a passionate, productive and interesting life" (Lillywhite 2016). In this long life he gave from his heart to UCR, to the UC system, and to his profession—and to his many students, colleagues and friends.

Mary V. Price Irwin W. Sherman Nickolas M. Waser David Reznick Carol Simon

#### **Literature Cited:**

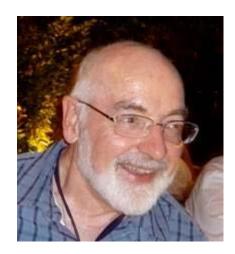
Lillywhite, Harvey. 2016. Herpetology loses a class act: Rodolfo Ruibal, 1927-2016. Herpetological Review 47(4):741-745

#### Links

Transcription of Oral History Interview with Rodolfo Ruibal: https://ucrhistory.ucr.edu/ruibal.htm

#### **IN MEMORIAM**

Siegfried Schaible Professor of Management, Emeritus Riverside 1940 — 2014



Professor Siegfried Schaible was born to Karl and Lina Schaible in Marburg, Germany during WWII. After high school graduation, he attended the University of Mainz where he met his future wife, Ingrid. They married in 1967. Siegfried studied mathematics and physics and finished two PhDs at the University of Cologne. In 1979 Siegfried took his wife and three kids and immigrated to Canada where he taught at the University of Alberta in Edmonton, Alberta. In 1987 he took a full-time tenured position at the Anderson Graduate School of Management at UC Riverside in California.

Professor Schaible served on many important committees for the Anderson Graduate School of Management. He was once Chair of the Faculty for the School and chaired important search committees that successfully recruited rookie assistant professors who eventually got tenured at UCR. Those include Yasushi Masuda (tenured and later moved to Keio University in Japan) and Mohsen ElHafsi (tenured and later promoted to full professor in School of Business).

Professor Schaible was one of the pioneers and world leaders of Generalized Convexity and Generalized Monotonicity and the creator of an international scientific association Working Group on Generalized Convexity (WGGC). Siegfried is dearly remembered by many members of WGGC, not only for his major contributions to the topics of generalized convexity and generalized

monotonicity, but also because of the special traits that made his personality so warm and unique. Siegfried attended all international symposia on generalized convexity, starting from the first one in Vancouver, Canada, back in 1980; During all these years, he was the main driving force of the group; he devoted most of his energy and his time to the benefit of the group. He always insisted on the necessity to avoid exclusions, by ensuring a good geographical distribution and promoting diversity in the topics studied.

He was a true scholar, thoughtful, wise and very respectful to his colleagues. Professor Schaible's research made a great impact in several fields starting with his early work on Fractional Programming and ending with his work on Generalized Convexity. Throughout his career, his work has generated over 6900 citations. Professor Schaible was one of the few, in the University of California, to be elected AAAS-Fellow of the American Association for the Advancement of Science, in 1998.

In his 20 years with the School of Business at UCR, Professor Schaible taught multiple courses in the area of Management, including graduate courses "Quantitative Methods in Management" and "Decision Making Under Uncertainty". In addition, he spent many years traveling and teaching at universities all over the world. He wrote for and edited many scientific journals and books in his field of expertise, Generalized Convexity. In his spare time Siegfried enjoyed reading theology, taking pictures, playing the violin and exploring the outdoors. Siegfried was a widower for 11 years. After his retirement from UCR in 2006, he moved to Taiwan to teach at Chung Yuan Christian University. He is survived by his siblings in Germany Dieter Schaible and Waltraut Kippenberger; his daughter and son-in-law Sue and Frank Suranyi of Camarillo, CA; his grandchildren Hannah, Joel, Elyse, Emme and Isabelle; his son and daughter-in-law John and Christy Schaible of Santa Ana, CA; his grandchildren Cody and Serena; and his daughter Rickie Schaible of Poway, CA.

This memorial was prepared by Alexander Barinov, Assistant Professor of Finance at the UCR School of Business, with information from the School of Business archives and Siegfried's colleagues at the School of Business, as well as information from the memorial webpage for Siegfried Schaible at the website of Working Group on Generalized Convexity (WGGC).



In Memoriam

Henry Snyder Professor of History UC Riverside 1929 – 2016

Henry L. Snyder, Emeritus Professor of History and former director of the Center for Bibliographical Studies, and Research at UC Riverside, <a href="http://cbsr.ucr.edu/">http://cbsr.ucr.edu/</a>, died in Kensington, California, on February 29, 2016.

A sixth generation Californian, Professor Snyder was born November 3, 1929, in Hayward. In high school, thanks to a free ticket to the San Francisco Opera, he discovered a lifelong passion, and in his youth, unable to afford a theater seat, he served as an usher. A frequent traveler as an adult, Snyder made it a point to see opera wherever he could, at venues both magnificent and mundane. Such was his passion that he organized opera companies where none existed, first in Baton Rouge and again in Riverside. Although he had command of several languages, he once quipped the only one he really needed to make himself universally understood was the Romance dialect "opera Italian."

He earned his B.A., M.A., and Ph.D. in history from UC Berkeley. After receiving his B.A. in 1951, he served for a decade as an officer in the California Army National Guard, commanding companies at Walnut Creek and Pittsburg and building the Guard's only full-strength rifle company in the Western United States. In 1961, he transferred to the Army Reserve, retiring from it in 1978 at the rank of lieutenant colonel. He was a member of the consulting faculty and taught at the U. S. Army Command and General Staff College at Fort Leavenworth, Kansas, for several years.

Genial and outgoing, he was a natural salesman, as he demonstrated as a newly minted Berkeley B.A. in his first job, in a department store, where he soon became the firm's youngest buyer. Decades later, he recalled being able to retail items that his colleagues

found impossible to move. He joined the faculty of the University of Kansas in 1963, rising to the rank of professor, then serving as Dean of Research Administration. In 1979, he moved to Louisiana State University at Baton Rouge to take up a position as Dean of the College of Letters and Sciences, and in 1986, happy for the chance to return to his home state, he came to UC Riverside to serve as the Dean of the College of Humanities, Arts, and Social Sciences. Although he stepped down as dean, he remained at Riverside until his retirement in 2009.

Over the course of a career spanning nearly five decades, Snyder published more than 30 scholarly articles in venues as far afield as The Journal of Modern History, The Library, and Opera Quarterly. His scholarly reputation was based on an edition, The Marlborough-Godolphin Correspondence, which Clarendon Press published in three volumes in 1975. To complete the mammoth task as quickly as possible, he sold the Duke of Marlborough on the idea he should be allowed to take the original letters from Blenheim Palace to his Oxford residence so that he could work on them whenever time permitted. Snyder also co-edited one book, The English Short-Title Catalogue: Past, Present, Future (AMS, 2003), and co-authored three books: The English Heritage (Forum, 1988), The Scottish World (Abrams, 1981), and Cataloging of the Hand Press: A Comparative and Analytical Study of Cataloging Rules and Formats Employed in Europe (Saur, 1994). He was active in the American Society for Eighteenth Century Studies, serving a term as its president, and he was a member of the board of directors of several scholarly organizations. He was a Visiting Lecturer at Bedford College, University of London, in 1965-1966, and a Fulbright Lecturer at the University of Hamburg, Germany, in 1974. He was awarded senior fellowships from both the American Council of Learned Societies and the National Endowment for the Humanities, although he declined the latter.

Impressive though these accomplishments were, Snyder's greatest achievements were in the digital humanities, a field he pioneered. In the late 1970s, a group of scholars and bibliographers from Britain and the United States were struggling to launch on online Eighteenth-Century Short-title Catalogue of British books, pamphlets and broadsides. They were thwarted by recurrent problems with organizing and financing the scheme, which began to seem over-ambitious. Then, in 1978, someone thought to solicit Snyder's participation. The interview for the position of co-director (with the British Library) conflicted in part with the Metropolitan Opera's latest production of Wagner's *Tannhäuser*, and decades later, Snyder still grumbled about having to miss the last act. At the time, he knew little of bibliography and nothing of computers; nevertheless, when he was offered the job, he accepted it. Thus "one of the most remarkable episodes in bibliographical showmanship had begun," observes celebrated bibliographer G. Thomas Tanselle, who worked closely with Snyder for years, in an essay collected in *The English* Short-Title Catalogue: Past, Present, Future. Snyder "sprang into action," drawing on "entrepreneurial skill, scholarly understanding, idealism linked with practicality, and what he himself called 'the conviction and fervor of an evangelist."

Snyder quickly mastered both bibliography and computing, keeping up with the latest advances in each area until he retired, drawing on knowledge of them and his formidable administrative and salesmanship skills to move the ESTC project forward.

Few could resist his appeals for help with it. Towards the end, even his love of opera was put to good use; he would break the ice with people by launching into his favorite arias. To organize North American efforts, he created ESTC/NA, and he established a base for cataloguing, the Center for Bibliographical Studies and Research, at UC Riverside, which co-owns the catalogue with the British Library. Grant application after grant application poured from Snyder's computers over the years, and he successfully raised more than \$11 million for the project. Over \$6 million came from the National Endowment for the Humanities alone, a record few humanists could match. Snyder secured the balance from the Andrew W Mellon Foundation, the Rockefeller Foundation, the H. W. Wilson Foundation, the Ahmanson Foundation, the Gladys Keieble Delmas Foundation, the Carl and Lily Pforzheimer Foundation, the Pew Charitable Trust, and the U.S. Department of Education. This formidable war-chest funded canvassing for relevant items in some two thousand libraries around the world. Snyder always led from the front, and in the days before digital photography, photocopy machines were an essential tool for recording title pages. Unfortunately, they were also awkward to move around, and there are legends of Snyder helping manhandle the machines up the narrow staircases of Oxford college libraries, one of the richest sources of material for the database.

Once the Eighteenth-Century Short Title Catalogue was completed, the indefatigable Snyder expanded his focus to include the earlier period but kept the initials, ESTC, rechristening the database the English Short Title Catalogue. By Snyder's retirement in 2009, the ESTC contained bibliographical information on nearly a half-million items, representing practically everything printed in English or in Britain and its possessions before 1801. Many institutions, scholars, and librarians were involved in completing this magisterial project, but it was widely acknowledged as the fruit of Snyder's labor.

Snyder's experience with the ESTC made him an invaluable colleague on other large database projects. He played a significant role in helping launch and develop the continental analog of the ESTC, The Heritage of the Printed Book Database, managed by the Consortium of European Research Libraries (CERL). In 1990, when the California Newspaper Project, now the California Digital Newspaper Collection, struggled to find a home, Snyder stepped in, hosting it at the Center for Bibliographic Studies and Research. It too was having trouble securing financial support until Snyder overcame the state legislature's reservations by bringing into a committee hearing a crumbling stack of the only known copies of some newspapers, his case made for him when a volume inadvertently fell over and disintegrated in the middle of the proceedings. Convinced of the project's value, the legislature approved the necessary funding, enabling Snyder to preserve some 9000 newspapers, as well as to begin digitizing them. Still not content to rest on his laurels, in 2000 Snyder organized another bibliographic initiative, The Catálogo Colectivo de Impresos Latinoamericanos hasta 1851 [CCILA], an union catalogue of Spanish and Portuguese language publications printed in North and South America, the Caribbean, and the Philippines between 1539 and 1850.

Snyder was a member of the Grolier Club, and he also belonged to the International Federation of Library Associations and Institutions (IFLA), chairing its Rare Books and Manuscripts Section for four years and working on its Newspaper Section. After his

retirement, he was a member of, then Librarian for, the Board of Directors of the Book Club of California, and he was on the Board of Directors of the California Genealogical Society, serving as chair of its Library Committee and as Librarian.

Scholars and others interested in history have long appreciated Snyder's tireless efforts in the digital humanities. National recognition came in 2007, when President George W. Bush awarded him one of ten National Humanities Medals presented that year for his "visionary leadership in bridging the worlds of scholarship and technology" by opening "new frontiers in cataloging and preserving ideas and documents for future generations." Snyder was only the sixth UC faculty member and the first UC Riverside faculty member to be so honored. International recognition came in 2009, when Queen Elizabeth II made Snyder an honorary officer of the Order of the British Empire in 2009, a rare honor normally reserved for American glitterati in business and politics.

Professor Snyder is survived by his three sons and seven grandchildren.

This memorial was prepared by Carole-Anne Tyler, Associate Professor of English, adapted from a version prepared by Tom Cogswell, Professor of History, which drew on a first draft by Tyler that was based on information from UCR colleagues in History and other departments; the National Humanities Medal page on the National Endowment for the Humanities web site, <a href="https://www.neh.gov/about/awards/national-humanities-medals/henry-leonard-snyder">https://www.neh.gov/about/awards/national-humanities-medals/henry-leonard-snyder</a>; and the San Francisco Chronicle.



In Memoriam

Stanley Stewart Professor of English UC Riverside 1931-2016

Stanley N Stewart, Distinguished Professor of English at UC Riverside, died after a very brief illness on February 9, 2016. He was almost 85 years old, and though he occasionally mentioned retiring once he turned 80, he so loved research and teaching that he invariably deferred that decision for another year.

Professor Stewart was born in Minneapolis on June 5, 1931, but grew up in Los Angeles. He joined the Navy, then pursued his B.A., M.A., and Ph.D. in English from UCLA and was a lifelong fan of their football team. He was an athlete himself, enjoying skiing, horseback riding, and tennis, playing with and against many campus colleagues, and he also sang in his church's choir. He came to UC Riverside in 1961, some half a dozen years after it had transmogrified from citrus experiment station to a small, liberal arts college and just two years after UC President Clark Kerr had designated it a "general university campus" in anticipation of the tidal wave of baby boomers he knew would flood the system. Serving UC Riverside for nearly 55 years, Professor Stewart saw it grow many times larger and transition from what was once dubbed the "Swarthmore of the West" to a full-fledged UC with robust graduate programs.

Professor Stewart was an accomplished scholar, with an interest in literary history and form and its relation to intellectual history, as well as the value—and pleasure--of careful close-reading. His expertise was in 16<sup>th</sup> and 17<sup>th</sup> century British literature, especially the work of the 17th-century poets and clerics Thomas Traherne and George Herbert, and their coevals, poet and polemicist John Milton, and poet and politician Andrew Marvell, and the poet and dramatist of the preceding generation that included Shakespeare, Ben Jonson. For many years, he was coeditor, with Robert Evans, of *The Ben Jonson Journal*, and he also served on the editorial boards of *John Donne Journal* and *Cithara: Essays in the Judaeo-Christian Tradition*. He belonged to numerous

professional organizations, among them the Modern Language Association, the Milton Society, the John Donne Society, the Renaissance Society of Southern California, the Renaissance Society of America, and the Association of Literary Scholars and Writers, serving the latter as vice-president, then president.

His publications are numerous: over nine single-author or co-authored scholarly books and dozens of articles. His first single author monograph, *The Enclosed Garden: The Tradition and the Image in 17th Century Poetry*, appeared in 1966 as a defining study of early modern visual and poetic images of the garden and argued that the meanings of garden poetry, such as Marvell's difficult "The Garden," are enriched when the work is read closely in its literary, aesthetic, and intellectual historical context, attending especially to the biblical Song of Songs as a source text. His last, *Shakespeare and Philosophy*, appeared in 2010 and was inspired by Professor Stewart's interest in the latter part of his career in the ordinary language philosophy of Ludwig Wittgenstein, which he saw as a corrective to the ideas of some of the new schools of literary theory and criticism of the post-war period that he thought moved too far afield from a focus on literature as literature. In that volume, he also addressed the role of Shakespeare in the thinking of philosophers besides Wittgenstein, including Hume, Kant, Kierkegaard, and Nietzsche.

His other book publications include a study of the criticism of Renaissance literature also influenced by his interest in Wittgenstein, *Renaissance Talk: Ordinary Language and the Mystique of Critical Problems;* analyses of the poetry of Traherne and of Herbert, *The Expanded Voice: The Art of Thomas Traherne* and *George Herbert*; a composition and creative writing text, *The Unity of Prose: From Description to Allegory*; a novel, *The King James Version*; and three co-authored volumes, *Nietzsche's Case: Philosophy as/and Literature, Jonson's Spenser: Evidence and Historical Criticism*, and *Caped Crusaders 101: Composition Through Comic Books.* He is in addition the co-editor of *The Cambridge Companion to Ben Jonson.* His scholarly achievements were recognized with a Guggenheim Fellowship and a Mellon Grant, as and he was chosen as the UC Riverside Faculty Research Lecturer in 2000. In 2009, the *Ben Jonson Journal* honored his contributions to Jonson scholarship and teaching with a festschrift issue that included fourteen essays inspired by his work over the years.

Students found Professor Stewart inspiring no matter what he taught, from the required lower-level survey of British literature to graduate classes on Shakespeare. He brought his deep knowledge of his field to his classes, as his undergraduate and graduate students regularly pointed out on evaluations, though they also noted his passion and warmth. A student in a Shakespeare course described him as a "walking Shakespearean Encyclopedia," while another averred, "He made me feel like an Elizabethan." In one of his final course evaluations, a student summed up his teaching style, writing, "Dr. Stewart embodies what a teacher should be: Informative, kind, receptive, encouraging, intellectually challenging, dignified, confident, empathetic, responsible, and witty. Not all teachers on this campus can claim all these at once." Not surprisingly, he was selected for the campus Distinguished Teaching Award. In keeping with his commitment to teaching, his first concern when he was hospitalized at the start of

winter quarter 2016 was finding someone to take over his courses for the rest of the term.

He is survived by his wife of 55 years, Barbara; their sons Brad and Duncan and Brad's wife Brenda; his six grandchildren and five great-grandchildren; and his brother and sister.

This memorial was prepared by Carole-Anne Tyler, Associate Professor of English, with information from colleagues in the UCR English Department; *The Ben Jonson Journal: Talking Renaissance Texts: Essays on the Humanist Tradition in Honor of Stanley Stewart*, 16:1-2, May 2009, viii-x, available online at <a href="https://www.euppublishing.com/toc/bjj/16/1-2">https://www.euppublishing.com/toc/bjj/16/1-2</a>; and Stan Stewart's "The President's Column," *ALSC Newsletter*, 8:3-4, Fall 2002-Winter 2003, 2.

#### School of Medicine FEC Annual Report to the Division February 25, 2020

#### To be received and placed on File

The School of Medicine FEC conducted several meetings in person or via email during the 2018-2019 academic year, including meetings dates of October 25 2018, November 29, 2018, January 24, February 28, April 25, May 23, June 27. Additional business was conducted via email throughout the year. The following items were considered (some on multiple occasions in person and via emails):

#### **General SOM FEC business**

- 1) Reaffirmed conflict of interest statement of FEC and forwarded to Senate.
- 2) Reaffirmed the FEC charge document and placed on file with the SOM.
- 3) FEC approved membership of and expanded membership to the Volunteer Clinical Appointments and Advancements Committee.
- 4) FEC proposed new directives for uniform evaluation criteria for clinical faculty and voted on membership of the Clinical Appointments and Advancements Committee.
- 5) FEC discussed and approved membership of the Medical School Admissions Committee.
- 6) The FEC discussed the financial status of the SOM with VC Bomotti and SOM leadership and crafted a document that was included in campus "Budget Model".
- 7) The FEC approved nominations to the Graduate Advisory Committee
- 8) The FEC provided endorsements for three proposed Endowed Chairs at the SOM.
- The FEC discussed a proposal of a "SOM Diversity Survey" that was passed on to the Office of Academic Affairs.

#### **Education and curriculum**

10) Reiterated the revised procedures for students' appeal process after dismissal from the Progress and Promotions Committee (PPC) that got inserted in the students' handbook.

#### **Division requests**

- 11) Reviews and commented on "Summary White Paper on RUSD STEM High School on the Campus of the University of California, Riverside"
- 12) Reviewed and commented on the "Proposed Revised Policy: Proposed Revised Presidential Policy on Sexual Violence and Sexual Harassment"
- 13) Reviewed and commented on the "Proposed Revised Policy: Proposed Revisions to Presidential Policy BFB-RMP-7 Protection of Administrative Records Containing Personally Identifiable Information"
- 14) Reviewed the "Provosts Task Force for Hybrid and Online Education: SOM already have advanced in Online Teaching Courses".
- 15) Reviewed and brought up for discussion at the SOM Biomedical sciences faculty the memo related to the "Request for Extension of the Exception 1:6 Limitation on Appointment of Professor Clinical X Series".

- 16) Reviewed the "eFile Plus Issues & Concerns".
- 17) Reviewed and commented on the "Proposed Model Policy for the Award Wining of Posthumous Undergraduate Degrees".
- 18) Reviewed and commented on the "Executive Committee of the School of Public Policy"
- 19) Reviewed the "Limited Review of Interim policy on Responding to Immigration Enforcement Involving Patients on UC Health Facilities".

#### **Degrees awarded**

39 MD and 4 Ph.D.

#### **SOM FEC composition 2018/2019**

Maurizio Pellecchia, Chair
Declan McCole, Vice Chair
Gerald Maguire
Ramdas Pai
Paul Lyons
Christian Lytle
Emma Wilson
Seema K. Tiwari-Woodruff
Andrew Subica
Kenneth Ballou (Non-senate clinical)
Maegen Dupper (Non-senate clinical)

## THE GRADUATE DIVISION AND EXECUTIVE COMMITTEES OF THE COLLEGES REPORT TO THE DIVISION FEBRUARY 25, 2020

#### To be received and placed on file:

#### Reports of Degrees Awarded - Summer 2019

Bourns College of Engineering  Bachelor of Science:	Not Received
College of Humanities, Arts and Social Sciences	
Bachelor of Arts:	
Bachelor of Science:	31
College of Natural and Agricultural Sciences	
Bachelor of Arts:	10
Bachelor of Science:	139
School of Business	
Bachelor of Science:	73
Depart of Department Assessed to Fall 2010	
Report of Degrees Awarded – Fall 2019	
Graduate Division	
Master of Arts:	
Master of Business Administration:	
Master of Education:	
Master of Finance:	
Master of Fine Arts:	
Master of Professional Accountancy:	
Master of Science:	82
Doctor of Philosophy:	68

The names of the candidates are filed in the official records of the Office of the Registrar.

K. Esterling, Secretary-Parliamentarian Riverside Division of the Academic Senate

		Cross-listed			Course
Action:	Course:	Course(s):	Title:	Units:	Renumbered:
Undergraduate					
Change	AHS 170		BAROQUE ARCHITECTURE	4 Units	
Change	ANTH 125		KINSHIP AND FAMILY ORGANIZATION	4 Units	
Change	ART 070 (E-Z)		DIGITAL IMAGING SOFTWARE FOR THE VISUAL ARTS	4 Units	
Change	ART 071 (E-Z)		PHOTOGRAPHIC MATERIALS AND PROCESSES	4 Units	
Change	BCH 100		ELEMENTARY BIOCHEMISTRY	4 Units	
Change	BCH 180 (E-Z)		ADVANCED METHODS IN BIOCHEMISTRY	2 Units	
Change	BIOL 034		HUMAN HEREDITY AND EVOLUTION	4 Units	
Change	BIOL 161A		FUNCTIONAL ANATOMY OF THE VERTEBRATES	5 Units	
Change	BIOL 161B		FUNCTIONAL ANATOMY OF THE VERTEBRATES	5 Units	
Change	BIOL 163		VERTEBRATE NATURAL HISTORY	5 Units	
Change	BIOL 171L		HUMAN ANATOMY AND PHYSIOLOGY LABORATORY	1 Unit	
Change	BIOL 194		INDEPENDENT READING	1 to 4 Units	
Change	BPSC 109	CBNS 109	EPIGENETICS	4 Units	
Change	BUS 105		PRODUCTION AND OPERATIONS MANAGEMENT	4 Units	
Change	BUS 145		DESIGNING AND LEADING TEAMS	4 Units	
Change	CHEM 001A		GENERAL CHEMISTRY	4 Units	
Change	CHN 030	AST 030 , CPLT 030	INTRODUCTION TO CHINESE CIVILIZATION	5 Units	
Change	CHN 040	CPLT 041, AST 040	MASTERWORKS OF CHINESE LITERATURE	4 Units	
Change	CHN 046	CPLT 042 , AST 046	RESPONSES TO POLITICAL REPRESSION IN MODERN CHINESE LITERATURE AND FILM	4 Units	
Change	CHN 046W		RESPONSES TO POLITICAL REPRESSION IN MODERN CHINESE LITERATURE AND FILM	4 Units	
Change	CHN 048	CPLT 048, AST 048	CHINESE CINEMA	4 Units	
Change	CHN 107	AST 107 , RLST 107	TAOIST TRADITIONS	4 Units	
Change	CHN 132	CLA 132, CPAC 132, AST 132	MEDICAL TRADITIONS IN CHINA AND GREECE	4 Units	
Change	CHN 134		MODERN CHINESE LITERATURE IN TRANSLATION	4 Units	
Change	CHN 141	POSC 140, CPAC 141, CLA 141, AST 145	MILITARISM AND HEGEMONY IN THE ANCIENT WORLD	4 Units	
Change	CHN 143	CLA 143, RLST 143, CPAC 143	DIVINATION AND PREDICTION IN CHINA AND GREECE	4 Units	
Change	CHN 148	AST 148	CHINESE POETRY AND POETICS IN TRANSLATION	4 Units	
Change	CPLT 193		CAPSTONE RESEARCH SEMINAR	4 Units	
Change	CRWT 155		THE GRAPHIC NOVEL	4 Units	
Change	CS 183		UNIX SYSTEM ADMINISTRATION	4 Units	
Change	DNCE 019		INTRODUCTION TO DANCE STUDIES	4 Units	
Change	ECON 146	URST 146	URBAN ECONOMICS	4 Units	URST 146
Change	ECON 153	BUS 153	LABOR ECONOMICS	4 Units	
Change	ECON 164		BEHAVIORAL ECONOMICS	4 Units	
Change	ECON 186		POLICY EVALUATION IN DEVELOPMENT ECONOMICS	4 Units	
Change	EDUC 005		INTRODUCTION TO EDUCATION STUDIES	4 Units	
Change	EDUC 010		PRINCIPALS OF LEARNING STRATEGIES	4 Units	
Change	EDUC 032C		CHILDREN WITH CHALLENGING BEHAVIORS	4 Units	
Change	EDUC 105		INTRODUCTION TO SCIENCE PEDAGOGY	4 Units	
Change	EDUC 171		READING AND LANGUAGE DEVELOPMENT	4 Units	
Change Change	EDUC 172 EDUC 177		READING AND LANGUAGE DEVELOPMENT READING AND WRITING IN THE CONTENT AREAS	4 Units 4 Units	
Change Change	EDUC 177 EDUC 178		READING AND WRITING IN THE CONTENT AREAS READING AND WRITING IN THE CONTENT AREAS	4 Units 4 Units	
Change	EDUC 178 EDUC 179B		LANGUAGE DEVELOPMENT IN CONTENT AREAS: ESL		
Ü			INSTRUCTION EMPHASIS		
Change	EE 128		SENSING AND ACTUATION FOR EMBEDDED SYSTEMS	4 Units	

		Cross-listed			Course
Action:	Course:	Course(s):	<u>Title:</u>	Units:	Renumbered:
Change	ENSC 001		INTRODUCTION TO ENVIRONMENTAL SCIENCE:	4 Units	
			NATURAL RESOURCES		
Change	ENSC 002		INTRODUCTION TO ENVIRONMENTAL SCIENCE:	4 Units	
-			ENVIRONMENTAL QUALITY		
Change	ENSC 003		CONTEMPORARY ISSUES IN THE ENVIRONMENTAL	4 Units	
8			SCIENCES		
Change	ENSC 102		INTRODUCTORY ATMOSPHERIC SCIENCE	4 Units	
Change	ENSC 110		ENVIRONMENTAL STATISTICS	4 Units	
Change	ENSC 120	NEM 120	SOIL ECOLOGY	4 Units	
Change	ENSC 120 ENSC 163	NEWI 120	HYDROLOGY	4 Units	
			SPATIAL ANALYSIS AND REMOTE SENSING FOR	4 Units	
Change	ENSC 175			4 Units	
CI.	DESCRIPTION AND ADDRESS OF THE PARTY OF THE		ENVIRONMENTAL SCIENCES	5 XX **	
Change	ETST 162		LEARNING NATIVE AMERICAN LANGUAGES	5 Units	
Change	GEO 007		MINERALS AND HUMAN HEALTH	4 Units	
Change	GEO 111		NUMERICAL SKILLS IN GEOSCIENCE	4 Units	
Change	GRK 001		INTRODUCTION TO CLASSICAL GREEK	4 Units	
Change	GRK 002		INTRODUCTION TO CLASSICAL GREEK	4 Units	
Change	GRK 003		INTRODUCTION TO CLASSICAL GREEK	4 Units	
Change	HIST 015		WORLD HISTORY: 1500 TO 1900	4 Units	
Change	HIST 015H		HONORS WORLD HISTORY: 1500 TO 1900	4 Units	
Change	HIST 020		WORLD HISTORY: THE LONG TWENTIETH CENTURY	4 Units	
Ü					
Change	HIST 020H		HONORS WORLD HISTORY: THE LONG TWENTIETH CENTURY	4 Units	
Change	HIST 020W		WORLD HISTORY: THE LONG TWENTIETH CENTURY	4 Units	
Change	11151 020 11		WORLD INSTORT. THE BOTTO I WENTERIN CENTERI	4 Omts	
Change	LATN 101 (E-Z)		ADVANCED LATIN READING AND GRAMMAR	4 Units	
	LATN 135		THE ROMAN NOVEL	4 Units	
Change				1 to 5 Units	
Change	LATN 190		SPECIAL STUDIES		
Change	MCS 010		CULTURAL STUDIES: HISTORICAL AND CONTEMPORARY PERSPECTIVES	4 Units	
Change	MUS 030A		HARMONY	4 Units	
Change	MUS 030C		HARMONY	4 Units	
Change	MUS 031A		MUSIC THEORY AND MUSICIANSHIP I	4 Units	
Change	MUS 031C		MUSIC THEORY AND MUSICIANSHIP I	4 Units	
-	PHIL 165			4 Units	
Change			PHILOSOPHY OF LAW		
Change	POSC 007	CCCT 142	INTRODUCTION TO POLITICAL THEORY	5 Units	
Change	SOC 140	GSST 143	THE SOCIOLOGY OF WOMEN	4 Units	
Change	SOC 146		GENDER IN GLOBAL PERSPECTIVE	4 Units	
Change	SOC 198I		INDIVIDUAL INTERNSHIP IN SOCIOLOGY	1 to 12 Units	
Change	SPN 123E		MEXICAN LITERARY AND CULTURAL STUDIES	4 Units	
Change	SPN 123F		MEXICAN LITERARY AND CULTURAL STUDIES	4 Units	
Change	SPN 123G		MEXICAN LITERARY AND CULTURAL STUDIES	4 Units	
Change	STAT 100A		INTRODUCTION TO STATISTICS	5 Units	
Change	STAT 100B		INTRODUCTION TO STATISTICS	5 Units	
Discontinue	BPSC 158		SUBTROPICAL AND TROPICAL HORTICULTURE	4 Units	
Discontinue	BPSC 170	ANTH 170	ETHNOBOTANY	4 Units	
Discontinue	BPSC 185		MOLECULAR EVOLUTION	4 Units	
	ENSC 001H		HONORS INTRODUCTION TO ENVIRONMENTAL	4 Units	
Discontinue	21.00 00111		SCIENCE: NATURAL RESOURCES	· Cimo	
Discontinue	ENSC 002H		HONORS INTRODUCTION TO ENVIRONMENTAL	4 Units	
Discontinuo	LINGC 00211			4 Omts	
Discontinue	ENICC 002H		SCIENCE: ENVIRONMENTAL QUALITY	4 11-4-	
D: //	ENSC 003H		HONORS CONTEMPORARY ISSUES IN THE	4 Units	
Discontinue	T77000 4 4 4		ENVIRONMENTAL SCIENCES		
Discontinue	ENSC 141	MCBL 141	PUBLIC HEALTH MICROBIOLOGY	4 Units	
	ENSC 153		ECOLOGICAL ECONOMICS AND ENVIRONMENTAL	4 Units	
Discontinue			VALUATION		
Discontinue	LATN 004		INTERMEDIATE LATIN	4 Units	
New	ANTH 050		HUMAN EVOLUTION	4 Units	
	ANTH 129A	CPAC 129A	INTRODUCTION TO MAYA HIEROGLYPHS	4 Units	
		,			
New		LNST 129A			
	ANTH 129B		THE LINGUISTICS OF ANCIENT MAYA WRITING	4 Units	
New		LNST 129B			
		12,15			

		Cross-listed			Course
Action:	Course:	Course(s):	Title:	Units:	Renumbered:
	ART 151		INTERMEDIATE VIDEO AND TIME-BASED	4 Units	
New	ADT 152		EXPERIMENTATION	4 11-:	
New	ART 152		ADVANCED VIDEO AND TIME-BASED EXPERIMENTATION	4 Units	
New	BCH 100H		HONORS ELEMENTARY BIOCHEMISTRY	4 Units	
New	BUS 142		BANKS AND RISKS OF FINANCIAL INSTITUTIONS	4 Units	
New	BUS 177		LABOR RELATIONS	4 Units	
New	CHFY 004		EDUCATIONAL RESEARCH	4 Units	
New	CS 142		ALGORITHM ENGINEERING	4 Units	
	CS 178A		PROJECT SEQUENCE IN COMPUTER SCIENCE AND	4 Units	
New			ENGINEERING		
N	CS 178B		PROJECT SEQUENCE IN COMPUTER SCIENCE AND	4 Units	
New New	EDUC 010H		ENGINEERING	4 Units	
New	EDUC 010H EDUC 154		HONORS PRINCIPALS OF LEARNING STRATEGIES EDUCATIONAL LEADERSHIP IN A DIVERSE SOCIETY	4 Units	
New	LDCC 134		EDUCATIONAL ELADERSHIF IN A DIVERSE SOCIETY	4 Omts	
New	ENGL 141M		LITERATURE AND RELATED FIELDS	4 Units	
New	ENTM 108		BIOLOGY OF SOCIAL INSECTS	4 Units	
New	ETST 121		CALIFORNIA NATIVE CULTURES	4 Units	
	GEO 013		OUR PLANETARY NEIGHBORS: THE SOLAR SYSTEM	4 Units	
New			AND BEYOND		
New	GRK 010		CLASSICAL GREEK: AN INTENSIVE COURSE	14 Units	
New	MCS 007		DIGITAL JOURNALISM AND SOCIETY	4 Units	
N	MCS 011		DRUG MARKETS AS CONFORMITY AND RESISTANCE	4 Units	
New New	MCS 012		GANGS: A CRITICAL ANALYSIS	4 Units	
New	MCS 116		ON NETWORKS: DIGITAL CULTURE, MEDIA,	4 Units	
New	WES 110		TECHNOLOGY	4 Cints	
	MCS 117		POSTHUMAN BODIES IN SCIENCE, MEDIA, AND	4 Units	
New			CULTURE		
New	MCS 119A		TOPICS IN MEMORY AND RESISTANCE I	4 Units	
New	MCS 119B		TOPICS IN MEMORY AND RESISTANCE II	4 Units	
	MCS 158		AFROFUTURISM AND THE POLITICS OF THE BLACK	4 Units	
New	3.600.150		SUPERHERO	4 77 1	
New	MCS 159		RACE, SPACE, AND IDENTITY	4 Units	
New	MHHS 001		INTRODUCTION TO MEDICAL AND HEALTH HUMANITIES	4 Units	
New	MHHS 191		SEMINAR IN MEDICAL AND HEALTH HUMANITIES	4 Units	
1.011	MUS 157		TOPICS INTERDISCIPLINARY APPROACHES TO	4 Units	
New			COMPOSITION		
New	PBPL 172		ENVIRONMENTAL POLICY	4 Units	
New	PHIL 165H		HONORS PHILOSOPHY OF LAW	4 Units	
	PHYS 050		INTRODUCTION TO APPLIED DATA SCIENCE: A	4 Units	
New	D000000000		MULTI-DISCIPLINARY APPROACH		
New	POSC 007W		INTRODUCTION TO POLITICAL THEORY WOMEN AND THE AMERICAN POLITICAL PROCESS	5 Units	
New	POSC 141		WOMEN AND THE AMERICAN POLITICAL PROCESS	4 Units	
New	SPN 197		RESEARCH FOR UNDERGRADUATES	1 to 4 Units	
New	TFDP 117		DIRECTING FOR THE SCREEN	4 Units	
New	TFDP 130A		PRODUCING SHORT EPISODIC CONTENT A	4 Units	
New	TFDP 130B		PRODUCING SHORT EPISODIC CONTENT B	4 Units	
	CRWT 048		CRAFT OF WRITING: SURVEY IN CONTEMPORARY	4 Units	
Restore			NONFICTION		
_	CRWT 048S		CRAFT OF WRITING: SURVEY IN CONTEMPORARY	5 Units	
Restore	DIOI 171 A		NONFICTION	4.11.5	DIOI 171
Split Split	BIOL 171A BIOL 171B		HUMAN PHYSIOLOGY HUMAN PHYSIOLOGY	4 Units 4 Units	BIOL 171 BIOL 171
Graduate Course			HOWARI III I SIOLOO I	- Omts	DIOL 1/1
Change	CS 206		ADVANCED SOFTWARE TESTING AND ANALYSIS	4 Units	
Change	CS 246		SOFTWARE VERIFICATION	4 Units	
Change	CWPA 200		ADVANCED PLAY ANALYSIS	4 Units	
	EDUC 236A		BEHAVIOR ANALYIC SKILLS DEVELOPMENT: LEVEL	4 Units	
Change			1		
	EDUC 236B		BEHAVIOR ANALYIC SKILLS DEVELOPMENT: LEVEL	4 Units	
Change			2		

		Cross-listed			Course
Action:	Course:	Course(s):	Title:	Units:	Renumbered:
	EDUC 236C		BEHAVIOR ANALYIC SKILLS DEVELOPMENT: LEVEL	4 Units	
Change			3		
6	EDUC 236D		BEHAVIOR ANALYIC SKILLS DEVELOPMENT: LEVEL	4 Units	
Change			4		
6	GEO 249		TECTONIC GEOMORPHOLOGY AND QUATERNARY	4 Units	
Change			FIELD TECHNIQUES		
Change	MCBL 226		MICROBIOMES	4 Units	
Change	MGT 200		ORGANIZATIONAL BEHAVIOR AND THEORY	4 Units	
Change	MGT 201		QUANTITATIVE ANALYSIS	4 Units	
Change	MGT 203		ECONOMICS FOR MANAGEMENT	4 Units	
Change	MGT 205		INFORMATION SYSTEMS	4 Units	
· ·	MGT 207		OPERATIONS MANAGEMENT FOR COMPETITIVE	4 Units	
Change			ADVANTAGE		
Change	MGT 209		MARKETING MANAGEMENT	4 Units	
Change	MGT 211		FINANCIAL ACCOUNTING	4 Units	
Change	MGT 235		STRATEGIC MANAGEMENT	4 Units	
-	PSYC 211		INTRODUCTION TO QUANTITATIVE METHODS IN	4 Units	
Change			PSYCHOLOGY		
	PSYC 212		MULTIPLE REGRESSION AND CORRELATION	4 Units	
Change			ANALYSIS		
Discontinue	ENSC 207		SURFACE WATER QUALITY MODELING	4 Units	
Discontinue	PHIL 265		PHILOSOPHY OF LAW	4 Units	
Discontinue	PHYS 253E		HEAVY-FERMION COMPOUNDS	3 Units	
Discontinue	PHYS 253K		CURRENT THEORETICAL TOPICS	3 Units	
Discontinue	PHYS 253M		THEORETICAL TOPICS: CONDENSED MATTER	3 Units	
Discontinue	PHYS 253N		ION-SURFACE INTERACTIONS	3 Units	
Discontinue	PHYS 253Q		SPACE AND ASTROPHYSICS	3 Units	
New	BPHY 250		ADVANCED TOPICS IN BIOPHYSICS	2 Units	
New	CS 250		SOFTWARE SECURITY	4 Units	
New	ENTM 257		CIBER SEMINAR	2 Units	
	GEO 266		A PRACTICAL INTRODUCTION TO EARTH SYSTEM	4 Units	
New			MODELING AND DYNAMICS		
New	ME 260		CONTINUUM MECHANICS	4 Units	
New	PHYS 237		EXPERIMENTAL QUANTUM COMPUTING	4 Units	
Extension Cours	es:				
Instructor	EDUC X83.01		Family Child Care Coordinator, Marisela Romero, M.A.		
			Health, Nutrition and Safety in Early Childhood, Marisela		
Instructor	EDUC X87.01		Romero, M.A.		

#### COMMITTEE ON COURSES REPORT TO THE RIVERSIDE DIVISION FEBRUARY 25, 2020

To be received and placed on file:

The Committee on Courses has approved requests to allow the following instructors to teach upper division courses as indicated:

INSTRUCTOR	DEPARTMENT/SCHOOL	LIMITS OF AUTHORIZATION
Kim, R.	Business	MGT 232 W'20
Rahman, MD	Computer Science	CS 100 W'20
Sadiqbatcha, S.	Computer Science	EE/CS 120A W'20
Zarook, S.	English	ENGL 103 W'20
El-Yacoubi, H.	Gender & Sexuality Studies	GSST 162 W'20
Baugh, C.	Psychology	PSYC 163 W'20

#### COMMITTEE ON COURSES REPORT TO THE RIVERSIDE DIVISION FEBRUARY 25, 2020

#### To be received and placed on file:

The Committee on Courses has approved the following course proposals for deletion, which have been listed in the General Catalog, but for at least four years, have not been offered, been offered with zero enrollment, or have been offered but canceled for deletion with the concurrence of the departments involved.

This following lists courses that were deleted and identified in the 2019-2020 Academic Year as part of the courses not offered for four or more year's process.

BPSC 158	ENSC 001H
BPSC 170	ENSC 002H
BPSC 185	ENSC 003H
	ENSC 141
	ENSC 207

Courses scheduled to be approved for deletion:

Conises solie	Juieu to be appio	veu ioi delellori.	
BPSC 210	ETST 125	RLST 024	RLST 212
	ETST 142	RLST 107	RLST 220
	ETST 143b	RLST 112	RLST 222
	ETST 176	RLST 128(E-Z)	RLST 227
	ETST 178	RLST 128È	RLST 228
	ETST 193	RLST 128F	RLST 229
		RLST 132	RLST 234
		RLST 136	RLST 235
		RLST 138	RLST 236
		RLST 139	RLST 238
		RLST 145	RLST 239
		RLST 157	RLST 246
		RLST 158	RLST 249
		RLST 175	RLST 250
		RLST 178	RLST 271
		RLST 210	

#### COMMITTEE ON UNIVERSITY EXTENSION REPORT TO THE RIVERSIDE DIVISION FEBRUARY 25, 2020

DEPT	COURSE	TITLE	INSTRUCTOR FIRST NAME	INSTRUCTOR LAST NAME	INSTRUCTOR DEGREE	TYPE OF APPROVAL	APPROVED
2211	New	Professional Certificate in Foundations of Interior Design		2011011111112	DEGILLE	X	01/22/20
	Revision	Supplementary Authorization in Introductory Mathematics				X	01/22/20
EDUC	X83.01	Family Child Care Coordinator	Marisela	Romero	Master	I*	01/29/20
EDUC	X87.01	Health, Nutrition and Safety in Early Childhood	Marisela	Romero	Master	I*	01/29/20
EDUC	X328	Developing Leadership Skills With Gifted Students	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X328.11	Gifted Students at Risk	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X328.28	Teaching Creatively Gifted Students	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X328.32	Best Practices for Gifted English Learners	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X329.01	Differentiating Instruction Using Prompts to Increase Higher-Level Thinking Skills	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X329.60	Language-Based Learning Differences: Helping Students Who Struggle with Reading and	l Penelope	Joven	M.A.	I	01/22/20
EDUC	X335	Asian Religions in America: Hinduism, Buddhism and Sikhism	Margaret	Hill	Ph.D.	I*	01/22/20
EDUC	X342	Classroom Management Strategies for Teachers: K-6	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X374.1	Riverside County Parent Engagement Leadership Certification Program, Level 1: Leaders	sl Michael	Roe	Ed.D	I*	01/22/20
EDUC	X374.2	Riverside County Parent Engagement Leadership Certification Program, Level 2: Connec	t Michael	Roe	Ed.D	I*	01/22/20
EDUC	X401.A	Digital Storytelling Basics, Part A	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X401.B	Digital Storytelling Basics, Part B	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X402.A	Cinematic Digital Storytelling: Screen Language and Production (A)	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X402.B	Cinematic Digital Storytelling: Screen Language and Production (B)	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X403	Applied Digital Storytelling: Creating a Short Movie	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X404.A	Integrating Digital Storytelling Into the Curriculum	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X404.B	Integrating Digital Storytelling Into the Curriculum (B)	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X405	Cinematic Digital Storytelling: Advanced Production Techniques	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X406	Digital Storytelling: Thesis Project	Maria	Gitto	B.A.	I*	01/22/20
EDUC	X407.A	Introduction to Digital Storytelling in Education Basic Screen Language & Production				C	01/28/20
EDUC	X407.A	Introduction to Digital Storytelling in Education Basic Screen Language & Production	Frank Joseph	Guttler III	B.A.	I	01/22/20
EDUC	X407.B	Opening "The Door" to Digital Storytelling in Education				C	01/28/20
EDUC	X407.B	Opening "The Door" to Digital Storytelling in Education	Frank Joseph	Guttler III	B.A.	I	01/22/20
EDUC	X407.C	Digital Storytelling in Education				C	01/28/20
EDUC	X407.C	Digital Storytelling in Education	Frank Joseph	Guttler III	B.A.	I	01/22/20
EDUC	X407.D	Digital Storytelling in Education - Online Bootcamp	Frank Joseph	Guttler III	B.A.	I	01/22/20
ENGL	X410	Content and Methods for Teaching Advanced Placement English Language and Composit		Correa	B.A.	I*	01/22/20
ENGL	X410	Content and Methods for Teaching Advanced Placement English Language and Composit	-	Miller	B.A.	I*	01/22/20
MGT	X410.82	Fundamentals of Supply Chain Management	Emsley Lee	Lopez	B.S.	I	01/22/20
MGT	X410.93	Logistics in Supply Chain Management: Domestic and Global	Rickey	Slaughter	M.B.A	I	01/22/20
ENGL	X410.B	Content and Methods for Teaching Advanced Placement English Language and Composi		Correa	B.A.	I*	01/22/20
ENGL	X410.B	Content and Methods for Teaching Advanced Placement English Language and Composi	t Phillip	Miller	B.A.	I*	01/22/20
BIOL	X425.1	Mosses in Motion: Desert Moss Ecology & Diversity				C	01/22/20
BIOL	X425.1	Mosses in Motion: Desert Moss Ecology & Diversity	Theresa	Clark	M.S.	I*	01/22/20
CS	X428.05	Contents and Methods for Teaching Advanced Placement Computer Science Principles	Chinma	Uche	Ph.D.	I*	01/22/20
EDUC	X428.07	Teaching the Gifted and Talented: Advanced Approaches to Curriculum Differentiation	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X428.08	Teaching the Gifted and Talented: Approaches to Curriculum and Design	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X428.09	Teaching the Gifted and Talented: Guidance and Goals of the Program	Christopher	Rangel	M.Ed.	I*	01/22/20
EDUC	X428.1	Teaching the Gifted and Talented: Recognizing Individual Differences	Christopher	Rangel	M.Ed.	I*	01/22/20

#### COMMITTEE ON UNIVERSITY EXTENSION REPORT TO THE RIVERSIDE DIVISION FEBRUARY 25, 2020

			INSTRUCTOR		INSTRUCTOR	TYPE OF	
DEPT	COURSE	TITLE	FIRST NAME	LAST NAME	DEGREE	APPROVAL	
LAW	X430	Fundamentals of Law for the Legal Professional	Harold	Норр	J.D.	I	01/22/20
LAW	X430	Fundamentals of Law	Christopher	Jensen	J.D.	I I	01/22/20
LAW	X430	Fundamentals of Law for the Legal Professional	Ignacio	Saucedo Ruiz	J.D.	I*	01/22/20
EDUC	X430.1	Introduction to STEAM Education	Emmie	Glancy	M.A.	I*	01/22/20
EDUC	X430.2	Access and Equity in STEAM Education	Courtney	Kane Williams	M.Ed.	I I*	01/22/20
EDUC	X430.3	Instructional Strategies for Teaching STEAM	Robin L.		Ed.D.		01/22/20
MATH	X435.01	Content and Methods for Teaching Advanced Placement Calculus AB	Ruth	Nielsen Miller	M.Ed.	I*	01/22/20
LAW	X435.5	Rules of Evidence	Harold	Hopp	J.D.	I	01/22/20
LAW	X435.5	Rules of Evidence	Ignacio	Saucedo Ruiz	J.D.	I*	01/22/20
EDUC	X437	Educating for Informed and Equitable Voting	Leah	Bueso	Ph.D.	I*	01/22/20
LAW	X437.1	Contract Law	Harold	Норр	J.D.	I	01/22/20
LAW	X439	Tort Law	Ignacio	Saucedo Ruiz	J.D.	I*	01/22/20
LAW	X449	Trial Preparation	Kristi	Bergamo	J.D.	I .	01/22/20
MGT	X450.8	Performance Appraisal and Evaluation	Carletta	Loflin	M.A.	I	01/22/20
MGT	X452.2	Employee Recruitment, Selection and Retention	Carletta	Loflin	M.A.	I	01/22/20
MGT	X452.3	Labor and Employee Relations	Carletta	Loflin	M.A.	I	01/22/20
MGT	X463.20	Sports Marketing and Promotions	Mitchell	Seigel	B.S.	I	01/22/20
BMSC	X465	Introduction to Forensic Science in Healthcare Settings	Lisa Renae	Gottuso	M.S.	I*	01/22/20
MGT	X465.1	Understanding Your Role As Supervisor	Desiree	Massei	M.B.A	I	01/22/20
BMSC	X465.12	Sworn Testimony for the Healthcare Specialist	Lisa Renae	Gottuso	M.S.	I*	01/22/20
MGT	X465.4	Motivating, Managing and Developing Others	Desiree	Massei	M.B.A	I	01/22/20
BMSC	X465.52	Forensic Approaches to Mental Health and Domestic Violence	Lisa Renae	Gottuso	M.S.	I*	01/22/20
MGT	X465.6	Moving Through Change	Desiree	Massei	M.B.A	I	01/22/20
MGT	X469.02	Communicating Effectively	Desiree	Massei	M.B.A	I	01/22/20
MGT	X470.39	Project Scheduling and Risk Management	Linda	McKean	M.A., PMP	I	01/22/20
ENGR	X471	Building Information Modeling (BIM) Concepts and Tools	Amanuel	Woldemikael	M.Arch.	I	01/22/20
MGT	X471.15	Introduction to Construction Management	Eugene	Durham	M.A.	I	01/22/20
ENGR	X472	Building Information Modeling (BIM) Using Autodesk Revit 2019	Amanuel	Woldemikael	M.Arch.	I	01/22/20
MGT	X473.5	Lean Six Sigma by the Numbers	Russell	Keenan	B.S.	I	01/22/20
MGT	X475	Marketing Principles and Practice	Stephen	Fritzenkotter	M.B.A.	I	01/22/20
ENGR	X475	Case Study Analyses - Building Information Modeling (BIM)	Amanuel	Woldemikael	M.Arch.	I	01/22/20
MGT	X479	Organizational Behavior Dynamics	John Michael	Horspool	B.A.	I	01/22/20
MGT	X479	Organizational Behavior Dynamics	Carletta	Loflin	M.A.	I	01/22/20
MGT	X497.09	International Finance	Diana	Cescolini	MS	I	01/22/20

## EXECUTIVE COUNCIL REPORT TO THE RIVERSIDE DIVISION February 25, 2020

#### To be received and placed on file:

Report of the following Endowed Chair Proposals and Campus Namings reviewed without objection by Executive Council:

Singletary Family Chair in Agriculture in the College of Natural and Agricultural Sciences

Endowed Term Chair for Research Excellence and Undergraduate Research Mentoring in the College of Humanities, Arts, and Social Sciences

Endowed Term Chair for Inclusive Excellence in the College of Natural and Agricultural Sciences



#### **EXECUTIVE COUNCIL**

December 13, 2019

To: Thomas M. Smith

Interim Provost & Executive Vice Chancellor

From: Dylan Rodríguez, Chair

Riverside Division

**Re:** Singletary Family Endowed Chair in Agriculture (CNAS)

Dear Provost Smith,

At its December 9, 2019 meeting, Executive Council discussed and had no objection to the establishment of the subject proposed endowed chair. I attach comments regarding the proposal from the Committee on Academic Personnel, Committee on Diversity, Equity, and Inclusion, the Committee on Faculty Welfare, and the Committee on Planning & Budget.

Peace dylan

Cc: Peter Hayashida, Vice Chancellor for University Advancement

Pat Kohlmeier, Executive Director of UCR Foundation and Donor Relations



November 13, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Sherryl Vint, Chair

Committee on Academic Personnel

Re: Endowed Chair Proposal: The Singletary Family Chair in Agriculture in

**CNAS** 

At its meeting on November 13, 2019, CAP reviewed the documents supporting the Singletary Family Endowed Chair in Agriculture within the College of Natural and Agricultural Sciences. CAP was enthusiastic about the establishment of this new Term Chair and voted in favor of the proposal (+9-0-0).



#### COMMITTEE ON DIVERSITY, EQUITY, AND INCLUSION

November 13, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Xuan Liu, Chair

Committee on Diversity, Equity, and Inclusion

Re: Endowed Chair Proposal: The Singletary Family Chair in Agriculture in

**CNAS** 

The Committee on Diversity, Equity, and Inclusion (CoDEI) considered the proposal for the establishment of the Singletary Family Endowed Chair in Agriculture within the College of Natural and Agricultural Sciences. Overall, CoDEI is very supportive of the Endowed Chair proposal; however, the committee would find it helpful to know how the endowed chair position will address campus challenges in advancing diversity, equity and inclusion in faculty recruitment, retention and promotion.



November 21, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Abhijit Ghosh, Chair

Committee on Faculty Welfare

Re: The Singletary Family Chair in Agriculture in CNAS

The Faculty Welfare Committee reviewed the establishment of The Singletary Family Chair in Agriculture in CNAS. The committee has no objections and the committee supports the establishment of the term chair within the College of Natural and Agriculture Sciences.

While we support the establishment of the term chair, we call on the campus to establish a policy on the process by which this type of chair is selected, which would be done in consultation with department chairs in the College.



#### PLANNING & BUDGET

November 26, 2019

To: Dylan Rodriguez, Chair

Riverside Division

| Juny WK Com-

From: Harry Tom, Chair

Committee on Planning and Budget

Re: Endowed Chair Proposal: The Singletary Family Chair in Agriculture in

**CNAS** 

The Committee on Planning & Budget (P&B) reviewed the proposal for the Singletary Family Chair in Agriculture in CNAS at their November 26, 2019 meeting. P&B did not find any issues with the proposal and approved of the endowed chair.



#### **EXECUTIVE COUNCIL**

December 13, 2019

To: Thomas M. Smith

Interim Provost & Executive Vice Chancellor

From: Dylan Rodríguez, Chair

Riverside Division

Re: Endowed Term Chair for Research Excellence and Undergraduate Research Mentoring (CHASS)

Dear Provost Smith,

At its December 9, 2019 meeting, Executive Council discussed and had no objection to the establishment of the subject proposed endowed chair. I attach comments regarding the proposal from the Committee on Academic Personnel, Committee on Diversity, Equity, and Inclusion, the Committee on Faculty Welfare, and the Committee on Planning & Budget.

Peace dylan

Cc: Peter Hayashida, Vice Chancellor for University Advancement

Pat Kohlmeier, Executive Director of UCR Foundation and Donor Relations



#### COMMITTEE ON DIVERSITY, EQUITY, AND INCLUSION

November 13, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Xuan Liu, Chair

Committee on Diversity, Equity, and Inclusion

Re: Endowed Term Chair for Research Excellence and Undergraduate

Research Mentoring (CHASS)

The Committee on Diversity, Equity, and Inclusion (CoDEI) considered the proposal for the establishment of the Endowed Term Chair for Research Excellence and Undergraduate Research Mentoring within the College of Humanities, Arts, and Social Sciences. Overall, CoDEI is very supportive of the Endowed Chair proposal; however, the committee would find it helpful to know how the endowed chair position will address campus challenges in advancing diversity, equity and inclusion in faculty recruitment, retention and promotion.



#### PLANNING & BUDGET

November 26, 2019

To: Dylan Rodriguez, Chair

Riverside Division

| Juny WK Com

Harry Tom Chair

From: Harry Tom, Chair

Committee on Planning and Budget

Re: Endowed Chair Proposal: Endowed Term Chair for Research Excellence & Undergraduate Research Mentoring (CHASS)

The Committee on Planning & Budget (P&B) reviewed the proposal for an Endowed Term Chair for Research Excellence & Undergraduate Research Mentoring in CHASS at their November 26, 2019 meeting. P&B did not find any issues with the proposal and approved of the endowed term chair.



November 13, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Sherryl Vint, Chair

Committee on Academic Personnel

Re: Endowed Term Chair for Research Excellence and Undergraduate

Research Mentoring (CHASS)

At its meeting on November 13, 2019, CAP reviewed the documents supporting the Endowed Term Chair for Research Excellence and Undergraduate Research Mentoring within the College of Humanities, Arts, and Social Sciences. CAP was enthusiastic about the establishment of this new Term Chair and voted in favor of the proposal (+9-0-0).



November 21, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Abhijit Ghosh, Chair

Committee on Faculty Welfare

Re: CHASS Endowed Term Chair for Research Excellence and Undergraduate

Research Mentoring

The Faculty Welfare Committee reviewed the establishment of the Endowed Term Chair for Research Excellence and Undergraduate Research Mentoring. The committee has no objections and the committee supports the establishment of the term chair within the College of Humanities, Arts, and Social Sciences.

While we support the establishment of the term chair, we call on the campus to establish a policy on the process by which this type of chair is selected, which would be done in consultation with department chairs in the College.



#### **EXECUTIVE COUNCIL**

January 29, 2020

To: Thomas M. Smith

Interim Provost & Executive Vice Chancellor

From: Dylan Rodríguez, Chair

Riverside Division

Re: Endowed Term Chair for Inclusive Excellence in the College of Natural and Agricultural

**Sciences** 

Dear Provost Smith,

At its January 27, 2020 meeting, Executive Council expressed no objection to the establishment of the proposed endowed chair. I attach comments regarding the proposal from the Committee on Academic Freedom, Committee on Academic Personnel, the Committee on Diversity, Equity, and Inclusion, and the Committee on Planning & Budget.

Peace dylan

Cc: Peter Hayashida, Vice Chancellor for University Advancement

Sharilyn Berry, Executive Director of UCR Foundation and Donor Relations



January 17, 2020

To: Dylan Rodriguez, Chair

Riverside Division of the Academic Senate

From:

Dmitri Maslov, Chair Maslow Committee on Academic Freedom (CAF)

Re: Endowed Term Chair for Inclusive Excellence in CNAS

The Committee on Academic Freedom considered the "Endowed Chair Proposal: Endowed Term Chair for Inclusive Excellence in CNAS' submitted for Systemwide Review on December 13, 2019."

The Committee regards this proposal as acceptable. The request to establish a Named Endowed Chair includes the certification made by Dean ("The intellectual independence of the chair holder's scholarly activities is assured") which should serve to protect academic freedom of the Chair holder.



January 9, 2020

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Sherryl Vint, Chair

Committee on Academic Personnel

Re: Endowed Chair Proposal: Endowed Term Chair for Inclusive Excellence in

**CNAS** 

At its meeting on January 8, 2020, CAP reviewed the documents supporting the Endowed Term Chair for Inclusive Excellence within the College of Natural and Agricultural Sciences. CAP was enthusiastic about the establishment of this new Term Chair and voted in favor of the proposal (+8-0-0).



### COMMITTEE ON DIVERSITY, EQUITY, AND INCLUSION

January 21, 2020

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Xuan Liu, Chair

Committee on Diversity, Equity, and Inclusion

Re: Endowed Term Chair for Inclusive Excellence in CNAS

The Committee on Diversity, Equity and Inclusion reviewed and supports the proposed Endowed Term Chair for Inclusive Excellence in CNAS.



#### PLANNING & BUDGET

January 14, 2020

To: Dylan Rodriguez, Chair

Riverside Division

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Harry Tom Chair

From: Harry Tom, Chair

Committee on Planning and Budget

Re: [Campus Review] Endowed Chair Proposal: Endowed Term Chair for

**Inclusive Excellence in CNAS** 

The Committee on Planning & Budget (P&B) reviewed the proposal for an Endowed Term Chair for Inclusive Excellence in CNAS at their January 14, 2020 meeting. P&B did not find any issues with the proposal and approved of the endowed term chair.

From: Jean Helwege <a href="helwege@ucr.edu">helwege@ucr.edu</a> Sent: Wednesday, October 30, 2019 5:49 PM

Dear Dylan and committee chairs,

In response to comments we received at the end of spring quarter, Xinping Cui and I have revised our proposal for a Master of Science in Business Analytics (MSiBA). Some of the committee chairs have turned over since we received these comments, so our email is addressed to both the former and current chairpersons of the committees involved.

While the previous version of the proposal was approved by all of the committees that reviewed it, Dylan and the Executive Council voiced concerns and the proposal was rejected. In the attached memos and in our Round 4 version, we have addressed these concerns. We have also made some small adjustments in the proposal related to the finances. We are hopeful that the proposal now meets your requirements and that it can soon be taken up at a Riverside division meeting. In the interest of avoiding a fifth UCR round, we offer to attend any of your Senate meetings to answer questions in person.

Sincerely, Jean Helwege

On Wed, Apr 24, 2019 at 1:31 PM <dylanr@ucr.edu> wrote:

Dear Jean:

I am writing to you as the proposer of the MSiBA program for the purpose of providing the most recent round of Senate consultation. Based on this full Senate review and subsequent discussion in Executive Council, a revised proposal should come forward and be routed for committee review.

Responses of the consulted standing committees were reviewed by Executive Council. EC specifically discussed section 2.1 Undergraduate Preparation for Admission of the proposal. EC raised questions regarding how the split between Colleges/Schools in the administration of the proposed MSiBA program will likely make it difficult to deal with admissions and related issues; the proposal is unclear in this regard, leaving the admissions process seemingly open-ended and non-specific. Executive Council wondered why only a single recommendation letter is required (when Graduate Division requires three). There was significant discussion regarding the critical need for self-supporting programs to return funds to the campus, especially since such programs require use of campus resources (e.g. library, dining, parking, safety, etc.). This, however, is a matter that must be engaged as an issue of campus policy, and not something that is particular to the MSiBA proposal.

Yours, dylan

# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

### **University of California Riverside**

### October 2019

#### Status:

Approved by School of Business Executive Committee: 3/18/2017

Approved by School of Business Faculty: 5/24/2017

Approved by Department of Statistics Faculty: 6/8/2017

Approved by College of Natural and Agricultural Sciences Executive Committee: 3/20/2018

Submitted to Graduate Division: 3/26/2018

Approved by Committee on Library and information Technology: 3/25/2019

Approved by Graduate Council: 4/8/2019

Approved by Committee on Planning and Budget: 4/12/2019

Approved by Committee on Diversity, Equity and Inclusion: 4/15/2019 Approved by Committee on Physical Resources Planning: 4/16/2019

Approved by UCR Academic Senate:

#### **GRADUATE DEGREE PROGRAM PROPOSAL**

#### **Lead Proposers:**

- The faculty of the School of Business and the A. Gary Anderson Graduate School of Management (AGSM)
- The faculty in the Department of Statistics
- The faculty members in the area of Operations and Supply Chain Management (OSCM)
- The faculty members in the area of Marketing
- The faculty members in the area of Finance
- Jean Helwege
- Xinping Cui

#### **Contact Information:**

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

Tel: 951.827.4284

Email: jean.helwege@ucr.edu

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# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### § 1.0 INTRODUCTION

With the availability of more detailed data and the ease with which businesses can use faster and cheaper computers to analyze data, the need for well-trained employees in the area of business analytics (BA) has increased dramatically in recent years. BA overlaps substantially with the area known as data analytics or data science, especially in its emphasis on statistics and software, but it differs in that the focus is on business applications. BA uses data and statistical tools to analyze the potential for increasing revenue, decreasing costs and identifying new profit opportunities.

Many business schools are aware of the demand for graduates of BA programs and see an opportunity to elevate their reputations by offering these degrees. According to Poets & Quants, roughly a third of the top 100 business schools have introduced BA masters programs. While BA can be and is taught at the undergraduate level, by its nature the degree is best structured as a graduate program that allows students to extend and strengthen their knowledge of statistics and business. We expect students entering this program to have completed an undergraduate degree in either a quantitative business major or in statistics. Reflecting this logic, the proposed degree is jointly offered by School of Business and by the Statistics Department.

#### 1.1 Aims and Objectives

The Master of Science in Business Analytics (MSiBA) program will expand the training of students with analytical backgrounds to allow them to apply their skills to business data. Businesses have access to increasingly large amounts of data about their customers, costs, and suppliers and they can use this information to improve operations, increase the yield on marketing programs and understand pricing and financing better, which all are methods of obtaining higher profits. The personnel required to do this work must be well trained in both statistics and business.

The proposed MSiBA offers a rigorous program that allows these students to gain the degree in three quarters. Students will have studied either statistics or a quantitative business discipline as undergraduates and will continue their studies at the master's level by following one of two tracks. The statistics track is for students who majored in one of the business disciplines as undergraduates (finance, operations/supply chain, or marketing) and the business track is for students who majored in statistics as undergraduates. Both tracks culminate in a two-quarter capstone class that applies their understanding of business analytics to a project.

The program will take advantage of existing courses in business and statistics. The main new proposed courses for this degree are a two-quarter sequence of capstone courses that allow students to work on a specific project with data tailored to their individual interests. There is also one new statistics course proposed for the MSiBA degree.

There are several objectives of the program that will benefit UCR, CNAS, and the School of Business. The

<sup>&</sup>lt;sup>1</sup> http://poetsandquants.com/2016/01/18/business-analytics-masters-at-the-top-100-b-schools/. This site includes links to the top schools with programs.

program offers a degree in a fast-growing area that requires rigorous training. By offering this program, the job placements, average salary and training of UCR alumni increase and this enhances UCR's reputation, as well as that of the Statistics Department and School of Business. In addition, the program aims to attract more high-quality students. This is especially helpful for School of Business, which currently mainly trains undergraduates who tend to study aspects of business that rely less on the most quantitative business skills. The program will be especially helpful to the Statistics Department in creating a path for undergraduates. Many of the statistics majors at UCR have excellent training in the general area of statistics, but they are ill-prepared to use their skills in business. Another goal is financial security for UCR. As a self-supporting program (SSP) offering a professional degree, not only will the MSiBA work as a stand-alone program without requiring support from the state, but it is also expected to be a significant source of revenue for UCR each year. Finally, UCR is currently the UC with the largest number of students studying business. The MSiBA program will enhance that standing further, not just in numbers and breadth of choices, but by helping UCR's reputation as the best UC campus for studying business.

#### 1.2 Historical Development of the Field and Departments' Strengths

Before the advent of the personal computer in the 1980s, students could only be trained in the area of statistical computing on a mainframe, where capacity was limited and undergraduates rarely had access. With cheap computing power and improved statistical functions in Excel, the level of statistical analysis of business data has improved at all levels of higher education over the years. Social media and point of sales systems, and other electronic sources of big data have combined with the higher level of statistical training to lower the cost of analyzing data for the purpose of increasing corporate profits. The first college of business in the U.S. to offer a business analytics degree at the undergraduate, Masters and MBA level was UT Austin in 2010. We expect that students will use increasingly sophisticated methods to analyze the wealth of data available. Therefore, the number of students enrolled in BA degree programs is likely to expand.

The faculty in the School of Business and the professors in Statistics are well-positioned to offer the MSiBA degree. Both sets of professors are highly trained in both statistics and business disciplines and they use business analytic tools in their research on a regular basis.

In the School of Business, the majority of professors do empirical research. Since so many ladder-rank professors use statistical techniques to analyze business data in their research, there are many professors in the school who can teach students how to use statistical analysis to answer business questions. And most of the faculty do empirical analysis with fairly large or very large databases and therefore have the skills to lead students into the area of big data. A smaller fraction of the faculty has taught programming as part of their business courses, while others have assigned homework that incorporates statistical analysis that can be carried out in Excel. The finance area implemented a policy in 2016-17 academic year in the Master's of Finance (MFin) program of providing incentives to students to complete statistical analysis in SAS rather than Excel. The faculty are well-positioned to supervise student projects in the proposed capstone courses.

The Department of Statistics has tremendous expertise in teaching statistics and in teaching statistical computing. Their role in the program is less focused on applications of statistical analysis to business and more teaching the fundamental skills need to analyze data with statistical computing packages. The MFin program has already hired faculty in the Statistics department to teach statistical computing (SAS) that is geared to business professionals, so they are also well-positioned to deliver the relevant course material and train students so that they have the statistical computing and analytical skills needed for the capstone courses.

#### 1.3 Timetable

The School of Business and the Department of Statistics are prepared to launch the program in the fall of 2020. We have conservatively projected enrollments at 15 students in the first year and gradually increasing to a projected maximum of 50 students by the fifth year. As a comparison, Arizona State University currently offers a 9-month master's of business analytics degree with 172 students enrolled.

The program requires three new courses, while the remainder of the program uses courses that are already in place. Two of the new courses are capstone courses that will be offered in Winter 2021 and Spring 2021 and the third is a statistics course. These courses have already been submitted by the School of Business and the Department of Statistics for approval by the relevant parties in the shared governance process.

#### 1.4 Relation to Existing Programs and Campus Academic Plan

The program fits the overall strategic plans of UCR, the School of Business and CNAS to increase the university and the schools' presence and reputation. The program helps on a number of fronts: it is more rigorous and technical than some other professional degree programs; it will attract students with backgrounds that are more quantitative and therefore have a greater degree of academic preparedness than the average UCR student; the job prospects for students in the program are better than in many other programs, so placement records should help our reputation; and the program can charge a reasonably high tuition to reflect the value-added advantages of this type of education.

The specialized skills taught in the MSiBA program should prepare students well for professional employment. Besides the high demand for business analytics professionals, which should lead to good placements, this program is likely to be recognized by the United States government as a STEM program. Foreign students who graduate from designated STEM programs are allowed to work for extended periods with OPT visas (currently 29 months vs. one year for a regular OPT visa).

The new degree program is a self-supported program that will rely extensively on existing courses in AGSM and Statistics. This means there will be no immediate need for more faculty and existing faculty can teach the majority of the material in existing courses to more students. Students will graduate having taken a common set of classes for most of the program but will be given a chance to apply their skills to a particular area in business, such as marketing, operations, or finance.

If this self-supported program grows and requires that more faculty be hired in response to its growth the additional faculty will help build critical mass in the School of Business and in Statistics, allowing UCR to advance its research mission. Students admitted to the MSiBA program will be strong quantitatively and will contribute positively to the classroom experience. MSiBA may also draw from the more quantitatively-oriented students in UCR undergraduate programs. If they are successful in completing this program and working in business analytics careers, the program may eventually help draw better students to our existing undergraduate programs in statistics and quantitative business disciplines.

Another advantage of the program is that it should gain in popularity compared to the traditional MBA. Business schools around the country are experiencing declining enrollments in full-time MBA programs. AGSM is no exception to this problem, and thus the number of students in a section is smaller than capacity and there are few electives that are offered more than once a year. By offering marketing, finance and operations courses to students in a growing field, UCR expands its opportunities to use more of its graduate business training capacity.

The program is distinctly different from the existing UCR program in Data Science, which is an online program

jointly offered by Statistics and BCOE. By having the Statistics Department involved in both programs, the faculty can monitor the two programs to make sure that one is not cannibalizing the other. The Data Science degree is designed to focus on the computing and database management. It does not involve strategies to maximize revenue, minimize cost or otherwise improve specific business applications.

#### 1.5 Interrelationships with the Programs of Other Institutions, Market and Competition

The number of business analytics programs has been increasing in recent years. Several new programs have begun in California, including UC Davis, UC San Diego and UC Irvine. Exhibit II lists the existing programs in California, their length, and cost.

TFE Times ranks business master's of business analytics programs and the only ranked program in California is USC (ranked #2). Outside of California there are several hundred schools that offer BA programs, although the TFE Times list only ranks the top 40 or so. Most programs are for a year of full-time study or less. Our proposal is for a nine-month program that allows students to graduate in spring, which puts them in a good position for the job market. Several programs that go longer than nine months do not have more units than what is proposed for UCR, but instead reduce the course load in some quarters and add one or two courses in the summer. For example, the number of courses in UCSD's business analytics program is the same as the one proposed here except that UCSD has two 1-unit professional development courses. Several nine-month programs are ranked high on the TFE Times list – for example, Arizona State (#6), Southern Methodist University (#11) - and many others are for 10 or 11 months (e.g., #5 Rochester and #4 UT Austin).

In addition, there are many other schools that offer data analytics or computer science programs, but these do not focus on business and are not in direct competition.

Exhibit VII includes letters of support for the proposed program, including one from Terrence August, who is the co-chair of the MSBA degree program at UCSD's Rady School of Business. He and Professor Vincent Nijs designed the program, so he has been involved in this relatively new program from inception. Professor August wrote that the demand for this degree is very large and notes that applications to UCSD's program grew from 300 in year 1 to over 700 in year 2 and to approximately 950 in 2019. Prior to beginning this highly desirable program, Rady surveyed students in November 2013 to determine interest in the degree. The results of this survey are included in Exhibit XVI.

#### 1.6 Administration

The interdepartmental program will be administered by two departments, Statistics and Business. Because the program is joint between two departments, the program requires its own set of by-laws. These are included in Exhibit IX. The two departments will have equal control over the program and will split the net revenues in proportion to their contributions to the program. The financial aspects of the program are discussed in greater detail in Section 6.

Business and Statistics will establish a joint steering committee. The steering committee will consist of three faculty from AGSM and three faculty from the Department of Statistics. The steering committee will collaborate to work on admissions criteria, but the expectation is that heavy emphasis will be placed on quantitative training and test scores. The program director will be chosen among these six faculty, will serve for three years, alternating between the two colleges (AGSM and CNAS). The Deans of the two colleges will alternate nominating the program director to the Provost/EVC, after consultation with the other Dean and the steering committee. The nominated director may or may not be from the Dean's own college.

As with the current setup for admissions into the MBA program, a large fraction of the work related to admissions will be done through the AGSM graduate staff. In particular, AGSM staff are responsible for ensuring that application materials are complete and submitted on time, for sending out rejections to candidates that are far below the standards expected of the program, and for making sure that the program is appropriate for the career goals of the applicants. Given the declining enrollment in MBA enrollments, the current size of the AGSM staff should be sufficient to deal with MSiBA applicants in the short-run. Once the program is more established and at steady state enrollment, a dedicated Director of Recruiting and Admissions is expected to be appointed and will assist the program director and the steering committee.

The program will be marketed on the Statistics and AGSM websites, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever School of Business decides to participate in such forums for the purpose of MBA recruiting.

Formal student advising will be administered by the steering committee. Because students are expected to have either an undergraduate statistics or business degree, some separate advising will occur based on previous training. In these situations, students with business degrees will likely receive advice from the Statistics members of the steering committee and students with statistics degrees will be advised by the business faculty on the steering committee. The program director will hold information sessions that cover most of the common ground. All steering committee members will be provided course roadmaps to ensure that individual advising is effective and efficient. Given that the Statistics Department is smaller than the combined finance, marketing and operations faculty within the School of Business, and that there are more support staff in the School of Business, Statistics is expected to undertake a smaller fraction of the work related to information sessions and marketing.

#### 1.7 Plan for Evaluation

AGSM and Statistics will continuously evaluate the program based on the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alumni.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

The School of Business is accredited by the AACSB, which confers its accreditation to over 840 business schools around the world. Nonetheless, only about 5% of business schools are accredited. Part of the accreditation process is the "assurance of learning" component, which requires the school to provide data to support its claim that student only graduate when they have learned the material. As with other School of Business programs, the MSiBA program will collect assessment data to ensure that the students in the program are learning what is expected of them.

All SSPs are required to show that they are self-supported by submitting annual reports detailing their financial situations. These reports will be created with the assistance of the CFAOs of CNAS and Business.

# § 2.0 PROGRAM

#### 2.1 Undergraduate Preparation for Admission

An admissions committee with representation from faculty in both the School of Business and the Department

of Statistics will review applications to the program, with the assistance of recruiting and admissions staff in the School of Business. The steering committee will communicate with the admissions committee each year to consider how best to identify students for the program and to discuss whether curriculum changes are appropriate given responses from admitted applicants who decline to attend.

The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses. Students who have weaker statistical training but otherwise show promise will be required to take STAT 171 or similar courses before entering the program. Students who do not have an undergraduate degree in statistics or the quantitative business disciplines may be considered for admission on a case by case basis, but the expectation is that all admitted students will have sufficient training in either statistics or quantitative business topics to be able to complete the degree in a timely fashion. Students with quantitative backgrounds who are not familiar with either business or statistics will be advised to enroll in the MBA program or the masters in Statistics program.

Because of the need to communicate the results of statistical and other quantitative analysis in the capstone classes and in the workplace after graduation, strong English skills are also required. The admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency. Preference will be given to applicants who have worked in industry for two or more years.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction.

Additionally, each applicant must submit at least two letters of recommendation (at least one academic). The admissions committee will determine in time whether additional letters are appropriate. All other application requirements are specified in the graduate application or in the General UCR catalog.

#### 2.2 Foreign Language

The program has no foreign language requirement.

# 2.3 Program of Study

#### 2.3.A Fields of emphasis

The MSiBA core specific field of emphasis is Business Analytics. Within this field, students can do a concentration in either operations, finance or marketing.

# 2.3. B Plan(s)

**Plan I (Thesis)** will not be an option for the Master of Science Business Analytics program. Given this is a three quarter (9 months) program, a Plan I (Thesis) option will not be feasible for students.

**Plan II (Comprehensive Examination)** will be the format for the MSiBA degree. In addition to the course requirements associated with Plan II set forth by the Graduate Division (i.e, at least 18 units must be in graduate level courses taken at a UC campus), every candidate must take a comprehensive examination. The comprehensive exam will be composed by the faculty teaching the MSiBA students. The steering committee will schedule the exam and arrange for proctors with the help of the AGSM staff.

#### 2.3. C Unit requirements

The Master of Science in Business Analytics will be offered as a three-quarter program (48 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

#### 2.3. D Required and recommended courses

All students in the program are required to take three courses (12 units) that focus on analytical tools for business. In addition, students must take a two-quarter capstone sequence (8 units) in which they complete a project that uses the tools acquired in the area of business analytics. These five courses are required for all students in the program. Another set of four required courses (16 units) is designed to enhance their previous training as undergraduates and these vary with a student's undergraduate major. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in both statistics and business. Students who have double majored are treated as if they majored in statistics as undergraduates. The remaining 12 units (3 courses) are elective courses that allow students to concentrate in a particular area of business. The three elective tracks are marketing, operations and finance. Descriptions of the courses are included in Exhibit I.

#### Required courses for all MSiBA students

- MGT 286A-B Capstone in Business Analytics (2 quarter course) NEW
- MGT 256 Business Analytics for Management
- STAT 208 Statistical Data Mining
- STAT 232 Statistics for Business Analytics NEW

# Required courses for students with an undergraduate business degree

•	STAT 205	Discrete Data Analysis
•	STAT 206	Statistical Computing
•	MGT 233	Marketing Research

MGT 267 Applied Business Forecasting

# Required courses for students with an undergraduate statistics degree

<ul> <li>MGT 202</li> </ul>	Financial Management
<ul> <li>MGT 204</li> </ul>	Cost and Management Accounting
<ul> <li>MGT 207</li> </ul>	Operations Management for Competitive Advantage
<ul> <li>MGT 209</li> </ul>	Marketing Management

## Electives – Choose a group of three from below

MGT 221 Decision Making Under Uncertainty
 MGT 258 Logistics and Supply Chain Management

MGT 239 Simulation for Business

Or

MGT 228 or MGT 257 Consumer Behavior or Marketing Strategy

MGT 253 Internet MarketingMGT 251 Market Assessment

Or

MGT 252 or MGT 295F Investments and Portfolio Management or Empirical Methods in Finance

MGT 232 Derivatives

MGT 244 or MGT 227 Corporate Risk Management or Fixed Income

All but three courses, MGT 286A-B and STAT 232, are existing courses and have been offered in at least one of the last two academic years. Exhibit I contains a copy of the catalog entries for the existing courses. Given current MBA enrollments, there is sufficient capacity in the existing classes to accommodate the needs of the MSiBA students. Over time, if the programs expand, it may be necessary to offer multiple sections of the courses. Upon approval of the program, the new courses will be offered at least annually and will require staffing. The Statistics Department and the School of Business are confident that they currently have the personnel needed to offer the courses required for the program.

# 2.4 Sample Program (full time)

Below are two sample programs. The first is for a student whose undergraduate training is in statistics and who has chosen to focus on operations. The second is for one whose undergraduate training is in business and has decided to continue with marketing.

# Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

MGT 256 Business Analytics for Management

MGT 207 Operations Management for Competitive Advantage

MGT 202 Financial Management

STAT 232 Statistics for Business Analytics

#### Quarter 2

MGT 286A Capstone in Business Analytics I

MGT 221 Decision Making Under Uncertainty

MGT 204 Cost and Management Accounting

MGT 209 Marketing Management

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 239 Simulation for Business
- MGT 258 Logistics and Supply Chain Management
- STAT 208 Statistical Data Mining Methods

#### Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

- STAT 206 Statistical Computing
- STAT 205 Discrete Data Analysis
- MGT 256 Business Analytics for Management
- STAT 232 Statistics for Business Analytics

#### Quarter 2

- MGT 257 Marketing Strategy
- MGT 286A Capstone in Business Analytics I
- MGT 253 Internet Marketing
- MGT 233 Marketing Research

# Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 251 Market Assessment
- MGT 267 Applied Business Forecasting
- STAT 208 Statistical Data Mining Methods

#### 2.5 Certifications

The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree.

#### 2.6 Normative time from matriculation to degree (full-time)

Plan II students should be able to complete the coursework for this program three quarters (9 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, all of which must be spent at the Riverside campus.

Only courses in which grades of B- or above or "S" are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree

objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal when

- 1. They have 12 or more units of "I" grades (incomplete course work) outstanding
- 2. The quarterly GPA falls below 3.00 for two consecutive quarters
- 3. They fail to fulfill program requirements in a timely and satisfactory manner, or
- 4. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

#### § 3.0 PROJECTED NEED

# 3.1 Student Demand for the Program

The demand is large and increasing, as attested below:

- The Wall Street Journal says: "B-school students can't get enough of big data. Neither can recruiters. Interest in specialized, one-year master's programs in business analytics, the discipline of using data to explore and solve business problems, has increased lately, prompting at least five business schools to roll out stand-alone programs in the past two years. The growing interest in analytics comes amid a broader shift in students' ambitions. No longer content with jobs at big financial and consulting firms, the most plum jobs for B-school grads are now in technology or in roles that combine business skills with data acumen, say school administrators."<sup>2</sup>
- Robert Half, an internationally recognized recruiting firm, surveyed CFOs and found that 61
  percent considered business analytics mandatory for some or all of their accounting and finance
  employees.<sup>3</sup>
- Poets & Quants, the MBA-focused website, reports that "business schools have rolled out...[business analytics]...programs, in response to fast-rising demand for workers trained to wrangle and analyze the big data streams that are getting bigger by the second."<sup>4</sup>

Business schools are creating programs in business analytics at a rapid pace, but the demand is also very high. This strong and increasing nationwide demand for graduates of master's level business analytics programs, combined with an underserved market here in Southern California, offers an opportunity to gain market share and establish a reputation as a leading school in the discipline. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena, will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program. Exhibit II provides information on existing business analytics programs offered in California.

In addition, some programs that are labeled as business analytics programs focus more on data science than on business, which overstates the degree of competition in this space. For example, the program at USC is offered by the Data Science and Operations (DSO) Department at USC. DSO has 27 tenure-track faculty as well as a dozen clinical professors. Among the tenure-track, 10 are listed as belonging to the area of Statistics,

<sup>&</sup>lt;sup>2</sup> Big Data Gets Master Treatment at B-Schools: The Wall Street Journal, November 5, 2014. <a href="http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y">http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y</a>

<sup>&</sup>lt;sup>3</sup> How Business Analytics and Other Key Skills Can Boost Your Career, Robert Half Finance and Accounting Blog, November 23, 2015.

<sup>&</sup>lt;sup>4</sup> Business Analytics Master's At 100 Top B-Schools, Poets & Quants, January 18, 2016.

while the rest are either in Operations or Information Systems. The flavor of the program reflects the fact that it is only offered by DSO, not the whole school, and that DSO is in part a statistics department. In particular, their one-year program requires six courses that emphasize statistics and three electives chosen from a list that includes seven statistics or database courses, while only two required courses are clearly focused on business. The only business elective is Marketing Analytics and there are no courses that allow a student to apply business analytics specifically to finance or operations. That is, the focus is on data science rather than applications to business.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded business analytics master's programs. UC San Diego charges \$58,000 for their 50-credit degree program. Our program has two fewer units, but it is otherwise similar. We believe it would be prudent to charge slightly less, or \$52,000. USC's program started in 2014 with a tuition set at \$47,000 and is currently slightly more than \$63,000. Our intent is to develop the MSiBA as a full-time program and we expect that initial enrollments will be of full-time students, but since many of our MBA classes are at night, the program may attract many part-timers as well. Exhibit III includes financial projections associated with the new program.

Evidence from other programs indicates that students with master's degrees are able to command materially higher compensation than undergraduates. Several sources on the internet suggest starting salaries near \$90,000. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Applicants seem to agree - more than 300 people applied for 87 spots in Arizona State's 2014 class. As noted earlier, the high cost of the UCSD program has not diminished the number of applications at all. Given that there is a ready market for such students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program themselves.

# 3.2 Opportunities for Placement of Graduates

According to McKinsey, there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the firm predicts, the US alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the data.<sup>6</sup>

### 3.3 Importance of the Discipline

Business analytics is highly important to several disciplines, especially operations, marketing and finance. With the recent developments in technology and communications and data-rich environments, business analytics is indispensable for managers in all three areas, as well as for CEOs and CFOs.

#### 3.4 Ways in Which the Program Will Meet the Needs of Society

Graduates of the program will obtain jobs with above average pay that are even higher than the salaries obtained with other graduate business degrees. The Master of Science in Business Analytics program will help students in the Inland Empire advance their careers by helping to obtain these desirable positions. The

<sup>&</sup>lt;sup>5</sup> Big Data Gets Master Treatment at B-Schools, Wall Street Journal, November 5, 2014.

<sup>&</sup>lt;sup>6</sup> See www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation.

program addresses an unmet need for graduate business education in Southern California in general. The program will contribute to UCR's reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration and the Department of Statistics maintain financial stability.

Students in the UCR Master of Science in Business Analytics program will acquire the knowledge and tools necessary to effectively manage their organizations. Their understanding of business analytics will help their organizations operate more efficiently. They will understand that effective use of business analytics give businesses a competitive advantage in the marketplace.

#### 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The Master of Science in Business Analytics program fits well with the research strengths of the School of Business and Statistics faculty. Moreover, as an SSP, revenues from the MSiBA program will help to support databases that are important to the research activities of the faculty, will provide competent research assistants, and will help to provide funding for the Ph.D. programs. In addition, by having more students enrolled in graduate level management and statistics courses, faculty are more likely to teach two sections of the same topic. Given the current workload of four sections per year, this makes it more likely that faculty can complete their teaching obligations with two types of courses (two preps), allowing more time for research. This is particularly helpful for younger faculty.

#### § 4.0 FACULTY

The faculty members in the School of Business and the Department of Statistics are quantitatively and qualitatively strong. In particular, the OCSM faculty, several of the quantitative marketing researchers, and the finance faculty are well-suited to delivering successful quantitative business courses. The faculty in Statistics are currently delivering not only statistics courses to their students, but the computer and software classes that are required for business analytics. The strength of the faculty for this program is evident from the number of courses that already exist and the fact that only three new courses would be required at UCR. Exhibit X includes the brief biographies of faculty who will teach in the program.

#### § 5.0 COURSES

In the first quarter of the Master of Science in Business Analytics program, students will be expected to take core courses in the areas that they did not study as undergraduates. In the second quarter, building onto the fundamentals, students are exposed to more advanced coursework and will focus their studies in one of three business disciplines: Operations, Marketing or Finance. They will also begin the design and data collection work related to their two-quarter capstone class. In the third quarter, students are expected to build on what they learned and complete their individual capstone projects. They will also expand into more detailed work in some topics and finish up required courses outside their main area. Descriptions of the courses are included in Exhibit I.

#### § 6.0 RESOURCE REQUIREMENTS

This proposal is for an SSP, which, by definition, does not draw down existing resources. Indeed, an important

goal of the program is to create a revenue base for Statistics and Business that will allow both departments to expand their faculty, provide summer research support, and create an alumni base that will be financially suited to donating to UCR. In addition to creating a revenue source for the departments involved in the program, SSPs create revenue for the university and the UC system by dint of the fact that all SSPs pay assessments to UCR and UCOP. Given that the program is designed to take advantage of existing capacity in the School of Business and CNAS, this SSP will help UCR avoid financial pressures related to state-supported programs. Both the Statistics and the Business departments have recently expanded their faculty, so no additional resource requirements involve faculty lines. Over time, if the program gains in popularity it will provide the resources to hire more faculty. Support staff for recruiting and administering the program are already in place and are expected to have more time given the declining enrollments in MBA programs.

A detailed financial projection for the program is included in Exhibit III. The nominal revenue is expected to increase over time as tuition and fees are increased with inflation, but there is little value to attempting to forecast inflation in this proposal. Thus, the figures are in real 2019 dollars and are not adjusted for inflation. The real costs of faculty and staff salaries and benefits are expected to increase over time due to merit pay increases and promotions. Other costs are expected to rise with enrollment, but the per student cost is expected to fall as economies of scale come into play.

The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty (one each). In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are not expected until the program is well established, if at all. Therefore, only minimal additional classroom space is required. <sup>7</sup>

Students are expected to have their own computers. Most software is already provided to students through a UCR site license, but if new software is needed to analyze data the students are expected to purchase it on their own, in the same way that they are expected to purchase their own books. The students can use data that the School of Business already purchases or they can obtain their own data using their own funds. There is no additional equipment needed for the MSiBA program nor are there any new library acquisitions required for it.

The program is likely to add greater pressure on parking. However, many of the Management courses are taught at night when parking is more plentiful. The School of Business recently began offering Saturday classes at the graduate level, which also helps alleviate parking pressures on campus. The parking program at UCR is also a

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We assume new sections of existing courses will not be needed because business analytics students will fill remaining seats in many business courses. These include the following STAT and MGT courses (with recent excess classroom capacity noted): STAT 205 (12 of 36 seats in Winter 2017); STAT 206 (11of 30 seats in Fall 2017); STAT 208 (12 of 30 seats in Spring 2017); MGT 202 Financial Management (offered in two quarters each year; 14 of 65 seats and 24 of 70 seats for sections 1 and 2, respectively, in Spring 2017 and 14 of 36 seats in Fall 2017); MGT 203 Economics for Management (1 of 74 seats and all 36 seats for sections 1 and 2, respectively, in Winter 2017); MGT 204 Cost and Management Accounting (29 of 65 seats in Fall 2017); MGT 207 Operations Management for Competitive Advantage (5 of 65 seats and 23 of 70 seats for sections 1 and 2, respectively, in Spring 2017); MGT 209 Marketing Management (6 of 77 seats and 4 of 35 seats for sections 1 and 2, respectively, in Winter 2017); MGT 221 Decision Making Under Uncertainty (all 30 seats filled in Fall 2017 but can be expanded to a larger room); MGT 227 Fixed Income (40 of 75 seats in Spring 2017); MGT 228 Consumer Behavior (8 of 60 seats in Fall 2017); MGT 232 Derivatives and Asset Pricing (7 of 36 seats in Winter 2017); MGT 233 Marketing Research (2 of 36 seats in Winter 2017); MGT 239 Simulation for Business (17 of 36 seats in Spring 2017); MGT 244 Corporate Risk Management (29 of 70 seats in Winter 2017); MGT 251 Market Assessment (6 of 36 seats remain); MGT 252 Investments and Portfolio Management (53 of 70 seats in Spring 2017); MGT 253 Internet Marketing (12 of 36 seats in Spring 2017); MGT 256 Business Analytics for Management (27 of 36 seats in Spring 2017); MGT 257 Marketing Strategy (4); MGT 258 Logistics and Supply Chain Management (10 of 36 seats in Winter 2017); MGT 267 Applied Business Forecasting (24 of 36 in Winter 2017); and MGT 295F Empirical Methods in Finance (1 of 16 seats in Winter 2017)

self-supported program, so the cost of additional parking spaces from MSiBA students is incorporated into the cost of a parking sticker and is not included in the budget shown in Exhibit III.

Most of the courses will be taught by School of Business faculty, with the rest being taught by faculty in the Department of Statistics. The split between the two depends on the backgrounds of the students in the program. If there are more students who studied undergraduate business, the Department of Statistics will have a greater portion of the MSiBA students in their classes. The more statistics undergrads who apply, the more the work for School of Business faculty. The two new capstone courses will require FTE faculty, which would be from the School of Business and Statistics (one for each quarter course). Given the average costs of salaries in the two departments and assuming a teaching load of four courses per year, the budget assumes that the initial cost of teaching these courses to be \$115,000 each. The cost of additional faculty for other courses is substantially lower, at \$35,000 because these courses are not dedicated to MSiBA students and because they may be staffed in part with lecturers. These costs add up to \$265,000, as shown in line 6 of the budget. The cost of offering courses in this program is lower than in some other schools' business analytics programs because it is a joint program with some courses being taught by statistics professors (rather than entirely by business professors). According to Eleuterio, Kelly, and Pelesko (2019), who studied the cost of teaching college students using data from the National Study of Instructional Costs and Productivity, the cost of a mathematics credit hour averages \$163, compared to \$263 for business courses.<sup>8</sup>

Similar to existing graduate programs in the School of Business (MBA, Professional MBA, MFin and MPAcc), the program will require support staff to aid students in advising, to provide career counseling and to discuss admissions/recruit new students. Currently, the existing graduate programs staff in the School of Business has excess capacity to provide these services, especially as enrollment in the full-time MBA program is expected to remain low for the foreseeable future. Thus, a portion of the time allocated to the MBA program can be shifted to the MSiBA program. If the MSiBA program is successful, the staff required for admissions and recruiting may increase and a dedicated director of admissions and recruiting will likely be required. Thus, the expected costs included in Exhibit III represent a portion of the salary of one full-time employee for each of the staff areas (advising, career services and recruiting/admissions) and a future dedicated director. In steady state, the amount will increase for each category to recognize the needs of a larger MSiBA student population.

Given the capacity of existing classes and the minimal upfront costs shown in Exhibit III, the program is expected to have a net revenue that is positive in the first year of existence. If it were to be the case that demand for space in the program is sharply lower than that indicated by the experience of UCSD, the costs of the program would be adjusted downwards to recognize the reduced time spent on advising and career development.

The financial projections in Exhibit III include revenue that is diverted from the program to other parts of UCR and UCOP. To ensure that the fixed costs of the university, plus all operating costs (such as janitorial services and electricity) are covered in an SSP, the program is required to show that it is self-supporting even after paying the indirect cost charge of 33.7% (which is set across all programs at UCR). In addition, UCOP charges an assessment (currently, 2.5%) starting from year one, while UCR assesses 9.6% of the expenditures starting in year three. These assessments support programs and campus structures. Not included in the budget are application fees paid to the Graduate Division.

The Master of Science in Business Analytic program plans to offer graduate student support by reserving 10% of the gross fee revenue for student financial aid. There are no requirements regarding return-to-aid for an SSP, but the School of Business has found that, absent stipends and other forms of aid many domestic students will not consider attending. Financial aid is also helpful in attracting the highest quality students. Also, the tuition

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<sup>&</sup>lt;sup>8</sup> See the 2019 Delaware Cost Study AIRP Presentation at www.ire.udel.edu/cost.

for this program is set at a relatively low level in order to avoid sticker shock among Inland Empire applicants, who are generally from a lower income bracket. As the program grows, the School of Business Development officers will strive to attain donor commitments for scholarships for graduate students in the Master of Science in Business Analytics.

The net revenues, after payments to UCR and UCOP and financial aid to deserving applicants, will be split fairly between the School of Business and the Department of Statistics.

#### § 7.0 GRADUATE STUDENT SUPPORT

In addition to financial aid in the form of tuition reductions, graduate students in the program may serve as readers for undergraduate courses or as research assistants for professors in either department who work on applied statistical research. Some students may be eligible to work as teaching assistants.

#### § 8.0 GOVERNANCE

The program will be directed by an interdepartmental group of faculty that will include all of the faculty in AGSM and all of the faculty housed in Statistics. AGSM will have oversight through its Executive Committee. At the same time, CNAS will have oversight through its Executive Committee. Further oversight will be in place with the creation of a new Advisory Board for the program that includes all ladder-rank faculty from the Department of Statistics and from the OCSM, Marketing and Finance areas of the School of Business. Executives of Southern California firms and UCR alumni with appropriate expertise will be asked to serve on the board as well.

#### § 9.0 CHANGES IN SENATE REGULATIONS

The Master of Science in Business Analytics program will not require any changes in Senate Regulations at the Divisional level or in the Academic Assembly.

# EXHIBIT I COURSE DESCRIPTIONS

# Statistics Courses:

# STAT 205 Discrete Data Analysis (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160A, STAT 160B, STAT 160C or equivalents; or consent of instructor. Contingency tables, log-linear models, information theory models, maximum likelihood estimation, goodness of fit, measures of association, computational procedures.

# STAT 206 Statistical Computing (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160C or consent of the instructor. Topics include statistical programming, simulation studies, smoothing and density estimation, generating random variables, optimization, Monte Carlo methods, Bootstrap, permutation methods, cross-validation.

# STAT 208 Statistical Data Mining Methods (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 201A, STAT 201B, STAT 202A or equivalents; or consent of the instructor. Covers principal data-mining methodologies and applications. Includes Bayes and LDA classifiers, logistic regression and neural network classifiers, support vector classifiers, classification trees, predictive modeling, ridge and lasso regressions, k-mean and Dendogram clustering methods, business analytics and mining association rules. Features SAS and R programming language.

# STAT 232 Statistics for Business Analytics (4) NEW

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 023, 100B or equivalent, or consent of the instructor. Covers analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data with applications in business.

# MGT 233 Marketing Research (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

#### MGT 267 Applied Business Forecasting (4)

Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

# **Core Management Courses:**

#### MGT 202 Financial Management (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): graduate standing or consent of instructor; MGT 201 (may be taken previously or concurrently), MGT 211 (may be taken previously or concurrently) or equivalents. Provides a foundation in theories of finance. Topics include time

value of money, security valuation, financial institutions, theories of risk measurements, managing a firm's investment decisions, capital structure, and sources of financing for a firm.

# MGT 204 Cost and Management Accounting (4)

Lecture, 3 hours; outside projects, 3 hours. Prerequisite(s): MGT 211 or equivalent. A study of accounting information for managerial planning and control. Topics include managerial applications for product costing, budgeting, and performance evaluation; accounting techniques for modern manufacturing systems; activity-based accounting and cost management; international cost accounting systems; and the behavioral implications of accounting information.

#### MGT 207 Operations Management for Competitive Advantage (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

#### MGT 209 Marketing Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

# **Business Analytics Courses:**

# MGT 256 Business Analytics for Management (4)

Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet Management / 332 environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

# MGT 286A Capstone in Business Analytics I (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will propose a topic of inquiry that will use a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical techniques used to answer questions related to business operations and profitability.

### MGT 286B Capstone in Business Analytics II (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; MGT 286A or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will work on a project that was initiated in MGT 286A that uses a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical

techniques used to answer questions related to business operations and profitability.

# **Operations Electives Courses:**

# MGT 221 Decision Making Under Uncertainty (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

# MGT 239 Simulation for Business (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

#### MGT 258 Logistics and Supply Chain Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

# **Marketing Electives Courses:**

#### MGT 228 Consumer Behavior (4)

Lecture, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. Analyzes why people buy and examines purchase decision processes and outcomes. Studies current models of consumer behavior. Topics include brand equity, customer delight, global marketing, behavior modification, and strategic market analysis.

#### MGT 251 Market Assessment (4)

Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines advanced topics in marketing, with emphasis on quantitative tools to aid marketing decision making. Topics include demand and market-share forecasting, conjoint analysis, market segmentation and cluster analysis, brand positioning and competitive market structures, and assessing market response to price, advertising, promotion, distribution, and sales force.

# MGT 253 Internet Marketing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 209 or consent of instructor. Examines the role of the Internet in an organization's overall marketing framework. Discusses marketing applications of personalization, traffic generation, online search, community, online experience, and other current Internetenabled marketing techniques. Emphasizes Internet retailing.

#### MGT 257 Marketing Strategy (4)

Seminar, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. A framework is developed for strategic marketing planning. Topics emphasized include market audits and futures research, product-market identification, product portfolio balancing, target market strategy, and integrated marketing program planning. Relies heavily on an extensive computer-based market simulation.

#### Finance Electives Courses:

# MGT 227 Fixed Income (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): MGT 201. Covers analytical techniques related to fixed-income securities. Includes basic analytical tools in fixed-income markets. Topics include relative pricing of fixed-income securities, yield-curve estimation, securities with embedded options, and trading strategies. Utilizes interest rates swaps, mortgage-backed securities, and credit derivatives.

#### MGT 232 Derivatives and Asset Pricing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Explores the pricing of derivatives-based securities. Covers various topics in derivatives markets. Introduces pricing techniques for forwards, futures, options, swaps, and other derivatives. Utilizes empirical data and financial modeling.

#### MGT 244 Corporate Risk Management (4)

Lecture, 3 hours; written case analyses and reports, 3 hours. Prerequisite(s): MGT 202. Provides an overview of derivative financial instruments. Focuses on the use of derivatives to manage risk in a corporate setting. Utilizes the case-method to develop strategies and policies for managing the risk exposure of an enterprise, as well as to assess the relations between risk management and value creation.

#### MGT 252 Investments and Portfolio Management (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Discusses standard asset pricing models, portfolio theory, and empirical uses of securities data. Addresses pricing in the capital markets and empirical issues in testing asset pricing models. Other topics include risk-adjusted portfolio performance, term structure, bond pricing, and bond portfolio management.

#### MGT 295F Empirical Methods in Finance (4)

Seminar, 3 hours; individual study, 3 hours. Prerequisite(s): ECON 205A or equivalent or consent of instructor; doctoral standing in Management or consent of instructor. Covers econometric approaches to analyzing common problems encountered when conducting empirical research. Focuses on hypothesis testing, specification tests, general methods of moments estimation, the capital asset pricing model, multifactor asset pricing models, event studies, operating performance studies, simultaneous equations models, and endogeneity issues. Demonstrates programming in SAS and/or Gauss.

# EXHIBIT II PROGRAMS OFFERED BY CALIFORNIA UNIVERSITIES

# 2019 TFE Times

University	Ranking	Location	Program	Length	Tuition
UCLA	unranked	Los Angeles	M.S. in Business Analytics	13 months	\$62,579
USC	2	Los Angeles	M. S. in Business Analytics	18 months	\$58,674
UC San Diego	unranked	San Diego	M. S. in Business Analytics	12 months	\$58,000
UC Irvine	unranked	Irvine	M. S. in Business Analytics	12 months	\$55,000
UC Davis	unranked	Davis	M. S. in Business Analytics	12 months	\$58,916
Cal State East Bay	unranked	Hayward	M. S. in Business Analytics	9 months	\$26,595
University of San Diego	unranked	San Diego	M. S. in Business Analytics	9 months	\$54,720
Santa Clara University	unranked	Santa Clara	M. S. Business Analytics	15 months	\$60,720
UC Berkeley Extension	certificate	online	Certificate in Business Analysis	12 months	\$4,500

# EXHIBIT III FINANCIAL PROJECTION

1 2 3 4	Year-average Program Headcount  REVENUE  Annual Fee Per Student  Total Fee Revenue Generated  Other funds	15 \$52,000 \$780,000	20 \$52,000	30	50
2 3 4	REVENUE  Annual Fee Per Student  Total Fee Revenue Generated	\$52,000			50
2 3 4	Annual Fee Per Student Total Fee Revenue Generated		\$52,000		
2 3 4	Annual Fee Per Student Total Fee Revenue Generated		\$52,000		
4		\$700,000	732,000	\$52,000	\$52,000
	Other funds	۶ <i>۲</i> ۵0,000	\$1,040,000	\$1,560,000	\$2,600,000
		\$0	\$0	\$0	\$0
5	TOTAL PROGRAM REVENUE	\$780,000	\$1,040,000	\$1,560,000	\$2,600,000
(	COSTS				
A	A. Program Direct Costs, Subject to IDC				
6	Total Faculty Salaries	\$265,000	\$272,950	\$281,139	\$579,145
7	Additional career services staff	\$20,000	\$20,600	\$21,218	\$42,436
8	Additional graduate student advising staff	\$25,000	\$25,750	\$26,523	\$53,045
9	Additional admissions and recruiting staff	\$25,000	\$25,750	\$26,523	\$53,045
10	Total Staff Salaries	\$70,000	\$72,100	\$74,263	\$148,526
11	Faculty and Staff Benefits	\$128,645	\$132,504	\$136,479	\$278,880
12	General Assistance	\$0	\$0	\$15,000	\$15,450
13	S&E	\$30,000	\$30,000	\$30,000	\$45,000
	Equipment, Travel, Campus-based	\$0	\$0	\$0	\$0
14	activities	<b>Ş</b> U	ŞU	ŞU	ŞU
15	TOTAL DIRECT COSTS, SUBJECT TO IDC	\$493,645	\$507,554	\$536,881	\$1,067,001
E	B. Program Direct Costs, Exempt from IDC				
16	Financial Aid	\$78,000	\$104,000	\$156,000	\$260,000
17	Other S&E and equipment	\$0	\$0	\$0	\$0
18	UCOP and UCR assessments	\$12,341	\$12,689	\$13,422	\$129,107
19	TOTAL DIRECT COSTS, EXEMPT FROM IDC	\$90,341	\$116,689	\$169,422	\$389,107
20	TOTAL DIRECT COSTS (line 15 + line 19)	\$583,986	\$624,243	\$706,303	\$1,456,108
21	Program IDC Rate	33.70%	33.70%	33.70%	33.70%
22	Program Indirect Costs (line 21 x line 15)	\$166,358	\$171,046	\$180,929	\$359,579
23 1	TOTAL PROGRAM COST (line 20 + line 22)	\$750,344	\$795,289	\$887,232	\$1,815,688
	SURPLUS (DEFICIT) (line 5 minus line 23)	\$29,656	\$244,711	\$672,768	\$784,312
	SURPLUS (DEFICIT) PER STUDENT	\$1,977	\$12,236	\$22,426	\$15,686

# EXHIBIT IV COURSE SCHEDULE AND COURSES

# Sample Program I (student has a B.S. in Statistics)

# Quarter 1

•	MGT 256	Business Analytics for Management
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MGT 207 Operations Management for Competitive Advantage

MGT 202 Financial Management

• STAT 232 Statistics for Business Analytics

# Quarter 2

•	MGT 286A	Capstone in Business Analytic	cs I	ĺ
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MGT 221 Decision Making Under Uncertainty

• MGT 209 Marketing Management

MGT 204 Cost and Management Accounting

# Quarter 3

•	MGT 286B	Capstone in Business Analytic	s II
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• MGT 239 Simulation for Business

• MGT 258 Logistics and Supply Chain Management

• STAT 208 Statistical Data Mining Methods

# Sample Program II (Student has a B.S. or B.A. in Business)

# Quarter 1

• STAT 206 Statistical Computing

• STAT 205 Discrete Data Analysis

• MGT 256 Business Analytics for Management

• STAT 232 Statistics for Business Analytics

# Quarter 2

MGT 257 Marketing Strategy

MGT 286A Capstone in Business Analytics I

MGT 253 Internet Marketing

MGT 233 Marketing Research

# Quarter 3

MGT 286B Capstone in Business Analytics II

• MGT 251 Market Assessment

• STAT 208 Statistical Data Mining Methods

MGT 267 Applied Business Forecasting

#### **EXHIBIT V**

# ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC

#### 1. Name of Program:

Masters of Science in Business Analytics

#### 2. Campus:

University of California Riverside

#### 3. Degree/Certificate:

Master's Degree

4. CIP Classification: (to be completed by the Office of the President)

#### 5. Date to be started:

September 1, 2020

6. If modification of existing program, identify that program & explain changes.

Not Applicable.

# 7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?

#### **Program Differentiation**

There is a large and increasing demand and professional need for specialized master's programs in Business Analytics. Our program is designed to extend the training of students who have already shown an aptitude for quantitative analysis and expands their skill set to sophisticated analytics in operations, marketing and finance. This makes the program focused on the business applications of statistics and quantitative analysis rather than the tools for handling large amounts of data, which is in contrast to the program at UC Davis or the online Data Science degree offered by UCR. An increasing number of schools are offering masters level programs in business analytics, but the only ranked program in our area is that offered by the University of Southern California. Their program is much too small to serve the demands of Southern California and it is tilted towards data science rather than business. UCR will be unique in the UC system in offering a nine-month Master of Science in Business Analytics degree and will be one of only five UC universities to offer the degree. The program is also unique in that it is joint between Statistics and Business, which ensures rigorous quantitative training while ascertaining that the program coursework differ from the curriculum in a data science program.

#### 8. Type(s) of students to be served:

The Master of Science in Business Analytics will be offered as a 9-month program (48 units) for graduates of a baccalaureate degree in either statistics or a quantitative business discipline. The program will extend the training of students along two tracks so that both sets of students will have similar skill sets by the end of the program.

#### 9. If program is not in current campus academic plan give reasons for proposing program now:

Computing power and sophistication of software products has evolved to such a degree that there is now an entire new field combining business acumen with statistical analysis. Traditionally, students have focused on business with limited ability to analyze data or have focused on data analytics without much knowledge of its application to business. The demand for this degree is fairly new and UCR would be at the forefront of schools offering the degree. In addition, the regional market is underserved and this program will be an immediate source of net revenue.

#### 10. If program requires approval of licensure board, what is the status of such approval? Not Applicable

#### 11. Please list special features of the program:

The program has two tracks serving two types of students, depending on their undergraduate studies. This allows all graduates of the program to reach the same level of expertise in business analytics by graduation.

#### 12. List all courses required:

The following four courses are required courses for all MSiBA students: MGT 286A-B (Capstone in Business Analytics, a 2 quarter sequence), MGT 256 (Business Analytics for Management), STAT 208 (Statistical Data Mining Methods) and STAT 232 (Statistics for Business Analytics). In addition, students with an undergraduate business degree are required to take STAT 205 (Discrete Data Analysis), STAT 206 (Statistical Computing), MGT 233 (Marketing Research) and MGT 267 (Applied Business Forecasting). Required courses for students with an undergraduate statistics degree are MGT 202 (Financial Management), MGT 204 (Cost and Management Accounting), MGT 207 (Operations Management for Competitive Advantage) and MGT 209 (Marketing Management).

In addition, students are required to take three electives that form a concentration. The electives must be a group of three courses in either operations, marketing or finance.

#### 15. List any related program offered by the proposing institution and explain relationship.

We anticipate that the program will help us fill empty seats in the more technical courses offered in the existing MBA program.

#### 16. Summarize employment prospects for graduates of the proposed program.

The program will educate individuals for employment in all types of businesses that collect and organize data for the purpose of maximizing profits. These include large industrial firms, financial services firms and consulting businesses. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

#### 17. Give estimated enrollment for the first 5 years and state basis for estimate.

We project 15 students in the first year, increasing each year to reach 50 students in about five years.

# 18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.

Exhibit III contains our financial projections. Library Acquisitions, Computing, Facilities and Equipment are considered to be "in-direct costs" and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program. An increase in faculty FTE is shown by the increase in costs allocated to the Business School or Statistics Faculty. There will be only incremental facilities cost as we will use available capacity in existing classrooms, including statistical computing rooms. Over time as the program expands we anticipate having more students and likely a few more sections of that require more classroom space. The incremental rent, equipment and other elements of classroom space are included in the budget. We do not have specific equipment needs for the MSiBA program. Direct costs for the program include marketing and recruiting costs, and additional support staff, and financial aid at 10% of gross revenue.

#### 19. How and by what agencies will the program be evaluated.

An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter.

# EXHIBIT VI BYLAWS FOR THE INTERDEPARTMENTAL MASTER OF SCIENCE IN BUSINESS ANALYTICS PROGRAM

# University of California, Riverside

Master of Science in Business Analytics (MSiBA) Program Faculty Approval Date:	
Graduate Council Approval Date:	

#### **Article I. Objective**

The mission of the Master's of Science in Business Analytics (MSiBA) program is to deliver graduate level courses that will lead to the awarding of a M.S degree that combines business education with training in statistical analysis. This degree program shall be operated in conformance with the rules and procedures of the Graduate Division of the Riverside Campus of University of California. The expectation is that graduates from this program will assume positions in leading companies that have resources to carry out detailed analyses of marketing, operations, and financial data. To achieve this objective, a combination of rigorous coursework in both statistics and the technical areas of business (operations, marketing and finance) will produce students who are capable of analyzing datasets in ways that will enhance company profits.

As an interdepartmental program, the MSiBA program will involve faculty from Statistics and from Business. If in the future, the School of Business were to separate into more than one department the program will involve Statistics and whichever departments house faculty in operations, marketing and finance.

#### Article II. Degree Offered by the Program

The program offers the Master of Science (M.S.) degree (comprehensive examination Plan I).

# Article III. Membership

## A. Qualifications for Program Faculty Membership

The program faculty shall consist of persons at the University of California, Riverside, who are ladder-rank faculty in the School of Business and all ladder-rank faculty in the Statistics Department. Other faculty members may teach courses that are required for obtaining the degree, but the administration of the program will be conducted by the above-mentioned faculty.

All program faculty members will have the same full rights and privileges regarding the governance of the program, with the exception of the Program Director. The Director will belong to the School of Business or the Department of Statistics.

#### Article IV. Organization and Administration

The administration of the program and its activities will be supervised by the Director.

#### A. Program Director

The Director will be chosen by the deans of CNAS and Business. The director will be a faculty member in Statistics or Business. The director from the School of Business must belong to one of the following areas: Finance, SCOM, or Marketing. The Director is responsible for the overall organization and leadership of the program. The Director shall serve as the chief officer and spokesperson for the program and shall call and preside over meetings of the program faculty. The Director represents the program at the Business School Dean's meetings and at the CNAS Dean's meetings.

The appointment of the Director shall be in accordance with the regulations of the UCR Graduate Council. The Director will be appointed by the Chancellor for a term of three years, upon the recommendation of the Dean of the Graduate Division and the Deans of CNAS and the School of Business. The Director will alternate between the Statistics and Business Departments. Each respective school's EC shall solicit the names of nominees for a new Director when the position turns over to a professor from their school. The Graduate Dean, in consultation with the respective Deans, will forward his/her recommendation to the Chancellor, who makes the appointment.

#### **Article V. Committees**

#### A. Steering Committee

The members of the Steering Committee will be selected by the Director on an annual basis. All members of the Admissions and Recruitment Committee must be program faculty who are AGSM or Statistics Department faculty members. The Admissions and Recruitment Committee shall consist of

- The Graduate Program Director, who supervises the committee
- Six program faculty that represent as many different major field areas in the program as possible. Three will be from the Department of Statistics and three from the School of Business.

The functions of this committee shall include setting admissions criteria for the program and recommendations for their financial support. Admissions decisions are made by the Committee with input from the program faculty and in coordination with the admissions and recruiting staffs of AGSM and Statistics. The Committee will also be responsible for oversight of recruitment strategies, organization of prospective student visits to campus, and appropriate updating of the program website and print brochures. The committee is expected to work closely with the graduate admissions and recruiting staffs of AGSM and Statistics. The Committee is also responsible for the oversight of academic advising.

#### **Article VI. Meetings**

At least one annual meeting of the program faculty must be held in the Fall at the beginning of the academic year. Other meetings may be called as frequently and for such purposes as deemed desirable by the Graduate Program Director. Meetings will be conducted according to Robert's Rules of Order. Minutes of the meetings shall be kept by the AGSM or CNAS staff and shall be distributed to all program faculty within ten days of the meeting.

#### **Article VII. Quorum**

A quorum consists of 50% of the eligible program faculty. Passage of motions shall require a simple majority of the MSiBA program members who are present at the meeting. Voting may also be done by electronic ballot.

# **Article VIII. Amendments**

Amendments and revisions to the bylaws may be proposed by either the AGSM faculty or the Statistics Department Faculty by petition of 20% or more of the faculty in either department. Proposed amendments shall be either discussed at a meeting which satisfies quorum requirements or distributed by electronic mail to the program faculty members at least one week before distribution of the relevant ballot. Passage of an amendment to the bylaws will require at least a majority of those voting by electronic mail. All amendments and revisions must be submitted to the UCR Graduate Council for review and approval.

# EXHIBIT VII LETTERS OF SUPPORT FOR THE PROPOSED MASTER OF SCIENCE IN BUSINESS ANALYTICS (MSiBA) PROGRAM

Exhibit VII includes letters of support from the following individuals:

Professor Sanjiv Das, Co-Director Masters of Business Analytics Program, Santa Clara University

Ms. Payal Shah, UCR Alumna, Ph.D. Statistics

Mr. Jesse Cota, UCR Alumnus, B.A. Business Economics

Mr. Minh Ly, UCR Alumnus, B.S. Statistics

Ms. Tricia Haderlie, School of Business Career Development Center Advisory Board member

Professor Karsten Hansen, Professor of Marketing, UC San Diego

Mr. Jefferson Hammann, Walmart

Professor Steve Sault, Interim Director, Research School of Finance, Actuarial Studies and Statistics, Australian National University

Professor Abel Rodriguez, Professor of Applied Math & Statistics and Associate Dean for Graduate Affairs, UC Santa Cruz

Professor Fernando Zapatero, Professor of Finance and Business Economics, University of Southern California

Professor Yongtao Guan, Professor of Management Science, University of Miami

Professor Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Professor Terrence August, Associate Professor of Innovation, Technology and Operations, UC San Diego

Professor Philip Kaminsky, Executive Associate Dean and Professor of Engineering, UC Berkeley

Professor Jean-Pierre Fouque, Professor of Statistics, UC Santa Barbara

Professor Charles Corbett, Professor of Operations Management and Sustainability, UCLA



Ocotober 21, 2017.

To: Professor Jean Helwege

Re: UCR Business Analytics Masters Program (MSiBA)

I am writing in support of your MS in Business Analytics proposal. I believe that with less than an additional year of coursework, your undergraduate students with a grounding in subjects such as math, statistics, quantitative business, engineering, etc., would be able to rotate into analytics and graduate with a Masters degree with sufficient training to be employed as entry-level hires in the vast array of Analytics jobs that remain unfilled today. In short, the basic proposition of the degree is well thought out, based on market demand, and satisfies a need in the job market.

I am the William and Janice Terry Professor of Finance and Data Science at Santa Clara University, and previously held appointments as Associate Professor at Harvard and Berkeley. My fields are quantitative finance and theoretical and applied computer science. I work at the interface of both fields, and supervise undergraduate and graduate students in both areas. My CV is available at <a href="http://srdas.github.io/">http://srdas.github.io/</a>. I am also a member of the advisory board of MIT's Consortium for Risk Analytics, and a Senior Fellow at the FDIC. I am the founder and co-director of the MS in Business Analytics (MSBA) program at SCU and we are based in the heart of Silicon Valley (Santa Clara county is Silicon Valley), so I am keenly aware of the growing demand for analytics skills.

I believe the goals of the program are differentiated well from other offerings. The key idea is that this program is not meant to produce more "data scientists" — a programmer with data and statistics skills. Data scientists play more technical roles at the intersection of computer science and statistics, but do not have business perspective. There is a greater proportional shortage of people who can ideate business propositions from data. Such people need a solid grounding in economics, finance, marketing, supply chains, where knowledge of business paradigms is key. I believe that the MSiBA will fill a huge gap for "business analysts" in the job market, as opposed to the gap for data scientists. My own estimation is that there are many more jobs for data scientists, which are being filled by software engineers with some coursework in handling data using machine learning. But, even though there are fewer jobs for business analysts, the percentage of these roles being filled is much smaller. This is the niche you are trying to fill and

it is a big opportunity. My own program at SCU is aimed at exactly the same market. We graduated our first cohort and placed them all, and this year we have tripled the size of the program for the cohort beginning in Fall 2017.

When we began our MSBA program, the intention was identical to yours, i.e., track our undergrads into it and enable them to continue on for a value-add degree. We were surprised and overwhelmed by the external demand for the degree, which led us to open it up to an external market. I suspect you may end up doing the same. As many of the major tech names begin to build and extend campuses in the LA region, you will find a natural home for some of your graduates, but the demand from startups is also high, especially for people who are not just programmers, but business thinkers as well. I think the courses you have will serve the students well, and the only course I see that would be useful to add on is a course on machine learning, which is an essential part of the training that analytics students must have.

Your proposal envisages a small initial cohort of 15 students. Your program will change rapidly as you learn from doing with feedback from employers, but I would also give thought to how to scale the program as you will likely be pleasantly surprised by the demand for it. There will be a need for faculty to rotate into teaching a skill set that extends beyond what is currently the provenance of business school education. This is a good challenge to have, and your program will add a new energy to both, your undergraduate and graduate programs. I believe it is a well thought out proposal, and I heartily support it.

Sincerely,

Sanjiv R. Das | William and Janice Terry Professor of Finance | Leavey School of Business | Santa Clara University |Tel: (408)-554-2776 | srdas@scu.edu | <a href="http://srdas.github.io/">http://srdas.github.io/</a>

November 1, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

# Dear Dean Uhrich,

I am writing to offer my support of the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Math and Statistics, M.S. in Statistics, and a PhD in Applied Statistics. Since graduating with my PhD, I have spent the last eight plus years in a career building statistical models to use as a tool in making important business decisions. I currently work in the Consumer Modeling and Analytics team at Bank of America as Senior Vice President, Quantitative Operations Manager.

I believe this program is helpful in preparing students for similar careers. Many people who have extensive training in statistics have little formal training in business. Time must be invested to learn this on the job, while graduates of this program would start the job with more of the relevant skills and training required on the business front as well.

In particular, the Statistics UG track with the finance concentration would really help someone with a strong statistical background who wants to work in a quantitative realm within the financial industry be better prepared. Hence, I truly believe this program will be a great resource and want for students with similar career interests.

Sincerely,

Payal Shah

Pshah1122@gmail.com

P.K 180

(951) 237-3517

Jesse Cota Senior Financial Analyst Agua Caliente Band of Cahuilla Indians jesse@cota.email (760) 625-4843

November 20, 2017

University of California Riverside Riverside, CA 92521

Honorable Members and Chairs of the different relevant departments:

As a member of the Inland Empire community and an alumnus of UCR, I am honored and enthusiastic in making a case for the one-year Master of Science in Business Analytics (MSiBA) program. I graduated in 2010 with a B.A. degree in Business Economics. My theoretical background was very well cemented, but I found myself lacking the practical skills in business analytics needed to be competitive in the labor market. It was only after a few years in the workforce and after having completed a master's degree from the School of Advanced International Studies at Johns Hopkins University (SAIS) that I began to obtain and improve skills in statistical analysis, econometric methods, data modeling, data management, and business intelligence among others.

Given today's abundance of professionals with bachelor's degrees, being able to differentiate oneself from the many is key. In addition, the current trend of corporations, government agencies, NGOs, and other organizations to make only decisions that are driven by data will continue to increase as server memory and computing power improve. With the proper advice, undergraduate students of accounting, business, economics, finance, statistics and related disciplines may guide their studies toward the goal of being admitted to the MSiBA program and hence make themselves competitive with the right mix in their skillset.

As a professional in the sector of business analytics, I witness on a day-to-day basis the need for better efficiency, analysis, and management of operations data. If more students graduate with the acumen and knowledge on how to treat, extract, transform, load, and analyze data, organizations hiring them will increase their added-value and efficiency. Therefore, I strongly recommend the creation of the one-year MSiBA program to the members and chairs of the different relevant departments within the University of California, Riverside. Should you have any questions, or would like further information, please do not hesitate to contact me at the email or phone number above.

Faithfully yours, Jesse Cota November 3, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

# Dear Dean Uhrich,

I am writing to give my support to the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Statistics – Quantitative Management in 2004, and have since then built a career in business operations. I currently work at Gigamon as Senior Manager, Demand Planning.

When I heard about the proposed MSiBA program, in particular, the Statistics UG track with the Operations concentration, I knew this would be a great program for students who are trained in Statistics have a better understanding of business operations. These are both tools that are used daily in my field. I think this will be a great program to prepare people, who are considering similar careers, with the relevant skills.

Best Regards,

Minh Ly

Minh.P.Ly@outlook.com

(909) 382-1618



February 12, 2018

Yunzeng Wang, Ph.D Dean, University of California, Riverside School of Business Riverside, CA 92521

Dear Dean Wang,

I am writing to offer my support for Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM. Businesses are in need of qualified professionals who have demonstrated their knowledge, skills and abilities by achieving a master's degree in this field.

Our organization is a non-profit and as such, it is vital for us to better understand the large amounts of data we have about our customers, programs, and costs in order to improve our operations and services, especially in a time when grant dollars are not readily available. Over the past two years, our organization had the privilege to host a couple of MBA Fellows; both concentrated on analytics and their work made an impact for us. A program dedicated to this would be instrumental in the non-profit and for profit worlds.

Sincerely,

Tricia Haderlie

SVP, Talent & Training

Satura a Spadestie











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9500 GILMAN DRIVE #0554 LA JOLLA, CALIFORNIA 92093-0554 WEB: www.rady.ucsd.edu

Karsten T. Hansen Professor of Marketing Rady School of Management E-mail:k4hansen@ucsd.edu Phone: (858) 822 7462

February 14, 2018

Yunzeng Wang Dean, School of Business University of California – Riverside Riverside, CA 92521

Re.: Degree proposal of MSiBA program, UC Riverside

Dear Dean Wang,

I am writing to offer my support for a new program in business analytics at UC Riverside. The proposed MS degree in business analytics (MSiBA) program will provide a valuable service to students in the Inland Empire as well as to the businesses that hire them. For reference, my background is 15 years of research in Quantitative Marketing with a specialty in "big data" analytics. Furthermore, my own school at UC San Diego launched a similar MSBA program in 2016 and I am quite familiar with many of the details in setting up a program like the one UC Riverside is proposing.

The MSiBA program is designed to ensure a high level of scholarship by combining the expertise of both statistics and business professors who will teach in this interdepartmental program. The admissions criteria also help ensure a high level of scholarship, as only those students who have already been trained in one of the two areas of study will enter the program. The two quarters of capstone courses also add to my confidence that graduates of this program will be able to apply their training in a real business environment.

The need for students trained in the area of business analytics is large and growing. This is a great opportunity for students from underrepresented groups to obtain professional training that will enhance both the financial aspects and prestige of their future careers. As a university that values the diversity of its undergraduate population, UCR will benefit greatly from extending this environment to its professional schools.

Overall, I think the directors of the proposed program have put together a very clear, detailed presentation of the program proposal and I think they make a convincing case for starting a MSiBA degree program at UCR. In sum, I believe this program will greatly enhance the reputation of UCR, the economy of the Inland Empire, and opportunities for underrepresented groups.

Best,

Karsten T. Hansen

February 22, 2018

Dr. Yunzeng Wang Dean, UCR School of Business University of California, Riverside Riverside, CA 92507

Dear Dean Wang,

From our first meeting in 2014 through my work on the CDC Advisory Board to the A. Gary Anderson Graduate School of Management, I have enjoyed unrivaled academic partnerships and community support, as well as lasting professional relationships and camaraderie which will transcend our formal assignments to our respective institutions. Through our board work, I have recently learned of Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM.

Having worked in corporate supply chain with Walmart for more than 16 years, as well as seven years with various governmental agencies, I would be remiss to not offer support to this proposal. I have taken the opportunity to review the related materials as well as reflect on the applications of such training to professionals in my field. Data analytics applications in complex business problem-solving are at the forefront of my field, and we are always in search of such talent that can leverage continued growth into our business.

Supply chain in general, and the retail sector in particular, are becoming increasingly competitive in an omni-channel world. Such a track of study would certainly have interested me had it been available at the time I pursued masters-level work. I would look forward to seeing this program in implementation and action, particularly with regard to the professionals that will graduate to successful careers in the supply chain space.

My thanks in advance for your consideration.

Sincerely,

Jefferson Hammann

jeffersonhammann@gmail.com

951.675.1979 mobile

Australian National University

**Associate Professor Steve Sault** 

Interim Director Research School of Finance, Actuarial Studies and Statistics College of Business and Economics

> T: +61 2 6125 4869 E: stephen.sault@anu.edu.au

3 August 2018

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

**RE: Master of Science in Business Analytics** 

Dear Dean Uhrich,

I write in strong support of the proposal for a Master of Science in Business Analytics to be offered at UC Riverside. Indeed, at the Australian National University we developed a similar program in 2015 in which the School of Finance, Actuarial Studies and Statistics teaches the statistics component. Particular strengths of the proposed program at UCR include:

- The cross-collaboration nature of the of the program which is being instructed across both the School of Business and Department of Statistics – this ensures that each course is instructed by academics with expertise in the particular subject matter, rather than courses being instructed by academics in a different field.
- The focus of the program on emphasising the three business topics of marketing, finance and operations also sets the program apart from traditional "data science" centric programs which concentrate on computer coding etc. This enables the program to capture a strong market interest in business analytics within finance and operations.
- The requirement that students come from a cognate background in quantitative business or statistics is a good approach and ensures that by the end their studies, all students will be at the same level of competence in business and statistics. While studying, students can focus on areas that they are less "proficient" in, to ensure that as graduates they have the skill set necessary to be attractive to employers.

The Australian National University | Canberra ACT 2601 Australia | CRICOS Provider No. 00120C

A highlight of the program are the two quarters of capstone courses offered within the program. These capstone courses will help to ensure high quality, well-trained

graduates.

As mentioned previously, the Australian National University developed a similar program in

2015, the Master of Applied Data Analytics. While this program also has a computer science

element, it is similar to the proposed Master of Science in Business Analytics as it involves

a cross-collaboration between three Colleges (College of Business and Economics, College

of Arts and Social Sciences and College of Engineering and Computer Science). Our School

teaches the statistics component into the degree. This program also has a heavy focus on

business, statistical analysis while also encompassing public policy initiatives. Within the

past 3 years, this program has grown to a student cohort of 50 students, a number similar

to the goal of the proposed program at UCR.

In summary I believe that the proposed program at UCR has been well crafted and will prove

to be robust and popular. I am certain it will attract a high quality student cohort, and be

sustainable in terms of the numbers attracted. I also trust that the program will enhance the

reputation of UCR for delivering programs of excellence that are in demand.

Yours sincerely,

Steve Sault

Interim Director

### UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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+1 (831) 459-4822 FAX +1 (831) 459-4829

APPLIED MATHEMATICS & STATISTICS BASKIN ENGINEERING BUILDING SANTA CRUZ, CALIFORNIA 95064

August 26, 2018

Jean Helwege Professor of Finance School of Business Administration University of California, Riverside

### Re: Proposal for a Self-Supporting MS Program in Business Analytics

Dear Dr. Helwege,

I am writing to express my support for the new Master of Science in Business Analytics (MSiBA) program being jointly proposed by the Department of Statistics and the Gary Anderson Graduate School of Management at the University of California, Riverside. The structure of the program, which brings together expertise from faculty in business and statistics, is a key strength of the program that will appeal to students interested in business but with a strong quantitative training.

For background, I am a Professor of Statistics at the University of California Santa Cruz. In addition, I currently serve as Associate Dean for Graduate Affairs in Baskin School of Engineering and as Associate Director of the Center for Data, Discovery and Decisions. In the past, I have served as the Chair of our Division's Senate Committee on Planning and Budget, and our representative to its university-wide counterpart. Because of this background, I have substantial experience both in the design and review of Self Supporting Programs, and I think I can provide a unique perspective on the proposal being put forward.

The program aims to "expand the training of students with analytical backgrounds to allow them to apply their skills to business data". The curriculum, which is rigorous, reflects this goal. Unlike most other programs in business analytics, the curriculum of the MSiBA at Riverside is biased towards traditional courses on business and management. According to the proposal, this has the additional advantage of using spare capacity in existing courses. While this choice of curriculum clearly differentiates the MSiBA from the other business analytics programs in the UC system, one potential concern is that it might not provide enough differentiation with respect to the standard MBA programs offered by the Gary Anderson School of Management, or by other UC campuses. The proposers might want to consider expanding the list of elective sequences to allow students to get further technical skills in statistics and data analysis if they so desire.

At nine months, the proposed program is also somewhat shorter than the rest of the business analytics programs offered in the UC system (which are typically 11 to12 month long). While there are some high-ranking programs that have a similar length (e.g., University of Arizona), and the shorter duration provides another important differentiator within California, this is a very accelerated time table. Students often need some time to fully absorb and integrate concepts. One way in which other programs have dealt with this issue has been by (1) integrating required courses through shared projects, and (2) requiring a series of capstone/professional development courses that build on each other and

provide opportunities for students to use skills acquired in different courses. I wonder if a similar approach could be helpful in the case of the MSiBA.

In spite of these small caveats, I would like to emphasize that this is a strong and well designed program that will serve a clear need in terms of workforce development. I wish you and Prof. Cui success with the review and launch of the program. Please do not hesitate to contact me if you need any further information.

Sincerely,

Abel Rodríguez

Professor

Department of Applied Math & Statistics Associate Dean for Graduate Affairs

Baskin School of Engineering e-mail: abel@soe.ucsc.edu

phone: +831 459 1047



### FINANCE AND BUSINESS ECONOMICS DEPARTMENT

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance Professor of Finance and Business Economics

August 30, 2018

Dean Kathryn Uhrich CNAS Geology 2258 Riverside CA 92507

Dear Dean Uhrich,

Professor Jean Helwege asked me to provide an assessment of the UCR proposal of a MS in Business Analytics. In this letter I express my opinion on the proposal she has sent me.

First, I have to emphasize the relevance and timing of such a program. It is no secret that companies of all types and industries depend more on data analysis for their decisions and need to hire people who are able to do such an analysis. This is especially the case in marketing and finance. However, they often have to hire graduates with technical backgrounds —as computer science and statistics—because the students with business background lack the data analysis knowledge required by many jobs. This is by no means a perfect solution because these graduates lack an understanding of the business aspects of the organizations and require a lot of guidance and, at least initially, cannot have managerial responsibilities. In sum, there is a large market for the proposed program that universities in our region are not attending.

In fact, the only similar program in the area —as pointed out in the proposal—is our own MS in Marshall. I was the Vice Dean for graduate programs responsible for its launching. I initially faced strong resistance from the administration, but I can reassure you that they could not be happier now that they went along with the proposal. The program receives many hundreds of applications every year—last time I checked over one thousand—but can only accept a small number of students for capacity limitations—determined by faculty size and classrooms availability. There is plenty of room for similar programs in the area. Furthermore, the program proposed has its own emphasis that makes it different from ours and would be preferable for many students.

University of Southern California



In particular, our program focuses on the data analysis and somehow overlooks the applications. I think this is a result of our large size that makes departments very protective of their turf and leads programs to miss on the interdisciplinary opportunities that your proposal exploits and will probably make it more marketable.

Finally, I have to point out that, in my opinion, timing is very important. It is a matter of time before other schools in the area offer similar programs. As you know rankings are sticky and being early in the game provides the opportunity to establish a reputation and achieve a good ranking before the market saturates.

I will be happy to elaborate more if you think that will be useful.

Best wishes,

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance

Professor of Finance and Business Economics

# UNIVERSITY OF MIAMI SCHOOL of BUSINESS ADMINISTRATION



Department of Management Science 5250 University Drive, KE 401 Coral Gables, FL 33146 Phone: 305-284-6595 Fax: 305-284-2321

To: Professor Kathryn Uhrich
Dean of the College of Natural and Agricultural Sciences
University of California at Riverside

Dear Professor Uhrich,

I am writing to offer my support to your proposed Master of Science in Business Analytics (MSiBA) program at UCR. In recent years, many MS programs similar to the proposed MSiBA program have been developed in the US, including the MS in Business Analytics (MSBA) program that we offer at the Miami Business School. These programs are designed to meet the ever increasing demand of analytical talents from nearly all sectors of business and industry. A program like this typically takes about a year or less, and graduates from such programs are well placed in the job market. The trend is here to stay, and I believe that programs alike will be self-sustainable for a long term.

I am the Leslie O. Barnes Professor and Chair of Management Science at the Miami Business School. I am also Director of the Deloitte Institute for Research and Practice in Analytics at the University of Miami. I previously held positions as Assistant and Associate Professors at Yale University and Assistant Professor at the University of Miami. I became the chair of Management Science in 2013. Under my leadership, our school launched the MSBA program in 2014. The number of enrolment for this program has been steadily increasing, with 11 in 2014 to more than 90 students in 2018. So far, we have had four cohorts of graduates, who found employment in big name companies such as Amazon, Capital One, Deloitte, NBC Universal, Visa amongst others. Their starting salary varies greatly with experiences, ranging from 60k to over 100k. Interests in this degree have increased dramatically – we received more than 500 applications for this program in 2017-2018, which nearly doubled the number of applications that we received in 2016-2017.

The MSBA program not only provides additional revenue to the university, but also creates new synergy to support faculty research. We currently charge 2030 dollars on tuition per credit hour. With more than 90 students and after having deducted scholarships, we are expected to generate well over 4 million dollars of revenue this year. To boost the reputation of our program, we have hired four tenure-track faculty members since 2014. The new faculty bring new expertise in areas such as statistics, machine learning, and operations research.

As a business professor with background training in statistics, I fully understand the importance of analytical skills in contemporary business operations. With an additional year of business training to students with analytical background (such as statistics, computer science and math), or analytical training to students with business background, the students are better prepared for the job market. The proposed curriculum is well-conceived and the proposed new courses on Statistics for Business Analytics and Statistical Data Mining are much needed in a program like this.

As mentioned in the proposal, there are not many similar programs in California, which hosts the headquarters of many technology companies. Although somewhat surprising, this presents a great opportunity for UCR to establish itself as a frontrunner and leader in this area. Based on my knowledge of the faculty at UCR Statistics Department and the Business School, I believe that they are well-positioned to develop such a program. I therefore support the proposed program fully.

You're sincerely,

Yongtao Guan

Leslie O. Barnes Professor and Chair of Management Science

The Miami Business School

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SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS & THE ERNEST & JULIO GALLO MANAGEMENT PROGRAM

UNIVERSITY OF CALIFORNIA, MERCED 5200 NORTH LAKE ROAD MERCED, CA 95343 (209) 228-7742 (209) 228-4007 FAX

To: Jean Helwege, Professor of Finance, UC Riverside

From: Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Re: M.S. in Business Analytics

Date: September 6, 2018

Having read the joint proposal by faculty in the School of Business and by the faculty in the Department of Statistics, and based on my direct experience with several schools, such as the University of Illinois, Urbana-Champaign, where I taught Business Statistics, North Carolina State University, where I taught Corporate Finance, Harvard Business School and UC Merced, I am writing in strong support of the proposed M.S. in Business Analytics at UC Riverside.

Because Business Analytics involves harnessing the information provided by data (including big data) and models via statistical and quantitative methods in order to improve business performance, a joint proposal by the School of Business and the Department of Statistics will allow the exploitation of synergies between the two academic units while reducing operational expenses. At the same time, the joint degree will offer an avenue for students with an undergraduate degree in a quantitative business major to enhance their skills via rigorous training in Statistics through the Statistics track, and to students with an undergraduate major in Statistics to improve marketability via the acquisition of business skills through the Business track. The distinction between two tracks, enables the delivery of the Master's program in three quarters, which is inline with the current trend of one-year professional degrees. In fact, our own new MM (Master's in Management) is a one-year professional degree. Unlike two-year MBA degrees that require substantial prior business experience and can be quite expensive both to students and in terms of delivery costs, one-year fast-track professional degrees can be deployed quickly with existing resources and are more appealing to both parties.

What distinguishes this proposal from other existing fast-track and traditional Master's programs is the cooperation with the Statistics Department and the rigorousness ascertained through the emphasis on quantitative and statistical methods. By contrast, MBA degrees attract students with a variety of backgrounds and frequently rely on quick back of the envelope calculations.

To conclude, based on my professional experience, as well as on my Senate service as a member of the UC Merced DivCo for three years and on the systemwide Academic Senate for one year, I have no hesitation in strongly recommending this proposal.

Tel: (209) 228-4640 E-mail: ftsoulouhas@ucmerced.edu Web page: http://tsoulouhas.info BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



RADY SCHOOL OF MANAGEMENT 92093-0553

9500 GILMAN DRIVE #0553 LA JOLLA, CALIFORNIA

WEB: www.rady.ucsd.edu

Yunzeng Wang Dean, School of Business University of California, Riverside Riverside, CA 92521-0203

September 15, 2018

Dear Dean Wang,

Thank you for providing me with a copy of the program proposal for a Master of Science in Business Analytics at UC Riverside, School of Business. I am currently the co-chair of the MSBA degree program at UC San Diego, Rady School of Management. I worked with Professor Vincent Nijs to design the program here at Rady and have also helped to organize our Center for Business Analytics. Over the past few years, we have reached out to many corporate stakeholders in the greater San Diego region to better understand their unmet needs in the area of business analytics and ensure that our degree program and research center were viewed as synergistic. We are now in the third year of offering our MSBA degree program and have learned quite a bit along the way. I served as a reviewer of the MSBA degree program proposals at UC Davis, UCLA, and UC Irvine and am therefore familiar with all of the degree programs in business analytics within the UC system.

With this backdrop, I would like to convey my impression of the proposed program at UC Riverside and offer some feedback as well. First, the program is uniquely designed in comparison to existing programs by strategically focusing on admitting undergraduates with either statistics or quantitative business backgrounds. To me, this is a clever design in that it reduces the variance of inputs and will make it easier to ensure students working in teams are close in their abilities. Our program at Rady has relatively broader acceptance criteria, which has certainly presented challenges over the past few years. One of the reasons I believe this aspect of UC Riverside's MSiBA proposal is a safe one is because the demand for this degree is very large. At Rady, we have seen applications grow from just over 300 in year 1, to over 700 in year 2, and approximately 950 this year. There are way more qualified students than we can possibly admit, and having more business analytics degree programs within the UC system would better serve the needs of individuals seeking to become business analytics professionals. Because I expect UC Riverside to also face strong demand, even a focused strategy on statistics and business undergraduate majors would not be a limiting one.

Second, this proposal seems to be a relatively more efficient one in its use of existing courses in the graduate degree programs currently offered by the School of Business and Statistics

department. Because existing sections of these courses are not operating at capacity, this proposal will be able to generate substantial revenue for the school while filling empty seats. It's good to see a proposal that aims to make more efficient use of resources; this is a problem sadly facing many of our schools. The associated cost savings above may justify some future electives that are specifically catered to business analytics students. At Rady, students find our Customer Analytics course to be a critical elective because it has students practicing the application of statistical and machine learning models on business problems over and over again. In this sense, it is the elective that best prepares students for the capstone projects in our program.

Third, having specialization tracks in the areas of operations, marketing and finance is unique in the UC system. Explicit tracks will enable students to focus on a specific business function and also create sub-cohorts that can be managed together. Overall, I like this structure. My experience has also taught me to be careful with self-imposed constraints. In that vein, I might suggest adding in the ability to have increased flexibility (perhaps by exception or suggested tracks as opposed to mandatory). From what I've seen at Rady, students are interested in *particular* courses, independent of discipline. We have also had many international students with degrees in business that are already specialized in finance. These students typically have minimal operations or marketing exposure, and may benefit from mixing across our marketing and operations electives.

In closing, I am supportive of the MSiBA program presented in this proposal. It is very well thought out and designed with aspects that make it unique within the UC system. I think it will be a very attractive one particularly for students who have majored in statistics and are looking to better understand business functions and the application of their knowledge in the business domain. I anticipate that the program will be successful in achieving its goals.

Sincerely,

Terrence August

Fenerce Logust

Associate Professor of Innovation, Technology and Operations Rady School of Management University of California, San Diego taugust@ucsd.edu (858) 822-7452

# UNIVERSITY OF CALIFORNIA, BERKELEY

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PHILIP M. KAMINSKY
EXECUTIVE ASSOCIATE DEAN AND CHANCELLOR'S PROFESSOR OF ENGINEERING
UNIVERSITY OF CALIFORNIA
COLLEGE OF ENGINEERING
320 McLAUGHLIN HALL # 1700
BERKELEY, CA 94720-1700

TELEPHONE: (510) 642 5771 FACSIMILE: (510) 642-9178 email: kaminsky@berkeley.edu

September 19, 2018

Jean Helwege University of California -- Riverside Riverside, CA 9251

RE: <u>Proposal for an Interdepartmental Graduate Program Leading to the Master of Science in</u>
<u>Business Analytics</u>

Dear Professor Helwege:

I am writing to express my support for the proposed Master of Science in Business Analytics (MSiBA) degree at UC Riverside. I am on the faculty of the Department of Industrial Engineering and Operations Research at UC Berkeley, a department whose course offerings overlap with the contents of this new degree.

There is no doubt in my mind that the MSiBA will meet a growing need (indeed, similar to the need met by some of the graduates of our professional master's degree). Businesses are facing increasing amounts of data, and are desperate for employees with the training to use that data to make effective business decisions. I have observed a constant clamor from our industrial advisory board for the type of students that this program will train, knowledgeable in both analytics, and the basics of business.

I've reviewed the degree proposal, and several things stand out. The proposed program clearly covers the key topics necessary in this area, and it does so efficiently, in a way that expands career opportunities for students in just nine months. It also does so, as far as I can tell, primarily by using existing campus resources. Furthermore, the two semester capstone component will prepare students to use these skills in a real-world setting.

In summary, the proposal strikes me as well thought out, well written, and comprehensive. This degree seems to be a low-risk addition to the UCR degree portfolio, one that will meet a definite need in the state, and do so in a way that is likely to enhance the reputation of UC Riverside.

Sincerely,

1

Philip M. Kaminsky Executive Associate Dean College of Engineering

### UNIVERSITY OF CALIFORNIA, SANTA BARBARA

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SANTA BARBARA . SANTA CRUZ

DEPARTMENT OF STATISTICS AND APPLIED PROBABILITY SANTA BARBARA, CA 93106-3110 805-893-2129 \* FAX 805-893-2334 www.pstat.ucsb.edu

Jean-Pierre Fouque
Distinguished Professor
Director of the Center for
Financial Mathematics and Actuarial Research
fouque@pstat.ucsb.edu
http://www.pstat.ucsb.edu/faculty/fouque

September 24, 2018

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

### Comments on the proposed Master of Science in Business Analytics

Data Science is multi-disciplinary in nature, ranging from Statistics, Computer Science, and application areas. The proposed Master in Business Analytics is based on Statistics and applications to Business. I find the idea very appealing and extremely well-suited to a one-year master program. Of coure, the admitted students need to be well-prepared in one of these two areas. This is clearly stated in the description of the program which is jointly administered by the School of Business and by the Statistics Department.

There is no question about the need of training in business decisions made by using the enormous amount of data in this area and the machine learning techniques. As described in the document, this program is at the right level (Master), it targets the right students (with strong undergraduate background in either Statistics or Quantitative Business), and it fits well the STEM designation. The program is also well-positioned with respect to the more classical MBAs.

Regarding its relationship with other similar programs in the UC system, the most comparable one is at UCSD but most of the other campuses do not offer one yet. If UC Santa Barbara had a Business School, I would be the first to promote the idea of such a program.

The details of the description, administration, admission, curriculum, evaluation, and resources, are well thought out and, in my opinion, this program will be very successful and competitive in the growing job market in this area.

As a UCSB faculty, I can only applaud and support this initiative at UCR.

Sincerely,

Jean-Pierre Fouque Distinguished Professor Director of the CFMAR



#### Charles J. Corbett

IBM Chair in Management Professor Of Operations Management and Sustainability

Tel +1 (310) 825-1651 Fax +1 (310) 206-3337 charles.corbett@anderson.ucla.edu

Los Angeles, September 24, 2018

To whom it may concern,

This brief letter serves to express my support for the proposed Master of Science in Business Analytics (MSiBA), to be offered by the Anderson Graduate School of Management at UC Riverside.

Offering such a program at UC Riverside seems a sensible move, for the reasons mentioned in the proposal. There are numerous synergies with the programs already offered by the Department of Statistics and by the School of Business at UCR. The proposal mentions that the program is expected to be a significant source of revenue; the enormous volume of applications to the Masters of Science in Business Analytics that we recently launched at the UCLA Anderson School of Management would support such an expectation.

The design of the program is appealing, with slightly different areas of emphasis for students depending on whether their prior training is more in business vs. more in statistics.

The skills needed to teach courses in this program are generally closely aligned with those of many faculty in business schools (and statistics departments). Especially many recent PhD graduates and current PhD students are increasingly expert in the analytical methods that underlie the MSiBA program, so the fit between faculty expertise and program needs will likely become even better over time.

I hope this letter is helpful

Those Cashin

Sincerely,

Charles

# EXHIBIT VIII BIOGRAPHIES OF SELECTED PARTICIPATING FACULTY

Exhibit XI includes biographies of the following professors:

### Statistics:

Xinping Cui, Department Chair and Professor James Flegal, Associate Professor Daniel Jeske, Professor Yehua Li, Professor

#### **Business:**

Subramanian (Bala) Balanchander, Professor Alexander Barinov, Assistant Professor Mohsen El Hafsi, Professor Long Gao, Associate Professor Elodie Goodman, Associate Professor Jean Helwege, Professor Iva Kalcheva, Assistant Professor Charles Zhang, Assistant Professor

### Bala Balachander

Subramanian "Bala" Balachander is Professor and the Albert O. Steffey Chair in Marketing at the School of Business Administration of the University of California, Riverside. Prior to his current position, he was a Professor of Management at Purdue University. Professor Balachander has a Ph. D. in Industrial Administration from Carnegie Mellon University, an MBA from IIM, Calcutta and a B. Tech in Chemical Engineering from IIT, Madras. His research studies competitive marketing strategy, pricing, bundling, sales promotions and market signaling, and uses methods of game theory and structural econometric models. His teaching interests are in pricing, marketing strategy and marketing models. A 2012 study published in the Journal of Product Innovation Management ranked Professor Balachander No. 16 among the world's top innovation management scholars based on articles published in the top marketing journals. Professor Balachander currently teaches MGT 257, Marketing Strategy.

### Alexander Barinov

Dr. Barinov is an Assistant Professor of Finance at A. Gary Anderson School of Business Administration, University of California Riverside. Prior to joining UCR in 2015, he taught at the University of Georgia. He earned his Ph.D. and his M.S. in Finance from the University of Rochester. He also holds a M.A. degree in Economics from New Economic School (Moscow) and a B.A. in Economics from Lomonosov Moscow State University. Dr. Barinov's work centers

around the idea that firms with high levels of firm-specific uncertainty and option-like equity beat the CAPM when expected aggregate volatility increases, and therefore serve as a hedge against aggregate volatility risk. His work is related to phenomena in the stock market known as the value effect, the small growth anomaly, the new issues puzzle, the idiosyncratic volatility discount and the analyst disagreement effect. Dr. Barinov currently teaches MGT 295G and MGT 252, which focus on investments in the stock market.

# Xinping Cui

Dr. Cui is a Professor of Statistics at the University of California –Riverside, a position she has held since 2014. She joined UCR in 2002, after working as a statistical analyst at Reed Neurological Research Center. Dr. Cui became chair of the Statistics department in 2016. She earned her Ph.D. in biostatistics at UCLA and an M.S. in applied statistics at Bowling Green State University. Dr. Cui's undergraduate degree is in mathematics, which she studied at Nankai University in Tianjin, China. She also has a M.S. degree in math from Nankai University. In addition to receiving grants from the National Institutes of Health to study statistical aspects of health and disease, Dr. Cui has worked with researchers at the UCR Agricultural Experimental Station. She currently teaches STAT 231A, Statistics for Biological Sciences, as well as several undergraduate statistics courses.

### Mohsen El Hafsi

Mohsen Elhafsi received both Ph.D. and M.S. in 1995 in industrial engineering from the University of Florida. He received a "Qualified Engineer" degree from the Ecole Nationale d'Ingenieurs de Tunis, Tunisia, in 1988. Dr. El Hafsi joined the School of Business at UCR as a tenure-track faculty member in 1997. In 2007, he was awarded a \$10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems.

# James Flegal

Dr. Flegal is an Associate Professor of Statistics at the University of California –Riverside. Professor Flegal received his Ph.D. from the University of Minnesota. Dr. Flegal has worked with researchers at NASA in the organization known as FIELDS, or Fellowships and Internships in Extremely Large Data Sets: A Training and Research Program in Big Data and Visualization. His research focuses on Monte Carlo methods and Markov chains. He currently teaches STAT 206, Statistical Computing.

## Long Gao

Dr. Gao is an Associate Professor of Management in the area of Operations and Supply Chain Management at the University of California –Riverside. He earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. Professor Gao currently teaches MGT 239, Simulation for Business and MGT 207, Operations Management for Competitive Advantage.

### Elodie Goodman

Dr. Goodman is an Associate Professor in the area of management science in the School of Business. She joined the University of California – Riverside in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d'Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and healthcare payment systems. She currently teaches MGT 201, Quantitative Analysis and MGT 221, Decision-Making Under Uncertainty.

# Jean Helwege

Dr. is a professor in the Finance area of the School of Business at UC Riverside. Before joining the group, she held the J. Henry Fellers Professorship in Business Administration at the University of South Carolina. Her prior experience also includes faculty positions at Penn State, the University of Arizona, and Ohio State University. From 1988 to 1998 she worked in the Federal Reserve System as an economist. She holds a Ph.D. in economics from UCLA and she received a Bachelor of Arts in linguistics from the University of Chicago. Her research interests include corporate bonds, bank regulation, financial distress, initial public offerings and capital structure. She currently teaches MGT 227, Fixed Income.

### Dan Jeske

Dr. Jeske is a Professor in the Statistics department at the University of California –Riverside, where he has worked since 2003. Prior to joining UCR, Professor Jeske held positions at Rutgers University and Bell Laboratories. He is the editor of *The American Statistician*, and has served on the editorial board of *Applied Stochastic Models in Business and Industry* and *Technometrics*. He earned his Ph.D. and his M.S. degrees in statistics at lowa State University. Dr. Jeske's undergraduate degree is in mathematics and computer science from Austin Peay State University. Dr. Jeske runs the Statistical Collaboratory Consulting Project at UCR, which has

cumulative revenues of over \$1 million. He currently teaches STAT 208, Statistical Data Mining.

## Ivalina Kalcheva

Dr. Kalcheva is an Assistant Professor of Finance in the School of Business at UCR. She joined the Business department in 2014 after having taught at the University of Arizona from 2007-2014. Professor Kalcheva earned her Ph.D. in Business Administration from the University of Utah. She has an M.B.A. from Saginaw Valley State University and she studied for her B.A. in economics in Bulgaria. Dr. Kalcheva's research focuses on the stock market and trading execution. She has taught MGT 252, Investment and Portfolio Management and MGT 202, Financial Management.

### Yehua Li

Dr. Li is a Professor of Statistics at the University of California –Riverside. Professor Li joined UCR in 2018 after having taught at Iowa State and the University of Georgia. He received his Ph.D. from Texas A&M University in 2006 and his undergraduate degree in applied math from Tsinghua University in Beijing, China. Dr. Li's research interests are in big data, bootstrapping, large sample theory, measurement error and nonparametric approaches. He has statistical methods for electrical engineers and applied experimental design.

# **Charles Zhang**

Dr. Zhang is an Assistant Professor of Management in the marketing area at the University of California –Riverside. Professor Zhang joined UCR in 2014 after having taught at Boston College. He received his Ph.D. in marketing from the University of Michigan and degrees in statistics from University College, London and Fudan University. Dr. Zhang's research interests are judgment and decision making with an emphasis on numerical judgment and inference. Some of his published work is focused on how the granularity of communicated numbers conveys information that goes beyond the magnitude of the numbers. Professor Zhang currently teaches MGT 233, Marketing Research.



Office of the Dean

900 University Avenue, Anderson Hall, Riverside, CA, 92521

Tel: 951.827.4237 Fax: 951.827.3970 e-mail: yunzeng.wang@ucr.edu web-site: http://soba.ucr.edu

March 23, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**RE:** Master of Arts in Business Analytics

### **Dear Committee Members:**

I am writing to endorse the proposed Master of Arts in Business Analytics. This is a well-designed program to meet the strong demand from students who has an analytical background and are interested in professional careers in business administration. The program has the potential to significantly differentiate UCR's Business School and to raise the reputation of the School and the Campus. The program will provide a stream of revenue to help improve faculty and student support.

Like the faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang

Dean



# College of Natural and Agricultural Sciences Agricultural Experiment Station and Cooperative Extension Office of the Deep 2258D Coolege Building

Office of the Dean – 2258D Geology Building Riverside, CA 92521-0127

To: CNAS Executive Committee

From: Kathryn Uhrich

Dean, CNAS

Date: April 12, 2017

RE: Proposal for an Interdepartmental Graduate Program Leading to the Master of

Science in Business Analytics

The Department of Statistics along with faculty of the School of Business and the A. Gary Anderson Graduate School of Management have proposed a valuable degree program that allows students to obtain a MS degree in Business Analytics. The degree program will be offered as a three-quarter 48 units program for graduates of a baccalaureate degree that provides sufficient quantitative background to enable successful completion of the program. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in statistics and business. The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree. All but three courses are existing courses and have been offered in at least one of the last two academic years. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields.

I fully support this proposed Master of Science degree program in Business Analytics.



March 28, 2018

To: Dylan Rodriguez, Chair of the Academic Senate

From: Jerayr Haleblian, School of Business Department Chair

Re: MSiBA

Dear Dylan,

I would like to strongly support the joint effort between the business school and the department of statistics to create a Master of Science in Business Analytics (MSiBA) at UC-Riverside. This program will develop the analytical abilities students and allow them to apply these abilities to business data. A recent trend has emerged in which businesses have access to vast amounts of data. Analyzing such data on customers, competitors, and costs can be used to improve strategy, forecasting, and operations. Programs in Business Analytics are emerging around the country, and are fast becoming the most in demand programs within business school program portfolios.

The UC Riverside School of Business has designed a Business Analytics program that is unique in that it trains its students in both business and statistics by drawing on both the school of Business and Department of Statistics. The resulting program has the potential to offer superior training in appropriate statistical analysis than can typically be offered when programs only reside in the business school.

From the perspective of the business school, we would like to emphasize the following:

- 1. The business school has sufficient resources to offer the classes in this program. Specifically, the proposed curriculum is based on courses we already offer. The only exceptions are two capstone courses (one in statistics and one in business) and a new statistics course. Accordingly, the business school needs to only staff one new course. Moreover, most of the existing courses that MSiBA students will take already have capacity for additional students. Therefore, the business school currently has the resources required to deliver the program with only minimal additional resource requirements.
- 2. The program is rigorous, and as a result with enhance the reputation of the business school. The UCR School of Business is currently ranked among the top 100 business schools in the US, and this program will only help enhance this reputation.
- 3. There is strong demand for business analytics programs across the country, and we fully expect that our program will be in high demand as worldwide businesses continue to move in the direction of increased large data set analyses.

4. The joint set up with the department of statistics gives us a competitive advantage, as we can offer superior data analytic training, which we believe will help sustain the program in the long term.

\_la-y-Halablian

Jerayr Haleblian Department Chair School of Business

# UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY ● DAVIS ● IRVINE ● LOS ANGELES ● MERCED ● RIVERSIDE ● SAN DIEGO ● SAN FRANCISCO



DEPARTMENT OF STATISTICS RIVERSIDE, CALIFORNIA 92521-0138

April 15, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**Dear Committee Members:** 

I am writing in strong support for the proposed inter-departmental Master program in Business Analytics at UCR. Business Analytics has grown out of the need to integrate business and statistical approaches to processing and interpreting business data. It is experiencing a rapid and unplanned growth. The program addresses critical shortage of college graduates trained in business analytics in the industry and government. The proposed program will provide a synergistic approach to real world business problem solving, one that leverages the content in statistics but using case-based focus and hands-on approach. Creating this program will also help differentiate and raise the reputation of UCR's Statistics Department. This self-support program is also expected to generate substantial revenue to help improve the support in students and faculty in Statistics Department.

Our Statistics Department is enthusiastically and fully committed to the establishment and the success of Business Analytics Program at UCR.

Sincerely,

Dr. Xinping Cui

Dinging Cui

Professor and Chair

Department of Statistics

University of California, Riverside



April 10, 2018

### To Whom It May Concern:

I write in support of the proposed MS in Business Analytics. With more, and more varied types of data available, businesses require professionals skilled and trained within this area. More than ever before businesses need managers and leaders who are able to make decisions informed by data. Graduates from this program will be well-prepared either for a transition to a PhD program in business or to transition to a career in the business world. This latter is especially relevant to our region where skills such as these are in short supply. Graduates from such programs elsewhere in the US are highly sought after. The program at UCR will contribute to the reputation of AGSM as a school of innovation in business learning. The proposed program builds on existing expertise within the school and is both rigorous and well-thought out and will provide students with the combination of analytical and technical skills necessary to succeed in this area.

Sincerely,

Shaun Bowler

Dean of the Graduate Division

Stran Boule



May 15, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Ward Beyermann, Chair, Executive Committee College of Natural and Agricultural Science

Re: Campus Review: Proposed Degree Program, Masters of Science in Business

Analytics (MSiBA)

The CNAS Executive Committee discussed the revised proposal for a Masters of Science in Business Analytics (MSiBA) at its May 8, 2018 meeting. The committee feels the concept has merit and supports the proposal.

Yours sincerely,

Ward Beyermann, Chair

**CNAS Executive Committee** 

Ward Beyerm



### **MEMORANDUM**

DATE: October 4, 2018

TO: Dylan Rodriguez, Chair

Riverside Division of Academic Senate

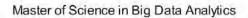
FROM: Jean Helwege, Chair

School of Business Executive Committee

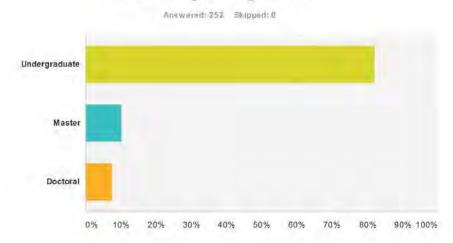
Re: Proposal for a Master of Science in Business Analytics (MSiBA)

The executive committee (EC) of the School of Business met to discuss the proposed MSiBA degree in February 2017. The members of the EC voted by electronic ballot on the proposal and the chair of the EC at the time, Peter Chung, sent an email on March 18 to the EC members indicating that the proposal was approved. For the sake of completeness and symmetry with the EC vote from CNAS, this memo will be added to the proposal to indicate that the School of Business EC is in favor of starting the MSiBA degree program.

# Exhibit XVI November 2013 UCSD Rady School's Market Demand Survey



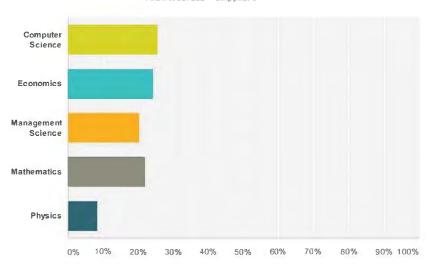
# Q1 What is your degree level?



Answer Choices	Responses	
Undergraduate	82.14%	207
Master	10.32%	26
Doctoral	7.54%	19
otal		252

# Q2 What is your area of study?

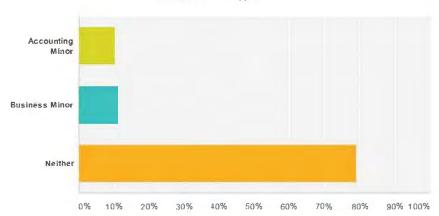
Answered: 252 Skipped: 0



nswer Choices	Responses	Responses	
Computer Science	25.40%	64	
Economics	24.21%	61	
Management Science	20.24%	51	
Mathematics	21.83%	55	
Physics	8.33%	21	
otal		252	

# Q3 Are you an accounting or business minor?

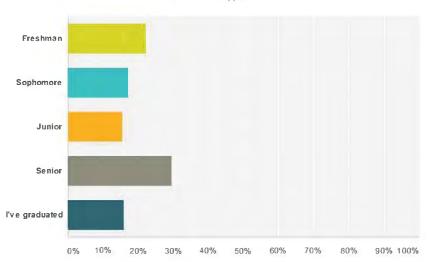




10.32%	26
11.11%	28
78.97%	199
	78.97%

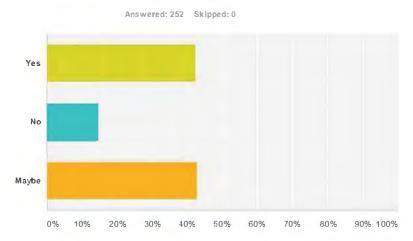
# Q4 What is your class level?

Answered: 252 Skipped: 0



Answer Choices	Responses	
Freshman	22.22%	56
Sophomore	17.06%	43
Junior	15.48%	39
Senior	29.37%	74
I've graduated	15.87%	40
otal		252

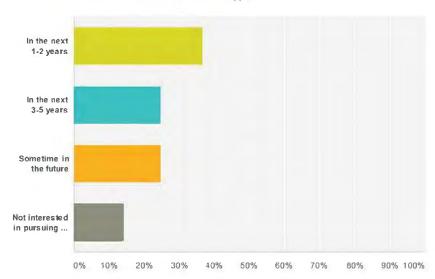
# Q5 Would you be interested in pursuing a Master of Science degree in Big Data Analytics?



Answer Choices	Responses	
Yes	42.46%	107
No	14.68%	37
Maybe	42.86%	108
otal		252

# Q6 When?

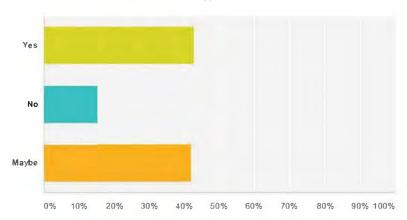
Answered: 252 Skipped: 0



Answer Choices	Responses	
In the next 1-2 years	36.51%	92
In the next 3-5 years	24.60%	62
Sometime in the future	24.60%	62
Not interested in pursuing a Master of Finance degree.	14.29%	36
otal		252

# Q7 Would you be interested in receiving a Master of Science degree in Big Data Analytics from the Rady School of Management?





Answer Choices	Responses	
Yes	42.86%	108
No	15.08%	38
Maybe	42.06%	106
otal		252



### **MEMORANDUM**

**DATE:** October 30, 2019

TO: Dylan Rodriguez, Chair

Riverside Division of Academic Senate

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - 3rd round comments

The EC noted the following topics in its discussion of the 3rd round of the proposal: (1) undergraduate preparation for admission; (2) recommendation letters; and (3) the split of self-supporting programs between the programs' departments and campus. We respond to these comments below:

Jean Helwege

Admissions: The EC was concerned that "the split between Colleges/Schools...will likely make it difficult to deal with admissions...leaving the admissions process open-ended and non-specific." We note that the proposal has a very specific admissions policy, which is to only admit students who have one of four types of undergraduate majors. Indeed, a previous Senate committee wondered if it was too specific. Thus, the admissions criteria are not well described as open-ended or non-specific. Perhaps the EC is more concerned with how the two departments will ensure that the criteria are met. Therefore, in this revision of the proposal, we revised the proposal to indicate that there is an admissions committee that consists of faculty from both Statistics and Business. We have every confidence that faculty in the two departments will work well together in creating a high quality program and neither group will neglect the important topic of admissions.

Letters of recommendation: The EC wondered why only one letter of recommendation is required when Graduate Division requires three. We note that the default number of letters is three but there are exceptions. The Master of Accountancy program has had a single letter requirement since the 2017-18 academic year. The other graduate programs in the School of Business requested a change to the number of letters four years ago but the Senate never completed its review of the request. This work was done in Spring 2019 and now the MBA and MFin programs also only require one letter. While a one-letter requirement for the MSiBA program would be typical of business schools, we revised the proposal to have two letters to reflect that the program is a combined business school and statistics department program.

Self-supporting programs (SSPs): The EC discussed the need for SSPs to return funds to campus and the desire for UCR to address this issue for all SSPs. We note that the financial projections in Exhibit III, in both the 3rd round version and the current version (where Exhibit III is adjusted in light of comments from CNAS), include three elements that relate to this topic. First, UCOP assesses 2.5% of the program expenditures annually, starting in its initial year. This occurs whether the program is profitable or not, presumably because UCOP needs to recover costs associated with the program each year regardless of its success. Second, UCR assesses 9.6% of the expenditures beginning in year 3, also, regardless of the other costs of the programs. By waiting until year 3, UCR is attempting to support programs that will ultimately benefit the university's financial condition. Finally, all SSPs must show they have positive net revenues after taking into account the indirect costs (IDC), which, at UCR, are assumed to be 33.7% of the direct costs. These indirect costs cover the costs to UCR of classrooms, electricity, janitorial services, safety, library resources and other overhead. They do not support the costs of dining or parking services, which charge prices that are commensurate with their costs and do not require support from student tuition.

If an SSP is not capable of showing sufficient revenue to cover all its costs - its direct costs (faculty, staff, materials, etc), the two yearly assessments and the 33.7% annual IDC rate - the program will be deemed to have failed and shut down. Thus, it is not possible for UCOP to approve a new SSP that is not projected to cover the costs to campus and it is not possible for UCR to continue an existing SSP if it imposes costs on campus that are not returned to campus.

The May 2019 summary of UCLA's policies on SSPs states that the department(s) should receive at least 75% of the tuition. Exhibit III shows that, in 2023-2024, the return-to-aid, the assessments, and the IDC rate, add up to about 29% of revenue. Thus, the proposed MSiBA program would produce revenue for CNAS and Business in amounts that are very much in line with what is common in the UC system.

We have revised the discussion of Exhibit III (in section 6) to clarify the financial implications of the program. We have also changed the format of the table in Exhibit III so that the calculations are clearer. To do so, we moved the footnote about classroom capacity to section 6. In addition, since the proposal has been in the Senate for so many years already, we updated the program fee (from \$48,000 to \$52,000) to reflect the passage of time and inflation.

We are very confident that the proposed MSiBA program will be financially sound and cover the costs to the rest of campus and the UC system, as required by UCOP and UCR in their SSP policies.



### **MEMORANDUM**

Jean Helwege

**DATE:** October 30, 2019

Louis Santiago, Chair

**CNAS Executive Committee** 

FROM: Jean Helwege

School of Business

Re: Master of Science Degree in Business Analytics - 3rd round comments

Xinping Cui and I thank the committee for its review of the 3rd round and its continued support for the proposal.

We have revised the proposal to include adjustments to the financial projections in Exhibit III, as well as accompanying detail in the discussion of the budget in section 6. Your committee noted that there are no increases in many of the columns in the budget. This is because the budget was prepared in real terms (i.e., in 2019 dollars). Since the proposal and the budget were first proposed several years ago and we have not updated the tuition to 2019 dollars, the revised Exhibit III now has a fee of \$52,000 rather than \$48,000. In addition, as your committee noted, there was no explicit acknowledgment of merit pay increases and promotions. The current version includes increases in real terms for expenses related to faculty and staff to reflect this issue.

Your committee also commented that there is no mention of the difference in the salary scales of Statistics and Business. This is now included in the discussion in section 6. Not mentioned in the proposal, because it is very much subject to change, is the fact that the current fraction of graduate business courses taught by part-time lecturers is not small. One would hope that a new program would only have the school's best faculty involved in it, but doing so would detract from the success of the existing SSPs. Moreover, it is impossible to know which courses would be taught by tenure track faculty and which by others, so the mix of salaries attributable to the instruction of these courses is not readily identifiable. The funds allocated to faculty salaries and benefits in Exhibit III are likely to be higher than what is actually paid.

We understand that work is being done on a revenue sharing agreement between the deans of CNAS and the School of Business. We now include a statement describing our vision of what the arrangement would be, which is a fair deal. We expect these arrangements to be determined by the time the program is approved by the Senate.

The revised proposal also includes a change to the number of letters of recommendation (now 2 instead of 1) and some other changes to section 2.1 (undergraduate preparation for admission). Also, there are small changes to sections 1.7 (plan for evaluation) and section 7 (graduate student support).



### **MEMORANDUM**

Jean Helwege

**DATE:** October 30, 2019

Boris Maciejovsky, Chair Committee on

Diversity and Equal Opportunity

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - 3rd round comments

Xinping Cui and I thank the committee for its review of the 3rd round and the committee's approval. Although all committees approved the 3rd round version of the proposal, the Executive Council of the Senate posed questions that required a 4th round, which we ask that you now review. Specifically, the revised proposal includes adjustments to the financial projections in Exhibit III, as well as accompanying detail in section 6 (resource requirements), and to the number of letters of recommendation (now 2 instead of 1). There are also small changes to sections 1.7 (plan for evaluation), 2.1 (undergraduate preparation for admission) and section 7 (graduate student support).



**DATE:** October 30, 2019

Jason Stajich, Chair Graduate

Council

FROM:

Jean Helwege

School of Business

Re: Master of Science Degree in Business Analytics - 3rd round comments

Xinping Cui and I thank the committee for its review of the 3rd round and the committee's approval.

The Graduate Council noted in its latest review that it "would like to strongly advise that the program add an assessment component or some form of tracking of student success after students are admitted to the program." We have added a few sentence to section 1.7 (plan for evaluation) that mention the AACSB assurance of learning (AOL) and assessment. AACSB is the accreditation entity for business schools around the world. All programs involving the UCR School of Business are evaluated by AACSB and require that we submit data on AOL and our method of assessment.

Although all committees approved the 3rd round version of the proposal, the Executive Council of the Senate posed questions that required a 4th round, which we ask that you now review. Specifically, the revised proposal includes adjustments to the financial projections in Exhibit III, as well as accompanying detail in section 6 (resource requirements). It also has a revision to the number of letters of recommendation (now 2 instead of 1). There are also small changes to section 2.1 (undergraduate preparation for admission) and section 7 (graduate student support), in addition to the above-mentioned revision to section 1.7.



Jean Helwege

**DATE:** October 30, 2019

Boris Maciejovsky, Chair Committee on

Diversity and Equal Opportunity

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - 3rd round comments

Xinping Cui and I thank the committee for its review of the 3rd round and the committee's approval. Although all committees approved the 3rd round version of the proposal, the Executive Council of the Senate posed questions that required a 4th round, which we ask that you now review. Specifically, the revised proposal includes adjustments to the financial projections in Exhibit III, as well as accompanying detail in section 6 (resource requirements), and to the letters of recommendation (now 2 instead of 1). There are also small changes to sections 1.7 (plan for evaluation), 2.1(undergraduate preparation for admission) and section 7 (graduate student support).



Jean Helwege

**DATE:** October 30, 2019

Katherine Kinney, Chair

Committee on Planning and Budget

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - revised proposal

Thank you and your committee for your efforts in reviewing the 3rd round version of the MSiBA proposal. Xinping Cui and I very much appreciate your committee's approval of the proposal. However, we are submitting another version in order to consider the comments of the Senate Executive Council. Their comments are related to your committee's comments on indirect costs, leading to an updated budget and its discussion (Exhibit III and section 6). In addition, the group expressed concern over the number of letters of recommendation, so the amended proposal now lists a requirement of two letters, rather than one (section 2.1).

In your April memo your wrote the "the proposal now devotes 10% of tuition revenues to return-to-aid and sets indirect costs at 30.7% and the Committee... approves the proposal in its current form." We note that the indirect costs are actually set at 33.7%, as required for all UCR programs. Perhaps it was a typo on our part, but in any case it helps alleviate the concern you wrote of in the next two sentences: "We note that we are making this determination in the absence of campus policy regarding standards for evaluating appropriate levels of return-to-aid and accounting for indirect costs. Policy will need to be developed to guide SSPs in the future." The 33.7% figure for indirect costs has been provided by the School of Business financial staff, who told us that this figure is uniform for all programs on campus. Of course, unlike the SSPs in the School of Business and a few other SSPs, most programs on campus are not required to show that they are financially robust and are unlikely to have had much experience with the accounting involved. Nonetheless, unless our staff are misinformed, there is indeed a campus policy on accounting for indirect costs.

As for the return-to-aid policy, we are only aware of the policy that there is no requirement to have any. It is tradition to offer scholarships and we note that the scholarships given to graduate students in the School of Business are disproportionately directed toward domestic students. Therefore, while 10% may seem low for the total revenue, as a percentage of tuition paid by domestic students it is substantially higher. The school currently has policies favoring employees of local government agencies, veterans, and graduates of UCR, as well as a general policy of providing funds to domestic students to ensure that a greater fraction of the student population is from the Inland Empire. Not only does this policy support the mission of the State of California and ensure greater diversity in our student population, but it is also an effective way to set the price of the program and attract the most qualified applicants.



Jean Helwege

**DATE:** October 30, 2019

Thomas Kramer, Chair Committee on Physical

Resources Planning

FROM:

Jean Helwege

School of Business

Re: Master of Science Degree in Business Analytics - 3rd round comments

Xinping Cui and I thank the committee for its review of the 3rd round and the committee's approval. Although all committees approved the 3rd round version of the proposal, the Executive Council of the Senate posed questions that required a 4th round, which we ask that you now review. Specifically, the revised proposal includes adjustments to the financial projections in Exhibit III, as well as accompanying detail in section 6 (resource requirements), and to the number of letters of recommendation (now 2 instead of 1). There are also small changes to sections 1.7 (plan for evaluation), 2.1 (undergraduate preparation for admission) and section 7 (graduate student support). We also corrected the typo that your committee pointed out.



January 6, 2020

To: Dylan Rodriguez, Chair

Riverside Division

From: Louis Santiago, Chair, Executive Committee

College of Natural and Agricultural Science

Re: Masters of Science in Business Analytics

The CNAS Executive Committee discussed the proposed Masters of Science in Business Analytics program. In general, there was vast support for the program, and members of my committee believe that it will be a valuable addition to the master's programs that the university offers. The committee thought that it was well thought out, and while acknowledging the financial burden, they thought that it would probably earn well after graduating so it would likely be worth the investment, although it would be good to justify the estimated enrollment of 15 in year 1 up to 50 by year 5, and that is a minor criticism. The committee was generally swayed by the strong external letters of support. To the extent that it is not redundant with existing programs at UCR, which it does not appear to be from a quick reading, the committee is in favor.

Com Souting



# COMMITTEE ON DIVERSITY, EQUITY, AND INCLUSION

December 10, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Xuan Liu, Chair

Committee on Diversity, Equity, and Inclusion

Re: Proposed Degree Program: 4th Round: Masters of Science in Business

Analytics (MSiBA)

CoDEI reviewed the 4<sup>th</sup> round of revisions to the Masters of Science in Business Analytics (MSiBA) proposal and has no substantial comments to offer.



#### **GRADUATE COUNCIL**

November 21, 2019

To: Dylan Rodriguez, Chair

**Riverside Division** 

From: Jason Stajich, Chair

**Graduate Council** 

Re: [Campus Review] Proposed Degree Program: 4th Round: Master of Science

in Business Analytics (MSiBA)

Graduate Council reviewed the fourth round of the proposal for a Master of Science in Business Analytics at their November 21, 2019 meeting. The concerns raised by the Graduate Council in previous versions of the proposal have been addressed. The Graduate Council is supportive of this version of the proposal.



November 22, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Leonid Pryadko Llaurd Pyordhe

Committee on Library and Information Technology

Re: [Campus Review] 4th Round Masters of Science in Business Analytics MSiBA

The Committee on Library and Information Technology reviewed the 4th Round Masters of Science in Business Analytics MSiBA at their November 21, 2019 meeting and did not note any concern relating to the Committee's charge of Library and Information Technology.



#### PLANNING & BUDGET

November 26, 2019

To: Dylan Rodriguez, Chair

Riverside Division

| Juny WK Com

Harry Tom Chair

From: Harry Tom, Chair

Committee on Planning and Budget

Re: [Campus Review] Proposed Degree Program: 4th Round: Master of Science

in Business Analytics (MSiBA)

The Committee on Planning & Budget (P&B) reviewed the fourth round of the proposal for a new Master of Science in Business Analytics at their November 26, 2019 meeting. P&B approved of the proposal in its current form.



November 22, 2019

To: Dylan Rodriguez, Chair

**Riverside Division** 

From: Sally Ness

Chair, Committee on Physical Resources Planning

Re: Campus Review-Proposed Degree Program: 4th Round: Masters of Science in

Business Analytics (MSiBA)

The Committee on Physical Resources Planning reviewed the Proposed Degree Program: 4th Round: Masters of Science in Business Analytics (MSiBA) at their November 21, 2019 meeting and is supportive of the revised program and does not have any further comments.

# **Cherysa P Cortez**

From: Jean Helwege <helwege@ucr.edu> Sent: Monday, February 25, 2019 11:42 AM

To: Cherysa P Cortez; Dylan Rodríguez; Boris Maciejovsky; Jason Stajich; Katherine A Kinney **Subject:** responses to comments on the proposed masters in business analytics and revision

**Attachments:** Response to CoDEO re 2nd Round MSiBA Proposal.pdf; Response to Grad Council re 2nd Round

MSiBA Proposal.pdf; Response to P&B re 2nd Round MSiBA Proposal.pdf; Proposal for a Master of

Science in Business Analytics Feb 2019 v2.pdf

Dear Jason, Katherine and Boris,

Attached are responses to your committees' comments on the revised proposal that we submitted in late October as well as another revision of the proposal. Based on comments received from Planning and Budget, we have revised Exhibit III (the financial statement) to take into account the indirect costs.

Jean Helwege **UC** Riverside jean.helwege@ucr.edu 951-827-4284

# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

# **University of California Riverside**

February 2019

#### **Status:**

Approved by School of Business Executive Committee: 3/18/2017

Approved by School of Business Faculty: 5/24/2017

Approved by the Department of Statistics Faculty: 6/8/2017

Approved by the College of Natural and Agricultural Sciences Executive Committee:

3/20/2018

Submitted to Graduate Division: 3/26/2018

Approved by Graduate Council: Approved by UCR Academic Senate:

#### **GRADUATE DEGREE PROGRAM PROPOSAL**

# **Lead Proposers:**

- The faculty of the School of Business and the A. Gary Anderson Graduate School of Management (AGSM)
- The faculty in the Department of Statistics
- The faculty members in the area of Operations and Supply Chain Management (OSCM)
- The faculty members in the area of Marketing
- The faculty members in the area of Finance
- Jean Helwege
- Xinping Cui

#### **Contact Information:**

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

Tel: 951.827.4284

Email: jean.helwege@ucr.edu

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# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### § 1.0 INTRODUCTION

With the availability of more detailed data and the ease with which businesses can use faster and cheaper computers to analyze data, the need for well-trained employees in the area of business analytics (BA) has increased dramatically in recent years. BA overlaps substantially with the area known as data analytics or data science, especially in its emphasis on statistics and software, but it differs in that the focus is on business applications. BA uses data and statistical tools to analyze the potential for increasing revenue, decreasing costs and identifying new profit opportunities.

Many business schools are aware of the demand for graduates of BA programs and see an opportunity to elevate their reputations by offering these degrees. According to Poets & Quants, roughly a third of the top 100 business schools have introduced BA masters programs. While BA can be and is taught at the undergraduate level, by its nature the degree is best structured as a graduate program that allows students to extend and strengthen their knowledge of statistics and business. We expect students entering this program to have completed an undergraduate degree in either a quantitative business major or in statistics. Reflecting this logic, the proposed degree is jointly offered by School of Business and by the Statistics Department.

# 1.1 Aims and Objectives

The Master of Science in Business Analytics (MSiBA) program will expand the training of students with analytical backgrounds to allow them to apply their skills to business data. Businesses have access to increasingly large amounts of data about their customers, costs, and suppliers and they can use this information to improve operations, increase the yield on marketing programs and understand pricing and financing better, which all are methods of obtaining higher profits. The personnel required to do this work must be well trained in both statistics and business.

The proposed MSiBA offers a rigorous program that allows these students to gain the degree in three quarters. Students will have studied either statistics or a quantitative business discipline as undergraduates and will continue their studies at the master's level by following one of two tracks. The statistics track is for students who majored in one of the business disciplines as undergraduates (finance, operations/supply chain, or marketing) and the business track is for students who majored in statistics as undergraduates. Both tracks culminate in a two-quarter capstone class that applies their understanding of business analytics to a project.

The program will take advantage of existing courses in business and statistics. The main new proposed courses for this degree are a two-quarter sequence of capstone courses that allow students to work on a specific project with data tailored to their individual interests. There is also one new statistics course proposed for the MSiBA degree.

There are several objectives of the program that will benefit UCR, CNAS, and the School of Business. The

<sup>&</sup>lt;sup>1</sup> http://poetsandquants.com/2016/01/18/business-analytics-masters-at-the-top-100-b-schools/. This site includes links to the top schools with programs.

program offers a degree in a fast-growing area that requires rigorous training. By offering this program, the job placements, average salary and training of UCR alumni increase and this enhances UCR's reputation, as well as that of the Statistics Department and School of Business. In addition, the program aims to attract more high quality students. This is especially helpful for School of Business, which currently mainly trains undergraduates who tend to study aspects of business that rely less on the most quantitative business skills. The program will be especially helpful to the Statistics Department in creating a path for undergraduates. Many of the statistics majors at UCR have excellent training in the general area of statistics, but are ill-prepared to use their skills in business. Another goal is financial security for UCR. As a self-supporting program offering a professional degree, not only will the MSiBA work as a stand-alone program without requiring support from the state, but it is also expected to be a significant source of revenue for UCR each year. Finally, UCR is currently the UC with the largest number of students studying business. The MSiBA program will enhance that standing further, not just in numbers and breadth of choices, but by helping UCR's reputation as the best UC campus for studying business.

## 1.2 Historical Development of the Field and Departments' Strengths

Before the advent of the personal computer in the 1980s, students could only be trained in the area of statistical computing on a mainframe, where capacity was limited and undergraduates rarely had access. With cheap computing power and improved statistical functions in Excel, the level of statistical analysis of business data has improved at all levels of higher education over the years. Social media and point of sales systems, and other electronic sources of big data have combined with the higher level of statistical training to lower the cost of analyzing data for the purpose of increasing corporate profits. The first college of business in the U.S. to offer a business analytics degree at the undergraduate, Masters and MBA level was UT Austin in 2010. We expect that students will use increasingly sophisticated methods to analyze the wealth of data available. Therefore, the number of students enrolled in BA degree programs is likely to expand.

The faculty in the School of Business and the professors in Statistics are well-positioned to offer the MSiBA degree. Both sets of professors are highly trained in both statistics and business disciplines and they use business analytic tools in their research on a regular basis.

In the School of Business, the majority of professors do empirical research. Since so many ladder-rank professors use statistical techniques to analyze business data in their research, there are many professors in the school who can teach students how to use statistical analysis to answer business questions. And most of the faculty do empirical analysis with fairly large or very large databases and therefore have the skills to lead students into the area of big data. A smaller fraction of the faculty have taught programming as part of their business courses, while others have assigned homework that incorporates statistical analysis that can be carried out in Excel. The finance area implemented a policy in 2016-17 academic year in the Masters of Finance (MFin) program of providing incentives to students to complete statistical analysis in SAS rather than Excel. The faculty are well-positioned to supervise student projects in the proposed capstone courses.

The Department of Statistics has tremendous expertise in teaching statistics and in teaching statistical computing. Their role in the program is less focused on applications of statistical analysis to business and more teaching the fundamental skills need to analyze data with statistical computing packages. The MFin program has already hired faculty in the Statistics department to teach statistical computing (SAS) that is geared to business professionals, so they are also well-positioned to deliver the relevant course material and train students so that they have the statistical computing and analytical skills needed for the capstone courses.

#### 1.3 Timetable

The School of Business and the Department of Statistics are prepared to launch the program in the fall of 2019. We have conservatively projected enrollments at 15 students in the first year and gradually increasing to a projected maximum of 50 students by the fifth year. As a comparison, Arizona State University currently offers a 9-month masters of business analytics degree with 153 students enrolled.

The program requires three new courses, while the remainder of the program uses courses that are already in place. Two of the new courses are capstone courses that will be offered in Winter 2020 and Spring 2020 and the third is a statistics course. These courses have already been submitted by the School of Business and the Department of Statistics for approval by the relevant parties in the shared governance process.

## 1.4 Relation to Existing Programs and Campus Academic Plan

The program fits the overall strategic plans of UCR, the School of Business and CNAS to increase the university and the schools' presence and reputation. The program helps on a number of fronts: it is more rigorous and technical than some other professional degree programs; it will attract students with backgrounds that are more quantitative and therefore require above average intelligence; the job prospects for students in the program are better than in many other programs, so placement records should help our reputation; and the program can charge a reasonably high tuition to reflect the value-added advantages of this type of education.

The specialized skills taught in the MSiBA program should prepare students well for professional employment. Besides the high demand for business analytics professionals, which should lead to good placements, this program is likely to be recognized by the United State government as a STEM program. Foreign students who graduate from designated STEM programs are allowed to work for extended periods with OPT visas (currently 29 months vs. one year for a regular OPT visa).

The new degree program is a self-supported program that will rely extensively on existing courses in AGSM and Statistics. This means there will be no immediate need for more faculty and existing faculty can teach the majority of the material in existing courses to more students. Students will graduate having taken a common set of classes for most of the program but will be given a chance to apply their skills to a particular area in business, such as marketing, operations, or finance.

If this self-supported program grows and requires that more faculty be hired in response to its growth the additional faculty will help build critical mass in the School of Business and in Statistics, allowing UCR to advance its research mission. Students admitted to the MSiBA program will be strong quantitatively and will contribute positively to the classroom experience. MSiBA may also draw from the more quantitatively-oriented students in UCR undergraduate programs. If they are successful in completing this program and working in business analytics careers, the program may eventually help draw better students to our existing undergraduate programs in statistics and quantitative business disciplines.

Another advantage of the program is that it should gain in popularity compared to the traditional MBA. Business schools around the country are experiencing declining enrollments in full-time MBA programs. AGSM is no exception to this problem, and thus the number of students in a section is smaller than capacity and there are few electives that are offered more than once a year. By offering marketing, finance and operations courses to students in a growing field, UCR expands its opportunities to use more of its graduate business training capacity.

The program is distinctly different from the existing UCR program in Data Science, which is an online program jointly offered by Statistics and BCOE. By having the Statistics Department involved in both programs, the faculty

can monitor the two programs to make sure that one is not cannibalizing the other. The Data Science degree is designed to focus on the computing and database management. It does not involve strategies to maximize revenue, minimize cost or otherwise improve specific business applications.

# 1.5 Interrelationships with the Programs of Other Institutions, Market and Competition

A few other UC schools and Cal State universities offer BA programs but most do not. UC Davis, UC San Diego and UC Irvine have one year masters degrees. Cal State East Bay has a nine-month program. UCLA just began its program in Fall 2018. UC Berkeley has online certificate programs. Cal State LA also has a certificate program but it is so new that no details are listed on its website.

TFE Times ranks business masters of business analytics programs and the only ranked program in California is USC (ranked #1). Outside of California there are several hundred schools that offer BA programs, although the TFE Times list only ranks the top 30 or so. Most programs are for a year of full-time study or less. Our proposal is for a nine-month program that allows students to graduate in spring, which puts them in a good position for the job market. Several programs that go longer than nine months do not have more units than what is proposed for UCR, but instead reduce the course load in some quarters and add one or two courses in the summer. For example, the number of courses in UCSD's business analytics program is the same as the one proposed here except that UCSD has two 1-unit professional development courses. Several nine-month programs are ranked high on the TFE Times list – for example, Arizona State (#5), Southern Methodist University (#18) - and many others are for 10 or 11 months (e.g., #4 Rochester and #6 UT Austin).

In addition, there are many other schools that offer data analytics or computer science programs, but these do not focus on business and are not in direct competition.

Exhibit VII includes letters of support for the proposed program, including one from Terrence August, who is currently the co-chair of the MSBA degree program at UCSD's Rady School of Business. He and Professor Vincent Nijs designed the program, so he has been involved in this relatively new program from inception. Professor August writes that the demand for this degree is very large and notes that applications to UCSD's program grew from 300 in year 1 to over 700 in year 2 and to approximately 950 this year. Prior to beginning this highly desirable program, Rady surveyed students in November 2013 to determine interest in the degree. The results are included in Exhibit XVI.

#### 1.6 Administration

The interdepartmental program will be administered by two departments, Statistics and Business. Because the program is joint between two departments, the program requires its own set of by-laws. These are included in Exhibit IX. The two departments will have equal control over the program and will split the revenues and costs in proportion to their teaching contributions and recruiting successes. The financial elements of the program are to be determined by the deans of CNAS and Business, with input from the co-directors of the program.

Business and Statistics will establish a joint steering committee. The steering committee will consist of three faculty from the AGSM and three faculty from the Department of Statistics. The steering committee will collaborate to work on admissions criteria, but the expectation is that heavy emphasis will be placed on quantitative training and test scores. The program director will be chosen among these six faculty, will serve for three years, alternating between the two colleges (AGSM and CNAS). The Deans of the two colleges will alternate nominating the program director to the Provost/EVC, after consultation with the other Dean and steering committee. The nominated director may or may not be from the Dean's own college.

As with the current setup for admissions into the MBA program, a large fraction of the work related to admissions will be done through the AGSM graduate staff. In particular, AGSM staff are responsible for ensuring that application materials are complete and submitted on time, for sending out rejections to candidates that are far below the standards expected of the program, and for making sure that the program is appropriate for the career goals of the applicants. Given the declining enrollment in MBA enrollments, the current size of the AGSM staff should be sufficient to deal with MSiBA applicants in the short-run. Once the program is more established and at steady state enrollment, a dedicated Director of Recruiting and Admissions is expected to be appointed and will assist the program director and the steering committee.

The program will be marketed on the Statistics and AGSM websites, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever School of Business decides to participate in such forums for the purpose of MBA recruiting.

Formal student advising will be administered by the steering committee. Because students are expected to have either an undergraduate statistics or business degree, some separate advising will occur based on previous training. In these situations, students with business degrees will likely receive advice from the Statistics members of the steering committee and students with statistics degrees will be advised by the business faculty on the steering committee. The program director will hold information sessions that cover most of the common ground. All steering committee members will be provided course roadmaps to ensure that individual advising is effective and efficient. Given that the Statistics Department is smaller than the combined finance, marketing and operations faculty within the School of Business, and that there are more support staff in the School of Business, Statistics is expected to undertake a smaller fraction of the work related to information sessions and marketing.

#### 1.7 Plan for Evaluation

AGSM and Statistics will continuously evaluate the program based on the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alumni.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

#### § 2.0 PROGRAM

#### 2.1 Undergraduate Preparation for Admission

The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses. Students who have weaker statistical training but otherwise show promise are required to take STAT 171 or similar courses before entering the program. Students who do not have an undergraduate degree in statistics or the quantitative business disciplines may be considered for admission on a case by case basis, but the expectation is that all

admitted students will have sufficient training in either statistics or quantitative business topics to be able to complete the degree in a timely fashion. Students with quantitative backgrounds who are not familiar with either business or statistics will be advised to enroll in the MBA program or the masters in Statistics program.

Because of the need to communicate the results of the analysis, such as that completed in the two-quarter capstone class, strong English skills are also required. The admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency. Preference will be given to applicants who have worked in industry for two or more years.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction.

Additionally each applicant must submit at least one letter of recommendation. The admissions committee will determine in time whether additional letters are appropriate. All other application requirements are specified in the graduate application or in the General UCR catalog.

#### 2.2 Foreign Language

The program has no foreign language requirement.

# 2.3 Program of Study

#### 2.3.A Fields of emphasis

The MSiBA core specific field of emphasis is Business Analytics. Within this field, students can do a concentration in either operations, finance or marketing.

#### 2.3. B Plan(s)

**Plan I (Thesis)** will not be an option for the Master of Science Business Analytics program. Given this is a three quarter (9 months) program, a Plan I (Thesis) option will not be feasible for students.

**Plan II (Comprehensive Examination)** will be the format for the MSiBA degree. In addition to the course requirements associated with Plan II set forth by the Graduate Division (i.e, at least 18 units must be in graduate level courses taken at a UC campus), every candidate must take a comprehensive examination. The comprehensive exam will be determined by the faculty involved in teaching the MSiBA students.

#### 2.3. C Unit requirements

The Master of Science in Business Analytics will be offered as a three-quarter program (48 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

#### 2.3. D Required and recommended courses

All students in the program are required to take three courses (12 units) that focus on analytical tools for

business. In addition, students must take a two-quarter capstone sequence (8 units) in which they complete a project that uses the tools acquired in the area of business analytics. These five courses are required for all students in the program. Another set of four required courses (16 units) is designed to enhance their previous training as undergraduates and these vary with a student's undergraduate major. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in both statistics and business. Students who have double majored are treated as if they majored in statistics as undergraduates. The remaining 12 units (3 courses) are elective courses that allow students to concentrate in a particular area of business. The three elective tracks are marketing, operations and finance. Descriptions of the courses are included in Exhibit I.

#### Required courses for all MSiBA students

- MGT 286A-B Capstone in Business Analytics (2 guarter course) NEW
- MGT 256 Business Analytics for Management
- STAT 208 Statistical Data Mining
- STAT 232 Statistics for Business Analytics NEW

#### Required courses for students with an undergraduate business degree

STAT 205 Discrete Data Analysis
 STAT 206 Statistical Computing
 MGT 233 Marketing Research

MGT 267 Applied Business Forecasting

#### Required courses for students with an undergraduate statistics degree

MGT 202 Financial Management

MGT 204 Cost and Management Accounting

MGT 207 Operations Management for Competitive Advantage

MGT 209 Marketing Management

## Electives – Choose a group of three from below

MGT 221 Decision Making Under Uncertainty
 MGT 258 Logistics and Supply Chain Management

MGT 239 Simulation for Business

Or

MGT 228 or MGT 257 Consumer Behavior or Marketing Strategy

MGT 253 Internet Marketing
 MGT 251 Market Assessment

Or

MGT 252 or MGT 295F
 Investments and Portfolio Management or Empirical Methods in Finance

MGT 232 Derivatives

MGT 244 or MGT 227 Corporate Risk Management or Fixed Income

All but three courses, MGT 286A-B and STAT 232, are existing courses and have been offered in at least one of

the last two academic years. Exhibit I contains a copy of the catalog entries for the existing courses. Given current MBA enrollments, there is sufficient capacity in the existing classes to accommodate the needs of the MSiBA students. Over time, if the programs expand, it may be necessary to offer multiple sections of the courses. Upon approval of the program, the new courses will be offered at least annually and will require staffing. The cluster hire search in business analytics should be sufficient to meet the additional staffing needs in AGSM. The Statistics Department is confident that it currently has the personnel needed to offer new courses required for the program.

#### 2.4 Sample Program (full time)

Below are two sample programs. The first is for a student whose undergraduate training is in statistics and who has chosen to focus on operations. The second is for one whose undergraduate training is in business and has decided to continue with marketing.

# Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

- MGT 256 Business Analytics for Management
- MGT 207 Operations Management for Competitive Advantage
- MGT 202 Financial Management
- STAT 232 Statistics for Business Analytics

#### Quarter 2

- MGT 286A Capstone in Business Analytics I
- MGT 221 Decision Making Under Uncertainty
- MGT 204 Cost and Management Accounting
- MGT 209 Marketing Management

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 239 Simulation for Business
- MGT 258 Logistics and Supply Chain Management
- STAT 208 Statistical Data Mining Methods

# Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

- STAT 206 Statistical Computing
- STAT 205 Discrete Data Analysis
- MGT 256 Business Analytics for Management

STAT 232 Statistics for Business Analytics

## Quarter 2

- MGT 257 Marketing Strategy
- MGT 286A Capstone in Business Analytics I
- MGT 253 Internet Marketing
- MGT 233 Marketing Research

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 251 Market Assessment
- MGT 267 Applied Business Forecasting
- STAT 208 Statistical Data Mining Methods

#### 2.5 Certifications

The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree.

#### 2.6 Normative time from matriculation to degree (full-time)

Plan II students should be able to complete the coursework for this program three quarters (9 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, all of which must be spent at the Riverside campus.

Only courses in which grades of B- or above or "S" are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal when

- 1. They have 12 or more units of "I" grades (incomplete course work) outstanding
- 2. The guarterly GPA falls below 3.00 for two consecutive guarters
- 3. They fail to fulfill program requirements in a timely and satisfactory manner, or
- 4. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

#### § 3.0 PROJECTED NEED

#### 3.1 Student Demand for the Program

The demand is large and increasing, as attested below:

- The Wall Street Journal says: "B-school students can't get enough of big data. Neither can recruiters. Interest in specialized, one-year master's programs in business analytics, the discipline of using data to explore and solve business problems, has increased lately, prompting at least five business schools to roll out stand-alone programs in the past two years. The growing interest in analytics comes amid a broader shift in students' ambitions. No longer content with jobs at big financial and consulting firms, the most plum jobs for B-school grads are now in technology or in roles that combine business skills with data acumen, say school administrators."<sup>2</sup>
- Robert Half, an internationally recognized recruiting firm, surveyed CFOs and found that 61
  percent considered business analytics mandatory for some or all of their accounting and finance
  employees.<sup>3</sup>
- Poets & Quants, the MBA-focused website, reports that "business schools have rolled out...[business analytics]...programs, in response to fast-rising demand for workers trained to wrangle and analyze the big data streams that are getting bigger by the second."4

Business schools are creating programs in business analytics at a rapid pace, but, as noted earlier, there are few UC schools with such graduate programs and California is the home state of only one of the ranked programs. Poets & Quants lists all of the top 100 business schools with a business analytics programs and the only ones in California are USC and UC San Diego. Since the Rady School program's first class entered in fall 2016, it is not yet established. This strong and increasing nationwide demand for graduates of master's level business analytics programs, combined with an underserved market here in Southern California, offers an opportunity to gain market share and establish a reputation as a leading school in the discipline. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena, will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program. Exhibit II provides information on existing business analytics programs offered in California.

In addition, some programs that are labeled as business analytics programs focus more on data science than on business, which overstates the degree of competition in this space. For example, the program at USC is offered by the Data Science and Operations (DSO) Department at USC. DSO has 27 tenure-track faculty as well as a dozen clinical professors. Among the tenure-track, 10 are listed as belonging to the area of Statistics, while the rest are either in Operations or Information Systems. The flavor of the program reflects the fact that it is only offered by DSO, not the whole school, and that DSO is in part a statistics department. In particular, their one-year program requires six courses that emphasize statistics and three electives chosen from a list that includes seven statistics or database courses, while only two required course are clearly focused on business. The only business elective is Marketing Analytics and there are no courses that allow a student to apply business analytics specifically to finance or operations. That is, the focus is on data science rather than applications to business.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded business analytics masters programs. UC San Diego charges \$1,058 per credit unit for their 50 credit

<sup>&</sup>lt;sup>2</sup> Big Data Gets Master Treatment at B-Schools: The Wall Street Journal, November 5, 2014. <a href="http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y">http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y</a>

<sup>&</sup>lt;sup>3</sup> How Business Analytics and Other Key Skills Can Boost Your Career, Robert Half Finance and Accounting Blog, November 23, 2015.

<sup>&</sup>lt;sup>4</sup> Business Analytics Master's At 100 Top B-Schools, Poets & Quants, January 18, 2016.

degree program, for a total tuition of \$52,900. Our program has two fewer units, but is otherwise similar. We believe it would be prudent to charge slightly less, about \$1000 per credit unit, or \$48,000. USC's program started in 2014 with a tuition set at \$47,000 and is currently at \$51,300. Our intent is to develop the MSiBA as a full-time program and we expect that initial enrollments will be of full-time students, but since many of our MBA classes are at night, the program may attract many part-timers as well. Exhibit III includes financial projections associated with the new program.

Evidence from other programs indicates that students with master's degrees are able to command materially higher compensation than undergraduates. Several sources on the internet suggest starting salaries near \$90,000. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Applicants seem to agree - more than 300 people applied for 87 spots in Arizona State's 2014 class. As noted earlier, the high cost of the UCSD program has not diminished the number of applications at all. Given that there is a ready market for such students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program themselves.

# 3.2 Opportunities for Placement of Graduates

According to McKinsey, there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the firm predicts, the US alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the data.<sup>6</sup>

# 3.3 Importance of the Discipline

Business analytics is highly important to several disciplines, especially operations, marketing and finance. With the recent developments in technology and communications and data-rich environments, business analytics is indispensable for managers in all three areas, as well as for CEOs and CFOs.

#### 3.4 Ways in Which the Program Will Meet the Needs of Society

Graduates of the program will obtain jobs with above average pay that are even higher than the salaries obtained with other graduate business degrees. The Master of Science in Business Analytics program will help students in the Inland Empire advance their careers by helping to obtain these desirable positions. The program address an unmet need for graduate business education in Southern California in general. The program will contribute to UCR's reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration and the Department of Statistics maintain financial stability.

Students in the UCR Master of Science in Business Analytics program will acquire the knowledge and tools necessary to effectively manage their organizations. Their understanding of business analytics will help their organizations operate more efficiently. They will understand that effective use of business analytics give businesses a competitive advantage in the marketplace.

<sup>&</sup>lt;sup>5</sup> Big Data Gets Master Treatment at B-Schools, Wall Street Journal, November 5, 2014.

<sup>&</sup>lt;sup>6</sup> See www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation.

#### 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The Master of Science in Business Analytics program fits well with the research strengths of the School of Business and Statistics faculty. Moreover, as a self-supporting program, revenues from the MSiBA program will help to support databases that are important to the research activities of the faculty, will provide competent research assistants, and will help to provide funding for the Ph.D. programs. In addition, by having more students enrolled in graduate level management and statistics courses, faculty are more likely to teach two sections of the same topic. Given the current workload of four sections per year, this makes it more likely that faculty can complete their teaching obligations with two types of courses (two preps), allowing more time for research. This is particularly helpful for younger faculty.

#### § 4.0 FACULTY

The faculty members in the School of Business and the Department of Statistics are quantitatively and qualitatively strong. In particular, the OCSM faculty, several of the quantitative marketing researchers, and the finance faculty are well-suited to delivering successful quantitative business courses. The faculty in Statistics are currently delivering not only statistics courses to their students, but the computer and software classes that are required for business analytics. The strength of the faculty for this program is evident from the number of courses that already exist and the fact that only three new courses would be required at UCR. Exhibit X includes the brief biographies of faculty who will teach in the program.

#### § 5.0 COURSES

In the first quarter of the Master of Science in Business Analytics program, students will be expected to take core courses in the areas that they did not study as undergraduates. In the second quarter, building onto the fundamentals, students are exposed to more advanced coursework and will focus their studies in one of three business disciplines: Operations, Marketing or Finance. They will also begin the design and data collection work related to their two-quarter capstone class. In the third quarter, students are expected to build on what they learned and complete their individual capstone projects. They will also expand into more detailed work in some topics and finish up required courses outside their main area. Descriptions of the courses are included in Exhibit I.

#### § 6.0 RESOURCE REQUIREMENTS

This proposal is for a self-supporting program, which by definition does not draw down existing resources. Indeed, an important goal of the program is to create a revenue base for Statistics and Business that will allow both departments to expand their faculty, provide summer research support, and create an alumni base that will be financially suited to donating to UCR. In addition, the program is designed to take advantage of existing capacity in the School of Business and CNAS. Both the Statistics and the Business departments have recently expanded their faculty, so no additional resource requirements involve faculty lines. Over time, if the program gains in popularity it will provide the resources to hire more faculty. Support staff for recruiting and administering the program are already in place and are expected to have more time given the declining enrollments in MBA programs.

The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty (one each). In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are expected until the program is well established, if at all. Therefore only minimal additional classroom space is required.

Students are expected to have their own computers. Most software is already provided to students through a UCR site license, but if new software is needed to analyze data the students are expected to purchase it on their own, in the same way that they are expected to purchase their own books. The students can use data that the School of Business already purchases or they can obtain their own data using their own funds. There is no additional equipment needed for the MSiBA program nor are there any new library acquisitions required for it.

The program is likely to add greater pressure on parking. However, many of the Management courses are taught at night when parking is more plentiful. The School of Business has recently begun offering Saturday classes, which will also help alleviate parking pressures.

Most of the courses will be taught by School of Business faculty, with the rest being taught by faculty in the Department of Statistics. The split between the two depends on the backgrounds of the students in the program. If there are more students who studied undergraduate business, Statistics Department will have a greater portion of the MSiBA students in their classes. The more statistics undergrads who apply, the more the work for School of Business faculty. The new capstone course will require FTE faculty, which would be from the School of Business and Statistics (one for each quarter course).

Similar to existing graduate programs in the School of Business (MBA, Professional MBA, MFin and MPAcc), the program will require support staff to aid students in advising, to provide career counseling and to discuss admissions/recruit new students. Currently, the existing graduate programs staff in the School of Business has excess capacity to provide these services, especially as enrollment in the full-time MBA program is expected to remain low for the foreseeable future. Thus, a portion of the time allocated to the MBA program can be shifted to the MSiBA program. If the MSiBA program is successful, the staff required for admissions and recruiting may increase and a dedicated director of admissions and recruiting will likely be required. Thus, the expected costs included in Exhibit III represent a portion of the salary of one full-time employee for each of the staff areas (advising, career services and recruiting/admissions) and a future dedicated director. In steady state, the amount will increase for each category to recognize the needs of a larger MSiBA student population.

The program is self-sufficient, given the existing courses, and does not require state resources. As a stand-alone professional program, it is expected to generate positive financial resources after considering all costs, as shown in Exhibit III. Given the existing capacity of existing classes and the minimal upfront costs shown in Exhibit III, the program is expected to have a net revenue that is positive in the first year of existence. If it were to be the case that demand for space in the program is sharply lower than that indicated by the experience of UCSD, the costs of the program would be adjusted downwards to recognize the reduced time spent on advising and career development.

#### § 7.0 GRADUATE STUDENT SUPPORT

The Master of Science in Business Analytic program will offer graduate student support by reserving 10% of the gross fee revenue for student financial aid. As the program grows, the School of Business Development officers will strive to attain donor commitments for scholarships for the Master of Science in Business Analytics graduate students.

In addition to financial aid in the form of tuition reductions, graduate students in the program may serve as readers for undergraduate courses or as research assistants for professors who work on applied statistical research.

#### § 8.0 GOVERNANCE

The program will be directed by an interdepartmental group of faculty that will include all of the faculty in AGSM and all of the faculty housed in Statistics. AGSM will have oversight through its Executive Committee. At the same time, CNAS will have oversight through its Executive Committee. Further oversight will be in place with the creation of a new Advisory Board for the program that includes all ladder-rank faculty from the Department of Statistics and from the OCSM, Marketing and Finance areas of the School of Business. Executives of Southern California firms and UCR alumni with appropriate expertise will be asked to serve on the board as well.

#### § 9.0 CHANGES IN SENATE REGULATIONS

The Master of Science in Business Analytics program will not require any changes in Senate Regulations at the Divisional level or in the Academic Assembly.

# EXHIBIT I COURSE DESCRIPTIONS

#### **Statistics Courses:**

#### STAT 205 Discrete Data Analysis (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160A, STAT 160B, STAT 160C or equivalents; or consent of instructor. Contingency tables, log-linear models, information theory models, maximum likelihood estimation, goodness of fit, measures of association, computational procedures.

#### STAT 206 Statistical Computing (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160C or consent of the instructor. Topics include statistical programming, simulation studies, smoothing and density estimation, generating random variables, optimization, Monte Carlo methods, Bootstrap, permutation methods, cross-validation.

#### STAT 208 Statistical Data Mining Methods (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 201A, STAT 201B, STAT 202A or equivalents; or consent of the instructor. Covers principal data-mining methodologies and applications. Includes Bayes and LDA classifiers, logistic regression and neural network classifiers, support vector classifiers, classification trees, predictive modeling, ridge and lasso regressions, k-mean and Dendogram clustering methods, business analytics and mining association rules. Features SAS and R programming language.

#### STAT 232 Statistics for Business Analytics (4) NEW

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 023, 100B or equivalent, or consent of the instructor. Covers analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data with applications in business.

#### MGT 233 Marketing Research (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

#### MGT 267 Applied Business Forecasting (4)

Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

## **Core Management Courses:**

#### MGT 202 Financial Management (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): graduate standing or consent of instructor; MGT 201 (may be taken previously or concurrently), MGT 211 (may be taken previously or concurrently) or equivalents. Provides a foundation in theories of finance. Topics include time

value of money, security valuation, financial institutions, theories of risk measurements, managing a firm's investment decisions, capital structure, and sources of financing for a firm.

#### MGT 204 Cost and Management Accounting (4)

Lecture, 3 hours; outside projects, 3 hours. Prerequisite(s): MGT 211 or equivalent. A study of accounting information for managerial planning and control. Topics include managerial applications for product costing, budgeting, and performance evaluation; accounting techniques for modern manufacturing systems; activity-based accounting and cost management; international cost accounting systems; and the behavioral implications of accounting information.

#### MGT 207 Operations Management for Competitive Advantage (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

#### MGT 209 Marketing Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

# **Business Analytics Courses:**

## MGT 256 Business Analytics for Management (4)

Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet Management / 332 environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

#### MGT 286A Capstone in Business Analytics I (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will propose a topic of inquiry that will use a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical techniques used to answer questions related to business operations and profitability.

# MGT 286B Capstone in Business Analytics II (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; MGT 286A or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will work on a project that was initiated in MGT 286A that uses a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical

techniques used to answer questions related to business operations and profitability.

# **Operations Electives Courses:**

#### MGT 221 Decision Making Under Uncertainty (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

#### MGT 239 Simulation for Business (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

#### MGT 258 Logistics and Supply Chain Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

# **Marketing Electives Courses:**

#### MGT 228 Consumer Behavior (4)

Lecture, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. Analyzes why people buy and examines purchase decision processes and outcomes. Studies current models of consumer behavior. Topics include brand equity, customer delight, global marketing, behavior modification, and strategic market analysis.

#### MGT 251 Market Assessment (4)

Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines advanced topics in marketing, with emphasis on quantitative tools to aid marketing decision making. Topics include demand and market-share forecasting, conjoint analysis, market segmentation and cluster analysis, brand positioning and competitive market structures, and assessing market response to price, advertising, promotion, distribution, and sales force.

#### MGT 253 Internet Marketing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 209 or consent of instructor. Examines the role of the Internet in an organization's overall marketing framework. Discusses marketing applications of personalization, traffic generation, online search, community, online experience, and other current Internetenabled marketing techniques. Emphasizes Internet retailing.

# MGT 257 Marketing Strategy (4)

Seminar, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. A framework is developed for strategic marketing planning. Topics emphasized include market audits and futures research, product-market identification, product portfolio balancing, target market strategy, and integrated marketing program planning. Relies heavily on an extensive computer-based market simulation.

#### Finance Electives Courses:

#### MGT 227 Fixed Income (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): MGT 201. Covers analytical techniques related to fixed-income securities. Includes basic analytical tools in fixed-income markets. Topics include relative pricing of fixed-income securities, yield-curve estimation, securities with embedded options, and trading strategies. Utilizes interest rates swaps, mortgage-backed securities, and credit derivatives.

#### MGT 232 Derivatives and Asset Pricing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Explores the pricing of derivatives-based securities. Covers various topics in derivatives markets. Introduces pricing techniques for forwards, futures, options, swaps, and other derivatives. Utilizes empirical data and financial modeling.

#### MGT 244 Corporate Risk Management (4)

Lecture, 3 hours; written case analyses and reports, 3 hours. Prerequisite(s): MGT 202. Provides an overview of derivative financial instruments. Focuses on the use of derivatives to manage risk in a corporate setting. Utilizes the case-method to develop strategies and policies for managing the risk exposure of an enterprise, as well as to assess the relations between risk management and value creation.

#### MGT 252 Investments and Portfolio Management (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Discusses standard asset pricing models, portfolio theory, and empirical uses of securities data. Addresses pricing in the capital markets and empirical issues in testing asset pricing models. Other topics include risk-adjusted portfolio performance, term structure, bond pricing, and bond portfolio management.

#### MGT 295F Empirical Methods in Finance (4)

Seminar, 3 hours; individual study, 3 hours. Prerequisite(s): ECON 205A or equivalent or consent of instructor; doctoral standing in Management or consent of instructor. Covers econometric approaches to analyzing common problems encountered when conducting empirical research. Focuses on hypothesis testing, specification tests, general methods of moments estimation, the capital asset pricing model, multifactor asset pricing models, event studies, operating performance studies, simultaneous equations models, and endogeneity issues. Demonstrates programming in SAS and/or Gauss.

# EXHIBIT II SCHOOLS THAT OFFER BUSINESS ANALYTICS PROGRAMS IN CALIFORNIA

2017 TFE Tin	nes
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University	Ranking	Location	Program	Length	Tuition
UCLA	Begins Fall 2018	Los Angeles	M.S. in Business Analytics	13 months	\$62,579
USC	1	Los Angeles	M. S. in Business Analytics	18 months	\$58,674
UC San Diego	unranked	San Diego	M. S. in Business Analytics	12 months	\$52,900
UC Davis	unranked	Davis	M. S. in Business Analytics	12 months	\$50,729
Cal State East Bay	unranked	Hayward	M. S. in Business Analytics	9 months	\$26,595
Cal State LA	certificate	Los Angeles	<b>Business Analytics Certificate</b>	9 units	\$6,300
UC Berkeley Extension	certificate	online	Predictive Analytics Certificate	10 units	\$4,000
UC Irvine Extension	certificate	online	<b>Business Analytics Certificate</b>	11 units	\$3,985
Santa Clara University	unranked	Santa Clara	M.S. Business Analytics	15 months	\$55,076

# EXHIBIT III FINANCIAL PROJECTION

_	2020-21	2021-22	2022-23	2023-24
Program Headcount	15	20	30	50
Annual Fee Per Student	\$48,000	\$48,000	\$48,000	\$48,000
Total Fee Revenue Generated	\$720,000	\$960,000	\$1,440,000	\$2,400,000
Additional Faculty Salaries	\$265,000	\$265,000	\$265,000	\$530,000
Career services staff	\$20,000	\$20,000	\$20,000	\$40,000
Graduate student advising staff	\$25,000	\$25,000	\$25,000	\$50,000
Admissions and recruiting staff	\$25,000	\$25,000	\$25,000	\$50,000
Total Staff Salaries	\$70,000	\$70,000	\$70,000	\$140,000
Faculty and Staff Benefits	\$103,615	\$103,615	\$103,615	\$207,230
General Assistance	\$0	\$0	\$15,000	\$15,000
S&E	\$30,000	\$30,000	\$30,000	\$30,000
TOTAL DIRECT COSTS, SUBJECT TO IDC	\$468,615	\$468,615	\$483,615	\$922,230
Financial Aid	\$72,000	\$96,000	\$144,000	\$240,000
Other (UCOP Assessment, UCR Admin Cost Recovery Charge )	\$20,160	\$26,880	\$40,320	\$268,320
TOTAL DIRECT COSTS, EXEMPT FROM IDC	\$92,160	\$122,880	\$184,320	\$508,320
Total Direct Costs				
TOTAL PROGRAM DIRECT COSTS	\$560,775	\$591,495	\$667,935	\$1,430,550
ANNUAL COST PER FTE STUDENT				
Program Direct Costs	\$28,046	\$22,187	\$16,703	\$21,464
Program Indirect Costs (assumes IDC rate=33.70%)	\$7,898	\$5,924	\$4,075	\$4,663
TOTAL COST PER FTE STUDENT	\$35,944	\$28,110	\$20,778	\$26,127
TOTAL PROGRAM COST	\$718,698	\$749,418	\$830,913	\$1,741,342
SURPLUS (DEFICIT)	\$1,302	\$210,582	\$609,087	\$658,658
SURPLUS (DEFICIT) PER HEADCOUNT STUDENT: <sup>7</sup>	\$87	\$10,529	\$20,303	\$13,173

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<sup>&</sup>lt;sup>7</sup> Assumes new sections of existing courses will not be needed because business analytics students will fill remaining seats in these courses. These include the following STAT and MGT courses (with recent excess classroom capacity noted): STAT 205 (12 of 36 seats in Winter 2017); STAT 206 (11of 30 seats in Fall 2017); STAT 208 (12 of 30 seats in Spring 2017); MGT 202 Financial Management (offered in two quarters each year; 14 of 65 seats and 24 of 70 seats for sections 1 and 2, respectively, in Spring 2017 and 14 of 36 seats in Fall 2017); MGT 203 Economics for Management (1 of 74 seats and all 36 seats for sections 1 and 2, respectively, in Winter 2017); MGT 204 Cost and Management Accounting (29 of 65 seats in Fall 2017); MGT 207 Operations Management for Competitive Advantage (5 of 65 seats and 23 of 70 seats for sections 1 and 2, respectively, in Spring 2017); MGT 209 Marketing Management (6 of 77 seats and 4 of 35 seats for sections 1 and 2, respectively, in Winter 2017); MGT 221 Decision Making Under Uncertainty (all 30 seats filled in Fall 2017 but can be expanded to a larger room); MGT 227 Fixed Income (40 of 75 seats in Spring 2017); MGT 228 Consumer Behavior (8 of 60 seats in Fall 2017); MGT 232 Derivatives and Asset Pricing (7 of 36 seats in Winter 2017); MGT 233 Marketing Research (2 of 36 seats in Winter 2017); MGT 239 Simulation for Business (17 of 36 seats in Spring 2017); MGT 244 Corporate Risk Management (29 of 70 seats in Winter 2017); MGT 251 Market Assessment (6 of 36 seats remain); MGT 252 Investments and Portfolio Management (53 of 70 seats in Spring 2017); MGT 253 Internet Marketing (12 of 36 seats in Spring 2017); MGT 256 Business Analytics for Management (27 of 36 seats in Spring 2017); MGT 257 Marketing Strategy (4); MGT 258 Logistics and Supply Chain Management (10 of 36 seats in Winter 2017); MGT 267 Applied Business Forecasting (24 of 36 in Winter 2017); and MGT 295F Empirical Methods in Finance (1 of 16 seats in Winter 2017)

# EXHIBIT IV COURSE SCHEDULE AND COURSES

# Sample Program I (student has a B.S. in Statistics)

# Quarter 1

•	MGT 256	Business Analytics for Management
•	MGT 207	Operations Management for Competitive Advantage
•	MGT 202	Financial Management
•	STAT 232	Statistics for Business Analytics

# Quarter 2

•	MGT 286A	Capstone in Business Analytics I
•	MGT 221	Decision Making Under Uncertainty
•	MGT 209	Marketing Management
•	MGT 204	Cost and Management Accounting

# Quarter 3

•	MGT 286B	Capstone in Business Analytics II
•	MGT 239	Simulation for Business
•	MGT 258	Logistics and Supply Chain Management
•	STAT 208	Statistical Data Mining Methods

# Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

• STAT 206 Statistical Computing

• STAT 205 Discrete Data Analysis

• MGT 256 Business Analytics for Management

• STAT 232 Statistics for Business Analytics

# Quarter 2

• MGT 257 Marketing Strategy

MGT 286A Capstone in Business Analytics I

MGT 253 Internet Marketing

MGT 233 Marketing Research

# Quarter 3

MGT 286B Capstone in Business Analytics II

• MGT 251 Market Assessment

• STAT 208 Statistical Data Mining Methods

MGT 267 Applied Business Forecasting

# **EXHIBIT V**

# ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC

# 1. Name of Program:

Master in Business Analytics

# 2. Campus:

University of California Riverside

### 3. Degree/Certificate:

Master's Degree

4. CIP Classification: (to be completed by the Office of the President)

#### 5. Date to be started:

September 1, 2018

6. If modification of existing program, identify that program & explain changes.

Not Applicable.

# 7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?

# **Program Differentiation**

There is a large and increasing demand and professional need for specialized masters programs in Business Analytics. Our program is designed to extend the training of students who have already shown an aptitude for quantitative analysis and expands their skill set to sophisticated analytics in operations, marketing and finance. This makes the program focused on the business applications of statistics and quantitative analysis rather than the tools for handling large amounts of data, which is in contrast to the program at UC Davis or the online Data Science degree offered by UCR. An increasing number of schools are offering masters level programs in business analytics, but the only ranked program in our area is that offered by the University of Southern California. Their program is much too small to serve the demands of Southern California and it is tilted towards data science rather than business. UCR will be unique in the UC system in offering a nine month Master of Business Analytics master's degree and will be one of only three UC universities to offer the degree. The program is also unique in that it is joint between Statistics and Business, which ensures rigorous quantitative training while ascertaining that the program coursework differ from the curriculum in a data science program.

# 8. Type(s) of students to be served:

The Master in Business Analytics will be offered as a 9-month program (48 units) for graduates of a baccalaureate degree in either statistics or a quantitative business discipline. The program will extend the training of students along two tracks so that both sets of students will have similar skill sets by the end of the program.

# 9. If program is not in current campus academic plan give reasons for proposing program now:

Computing power and sophistication of software products has evolved to such a degree that there is now an entire new field combining business acumen with statistical analysis. Traditionally, students have focused on business with limited ability to analyze data or have focused on data analytics without much knowledge of its application to business. The demand for this degree is fairly new and UCR would be at the forefront of schools offering the degree. In addition, the regional market is underserved and this program will be an immediate source of net revenue.

### 10. If program requires approval of licensure board, what is the status of such approval? Not Applicable

### 11. Please list special features of the program:

The program has two tracks serving two types of students, depending on their undergraduate studies. This allows all graduates of the program to reach the same level of expertise in business analytics by graduation.

### 12. List all courses required:

The following four courses are required courses for all MSiBA students: MGT 286A-B (Capstone in Business Analytics, a 2 quarter sequence), MGT 256 (Business Analytics for Management), STAT 208 (Statistical Data Mining Methods) and STAT 232 (Statistics for Business Analytics). In addition, students with an undergraduate business degree are required to take STAT 205 (Discrete Data Analysis), STAT 206 (Statistical Computing), MGT 233 (Marketing Research) and MGT 267 (Applied Business Forecasting). Required courses for students with an undergraduate statistics degree are MGT 202 (Financial Management), MGT 204 (Cost and Management Accounting), MGT 207 (Operations Management for Competitive Advantage) and MGT 209 (Marketing Management).

In addition, students are required to take three electives that form a concentration. The electives must be a group of three courses in either operations, marketing or finance.

# 15. List any related program offered by the proposing institution and explain relationship.

We anticipate that the program will help us fill empty seats in the more technical courses offered in the existing MBA program.

# 16. Summarize employment prospects for graduates of the proposed program.

The program will educate individuals for employment in all types of businesses that collect and organize data for the purpose of maximizing profits. These include large industrial firms, financial services firms and consulting businesses. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

# 17. Give estimated enrollment for the first 5 years and state basis for estimate.

We project 15 students in the first year, increasing each year to reach 50 students in about five years.

# 18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.

Exhibit III contains our financial projections. Library Acquisitions, Computing, Facilities and Equipment are considered to be "in-direct costs" and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program. An increase in faculty FTE is shown by the increase in costs allocated to the Business School or Statistics Faculty. There will be only incremental facilities cost as we will use available capacity in existing classrooms, including statistical computing rooms. Over time as the program expands we anticipate having more students and likely a few more sections of that require more classroom space. The incremental rent, equipment and other elements of classroom space are included in the budget. We do not have specific equipment needs for the MSiBA program. Direct costs for the program include marketing and recruiting costs, and additional support staff, and financial aid at 10% of gross revenue.

### 19. How and by what agencies will the program be evaluated.

An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter

# EXHIBIT VI BYLAWS FOR THE INTERDEPARTMENTAL MASTERS DEGREE PROGRAM IN BUSINESS ANALYTICS

# University of California, Riverside

Masters of Science Degree in Business Analytics (MSiBA) Program Faculty Approval Date:	
Graduate Council Approval Date:	

# **Article I. Objective**

The mission of the Master's of Science in Business Analytics (MSiBA) program is to deliver graduate level courses that will lead to the awarding of a M.S degree that combines business education with training in statistical analysis. This degree program shall be operated in conformance with the rules and procedures of the Graduate Division of the Riverside Campus of University of California. The expectation is that graduates from this program will assume positions in leading companies that have resources to carry out detailed analyses of marketing, operations, and financial data. To achieve this objective, a combination of rigorous coursework in both statistics and the technical areas of business (operations, marketing and finance) will produce students who are capable of analyzing datasets in ways that will enhance company profits.

As an interdepartmental program, the MSiBA program will involve faculty from Statistics and from Business. If in the future, the School of Business were to separate into more than one department the program will involve Statistics and whichever departments house faculty in operations, marketing and finance.

# Article II. Degree Offered by the Program

The program offers the Master of Science (M.S.) degree (comprehensive examination Plan I).

# Article III. Membership

# A. Qualifications for Program Faculty Membership

The program faculty shall consist of persons at the University of California, Riverside, who are ladder-rank faculty in the School of Business and all ladder-rank faculty in the Statistics Department. Other faculty members may teach courses that are required for obtaining the degree, but the administration of the program will be conducted by the above-mentioned faculty.

All program faculty members will have the same full rights and privileges regarding the governance of the program, with the exception of the Program Director. The Director will belong to the School of Business or the Department of Statistics.

# Article IV. Organization and Administration

The administration of the program and its activities will be supervised by the Director.

### A. Program Director

The Director will be chosen by the deans of CNAS and Business. The director will be a faculty member in Statistics or Business. The director from the School of Business must belong to one of the following areas: Finance, SCOM, or Marketing. The Director is responsible for the overall organization and leadership of the program. The Director shall serve as the chief officer and spokesperson for the program and shall call and preside over meetings of the program faculty. The Director represents the program at the Business School Dean's meetings and at the CNAS Dean's meetings.

The appointment of the Director shall be in accordance with the regulations of the UCR Graduate Council. The Director will be appointed by the Chancellor for a term of three years, upon the recommendation of the Dean of the Graduate Division and the Deans of CNAS and the School of Business. The Director will alternate between the Statistics and Business Departments. Each respective school's EC shall solicit the names of nominees for a new Director when the position turns over to a professor from their school. The Graduate Dean, in consultation with the respective Deans, will forward his/her recommendation to the Chancellor, who makes the appointment.

### **Article V. Committees**

### A. Steering Committee

The members of the Steering Committee will be selected by the Director on an annual basis. All members of the Admissions and Recruitment Committee must be program faculty who are AGSM or Statistics Department faculty members. The Admissions and Recruitment Committee shall consist of

- The Graduate Program Director, who supervises the committee
- Six program faculty that represent as many different major field areas in the program as possible. Three will be from the Department of Statistics and three from the School of Business.

The functions of this committee shall include setting admissions criteria for the program and recommendations for their financial support. Admissions decisions are made by the Committee with input from the program faculty and in coordination with the admissions and recruiting staffs of AGSM and Statistics. The Committee will also be responsible for oversight of recruitment strategies, organization of prospective student visits to campus, and appropriate updating of the program website and print brochures. The committee is expected to work closely with the graduate admissions and recruiting staffs of AGSM and Statistics. The Committee is also responsible for the oversight of academic advising.

### **Article VI. Meetings**

At least one annual meeting of the program faculty must be held in the Fall at the beginning of the academic year. Other meetings may be called as frequently and for such purposes as deemed desirable by the Graduate Program Director. Meetings will be conducted according to Robert's Rules of Order. Minutes of the meetings shall be kept by the AGSM or CNAS staff and shall be distributed to all program faculty within ten days of the meeting.

# **Article VII. Quorum**

A quorum consists of 50% of the eligible program faculty. Passage of motions shall require a simple majority of the MSiBA program members who are present at the meeting. Voting may also be done by electronic ballot.

# **Article VIII. Amendments**

Amendments and revisions to the bylaws may be proposed by either the AGSM faculty or the Statistics Department Faculty by petition of 20% or more of the faculty in either department. Proposed amendments shall be either discussed at a meeting which satisfies quorum requirements or distributed by electronic mail to the program faculty members at least one week before distribution of the relevant ballot. Passage of an amendment to the bylaws will require at least a majority of those voting by electronic mail. All amendments and revisions must be submitted to the UCR Graduate Council for review and approval.

# EXHIBIT VII LETTERS OF SUPPORT FOR THE PROPOSED MASTERS IN BUSINESS ANALYTICS PROGRAM (MSiBA)

Exhibit VII includes letters of support from the following individuals:

Professor Sanjiv Das, Co-Director Masters of Business Analytics Program, Santa Clara University

Ms. Payal Shah, UCR Alumna, Ph.D. Statistics

Mr. Jesse Cota, UCR Alumnus, B.A. Business Economics

Mr. Minh Ly, UCR Alumnus, B.S. Statistics

Ms. Tricia Haderlie, School of Business Career Development Center Advisory Board member

Professor Karsten Hansen, Professor of Marketing, UC San Diego

Mr. Jefferson Hammann, Walmart

Professor Steve Sault, Interim Director, Research School of Finance, Actuarial Studies and Statistics, Australian National University

Professor Abel Rodriguez, Professor of Applied Math & Statistics and Associate Dean for Graduate Affairs, UC Santa Cruz

Professor Fernando Zapatero, Professor of Finance and Business Economics, University of Southern California

Professor Yongtao Guan, Professor of Management Science, University of Miami

Professor Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Professor Terrence August, Associate Professor of Innovation, Technology and Operations, UC San Diego

Professor Philip Kaminsky, Executive Associate Dean and Professor of Engineering, UC Berkeley

Professor Jean-Pierre Fouque, Professor of Statistics, UC Santa Barbara

Professor Charles Corbett, Professor of Operations Management and Sustainability, UCLA



Ocotober 21, 2017.

To: Professor Jean Helwege

Re: UCR Business Analytics Masters Program (MSiBA)

I am writing in support of your MS in Business Analytics proposal. I believe that with less than an additional year of coursework, your undergraduate students with a grounding in subjects such as math, statistics, quantitative business, engineering, etc., would be able to rotate into analytics and graduate with a Masters degree with sufficient training to be employed as entry-level hires in the vast array of Analytics jobs that remain unfilled today. In short, the basic proposition of the degree is well thought out, based on market demand, and satisfies a need in the job market.

I am the William and Janice Terry Professor of Finance and Data Science at Santa Clara University, and previously held appointments as Associate Professor at Harvard and Berkeley. My fields are quantitative finance and theoretical and applied computer science. I work at the interface of both fields, and supervise undergraduate and graduate students in both areas. My CV is available at <a href="http://srdas.github.io/">http://srdas.github.io/</a>. I am also a member of the advisory board of MIT's Consortium for Risk Analytics, and a Senior Fellow at the FDIC. I am the founder and co-director of the MS in Business Analytics (MSBA) program at SCU and we are based in the heart of Silicon Valley (Santa Clara county is Silicon Valley), so I am keenly aware of the growing demand for analytics skills.

I believe the goals of the program are differentiated well from other offerings. The key idea is that this program is not meant to produce more "data scientists" — a programmer with data and statistics skills. Data scientists play more technical roles at the intersection of computer science and statistics, but do not have business perspective. There is a greater proportional shortage of people who can ideate business propositions from data. Such people need a solid grounding in economics, finance, marketing, supply chains, where knowledge of business paradigms is key. I believe that the MSiBA will fill a huge gap for "business analysts" in the job market, as opposed to the gap for data scientists. My own estimation is that there are many more jobs for data scientists, which are being filled by software engineers with some coursework in handling data using machine learning. But, even though there are fewer jobs for business analysts, the percentage of these roles being filled is much smaller. This is the niche you are trying to fill and

it is a big opportunity. My own program at SCU is aimed at exactly the same market. We graduated our first cohort and placed them all, and this year we have tripled the size of the program for the cohort beginning in Fall 2017.

When we began our MSBA program, the intention was identical to yours, i.e., track our undergrads into it and enable them to continue on for a value-add degree. We were surprised and overwhelmed by the external demand for the degree, which led us to open it up to an external market. I suspect you may end up doing the same. As many of the major tech names begin to build and extend campuses in the LA region, you will find a natural home for some of your graduates, but the demand from startups is also high, especially for people who are not just programmers, but business thinkers as well. I think the courses you have will serve the students well, and the only course I see that would be useful to add on is a course on machine learning, which is an essential part of the training that analytics students must have.

Your proposal envisages a small initial cohort of 15 students. Your program will change rapidly as you learn from doing with feedback from employers, but I would also give thought to how to scale the program as you will likely be pleasantly surprised by the demand for it. There will be a need for faculty to rotate into teaching a skill set that extends beyond what is currently the provenance of business school education. This is a good challenge to have, and your program will add a new energy to both, your undergraduate and graduate programs. I believe it is a well thought out proposal, and I heartily support it.

Sincerely,

Sanjiv R. Das | William and Janice Terry Professor of Finance | Leavey School of Business | Santa Clara University |Tel: (408)-554-2776 | srdas@scu.edu | <a href="http://srdas.github.io/">http://srdas.github.io/</a>

November 1, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

Dear Dean Uhrich,

I am writing to offer my support of the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Math and Statistics, M.S. in Statistics, and a PhD in Applied Statistics. Since graduating with my PhD, I have spent the last eight plus years in a career building statistical models to use as a tool in making important business decisions. I currently work in the Consumer Modeling and Analytics team at Bank of America as Senior Vice President, Quantitative Operations Manager.

I believe this program is helpful in preparing students for similar careers. Many people who have extensive training in statistics have little formal training in business. Time must be invested to learn this on the job, while graduates of this program would start the job with more of the relevant skills and training required on the business front as well.

In particular, the Statistics UG track with the finance concentration would really help someone with a strong statistical background who wants to work in a quantitative realm within the financial industry be better prepared. Hence, I truly believe this program will be a great resource and want for students with similar career interests.

Sincerely,

Payal Shah

Pshahl 122@gmail.com

(951) 237-3517

Jesse Cota Senior Financial Analyst Agua Caliente Band of Cahuilla Indians jesse@cota.email (760) 625-4843

November 20, 2017

University of California Riverside Riverside, CA 92521

Honorable Members and Chairs of the different relevant departments:

As a member of the Inland Empire community and an alumnus of UCR, I am honored and enthusiastic in making a case for the one-year Master of Science in Business Analytics (MSiBA) program. I graduated in 2010 with a B.A. degree in Business Economics. My theoretical background was very well cemented, but I found myself lacking the practical skills in business analytics needed to be competitive in the labor market. It was only after a few years in the workforce and after having completed a master's degree from the School of Advanced International Studies at Johns Hopkins University (SAIS) that I began to obtain and improve skills in statistical analysis, econometric methods, data modeling, data management, and business intelligence among others.

Given today's abundance of professionals with bachelor's degrees, being able to differentiate oneself from the many is key. In addition, the current trend of corporations, government agencies, NGOs, and other organizations to make only decisions that are driven by data will continue to increase as server memory and computing power improve. With the proper advice, undergraduate students of accounting, business, economics, finance, statistics and related disciplines may guide their studies toward the goal of being admitted to the MSiBA program and hence make themselves competitive with the right mix in their skillset.

As a professional in the sector of business analytics, I witness on a day-to-day basis the need for better efficiency, analysis, and management of operations data. If more students graduate with the acumen and knowledge on how to treat, extract, transform, load, and analyze data, organizations hiring them will increase their added-value and efficiency. Therefore, I strongly recommend the creation of the one-year MSiBA program to the members and chairs of the different relevant departments within the University of California, Riverside. Should you have any questions, or would like further information, please do not hesitate to contact me at the email or phone number above.

Faithfully yours, Jesse Cota November 3, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

# Dear Dean Uhrich,

I am writing to give my support to the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Statistics – Quantitative Management in 2004, and have since then built a career in business operations. I currently work at Gigamon as Senior Manager, Demand Planning.

When I heard about the proposed MSiBA program, in particular, the Statistics UG track with the Operations concentration, I knew this would be a great program for students who are trained in Statistics have a better understanding of business operations. These are both tools that are used daily in my field. I think this will be a great program to prepare people, who are considering similar careers, with the relevant skills.

Best Regards,

Minh Ly

Minh.P.Ly@outlook.com

(909) 382-1618



February 12, 2018

Yunzeng Wang, Ph.D Dean, University of California, Riverside School of Business Riverside, CA 92521

Dear Dean Wang,

I am writing to offer my support for Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM. Businesses are in need of qualified professionals who have demonstrated their knowledge, skills and abilities by achieving a master's degree in this field.

Our organization is a non-profit and as such, it is vital for us to better understand the large amounts of data we have about our customers, programs, and costs in order to improve our operations and services, especially in a time when grant dollars are not readily available. Over the past two years, our organization had the privilege to host a couple of MBA Fellows; both concentrated on analytics and their work made an impact for us. A program dedicated to this would be instrumental in the non-profit and for profit worlds.

Sincerely,

Tricia Haderlie

SVP, Talent & Training

Satura and Anderlie











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Karsten T. Hansen Professor of Marketing Rady School of Management E-mail:k4hansen@ucsd.edu Phone: (858) 822 7462

February 14, 2018

Yunzeng Wang Dean, School of Business University of California – Riverside Riverside, CA 92521

Re.: Degree proposal of MSiBA program, UC Riverside

Dear Dean Wang,

I am writing to offer my support for a new program in business analytics at UC Riverside. The proposed MS degree in business analytics (MSiBA) program will provide a valuable service to students in the Inland Empire as well as to the businesses that hire them. For reference, my background is 15 years of research in Quantitative Marketing with a specialty in "big data" analytics. Furthermore, my own school at UC San Diego launched a similar MSBA program in 2016 and I am quite familiar with many of the details in setting up a program like the one UC Riverside is proposing.

The MSiBA program is designed to ensure a high level of scholarship by combining the expertise of both statistics and business professors who will teach in this interdepartmental program. The admissions criteria also help ensure a high level of scholarship, as only those students who have already been trained in one of the two areas of study will enter the program. The two quarters of capstone courses also add to my confidence that graduates of this program will be able to apply their training in a real business environment.

The need for students trained in the area of business analytics is large and growing. This is a great opportunity for students from underrepresented groups to obtain professional training that will enhance both the financial aspects and prestige of their future careers. As a university that values the diversity of its undergraduate population, UCR will benefit greatly from extending this environment to its professional schools.

Overall, I think the directors of the proposed program have put together a very clear, detailed presentation of the program proposal and I think they make a convincing case for starting a MSiBA degree program at UCR. In sum, I believe this program will greatly enhance the reputation of UCR, the economy of the Inland Empire, and opportunities for underrepresented groups.

Best,

Karsten T. Hansen

February 22, 2018

Dr. Yunzeng Wang Dean, UCR School of Business University of California, Riverside Riverside, CA 92507

Dear Dean Wang,

From our first meeting in 2014 through my work on the CDC Advisory Board to the A. Gary Anderson Graduate School of Management, I have enjoyed unrivaled academic partnerships and community support, as well as lasting professional relationships and camaraderie which will transcend our formal assignments to our respective institutions. Through our board work, I have recently learned of Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM.

Having worked in corporate supply chain with Walmart for more than 16 years, as well as seven years with various governmental agencies, I would be remiss to not offer support to this proposal. I have taken the opportunity to review the related materials as well as reflect on the applications of such training to professionals in my field. Data analytics applications in complex business problem-solving are at the forefront of my field, and we are always in search of such talent that can leverage continued growth into our business.

Supply chain in general, and the retail sector in particular, are becoming increasingly competitive in an omni-channel world. Such a track of study would certainly have interested me had it been available at the time I pursued masters-level work. I would look forward to seeing this program in implementation and action, particularly with regard to the professionals that will graduate to successful careers in the supply chain space.

My thanks in advance for your consideration.

Sincerely,

Jefferson Hammann

jeffersonhammann@gmail.com

951.675.1979 mobile



**Associate Professor Steve Sault** 

Interim Director Research School of Finance, Actuarial Studies and Statistics College of Business and Economics

> T: +61 2 6125 4869 E: stephen.sault@anu.edu.au

3 August 2018

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

**RE: Master of Science in Business Analytics** 

Dear Dean Uhrich,

I write in strong support of the proposal for a Master of Science in Business Analytics to be offered at UC Riverside. Indeed, at the Australian National University we developed a similar program in 2015 in which the School of Finance, Actuarial Studies and Statistics teaches the statistics component. Particular strengths of the proposed program at UCR include:

- The cross-collaboration nature of the of the program which is being instructed across both the School of Business and Department of Statistics – this ensures that each course is instructed by academics with expertise in the particular subject matter, rather than courses being instructed by academics in a different field.
- The focus of the program on emphasising the three business topics of marketing, finance and operations also sets the program apart from traditional "data science" centric programs which concentrate on computer coding etc. This enables the program to capture a strong market interest in business analytics within finance and operations.
- The requirement that students come from a cognate background in quantitative business or statistics is a good approach and ensures that by the end their studies, all students will be at the same level of competence in business and statistics. While studying, students can focus on areas that they are less "proficient" in, to ensure that as graduates they have the skill set necessary to be attractive to employers.

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A highlight of the program are the two quarters of capstone courses offered within the program. These capstone courses will help to ensure high quality, well-trained

graduates.

As mentioned previously, the Australian National University developed a similar program in

2015, the Master of Applied Data Analytics. While this program also has a computer science

element, it is similar to the proposed Master of Science in Business Analytics as it involves

a cross-collaboration between three Colleges (College of Business and Economics, College

of Arts and Social Sciences and College of Engineering and Computer Science). Our School

teaches the statistics component into the degree. This program also has a heavy focus on

business, statistical analysis while also encompassing public policy initiatives. Within the

past 3 years, this program has grown to a student cohort of 50 students, a number similar

to the goal of the proposed program at UCR.

In summary I believe that the proposed program at UCR has been well crafted and will prove

to be robust and popular. I am certain it will attract a high quality student cohort, and be

sustainable in terms of the numbers attracted. I also trust that the program will enhance the

reputation of UCR for delivering programs of excellence that are in demand.

Yours sincerely,

Steve Sault

Interim Director

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APPLIED MATHEMATICS & STATISTICS BASKIN ENGINEERING BUILDING SANTA CRUZ, CALIFORNIA 95064

August 26, 2018

Jean Helwege Professor of Finance School of Business Administration University of California, Riverside

Re: Proposal for a Self-Supporting MS Program in Business Analytics

Dear Dr. Helwege,

I am writing to express my support for the new Master of Science in Business Analytics (MSiBA) program being jointly proposed by the Department of Statistics and the Gary Anderson Graduate School of Management at the University of California, Riverside. The structure of the program, which brings together expertise from faculty in business and statistics, is a key strength of the program that will appeal to students interested in business but with a strong quantitative training.

For background, I am a Professor of Statistics at the University of California Santa Cruz. In addition, I currently serve as Associate Dean for Graduate Affairs in Baskin School of Engineering and as Associate Director of the Center for Data, Discovery and Decisions. In the past, I have served as the Chair of our Division's Senate Committee on Planning and Budget, and our representative to its university-wide counterpart. Because of this background, I have substantial experience both in the design and review of Self Supporting Programs, and I think I can provide a unique perspective on the proposal being put forward.

The program aims to "expand the training of students with analytical backgrounds to allow them to apply their skills to business data". The curriculum, which is rigorous, reflects this goal. Unlike most other programs in business analytics, the curriculum of the MSiBA at Riverside is biased towards traditional courses on business and management. According to the proposal, this has the additional advantage of using spare capacity in existing courses. While this choice of curriculum clearly differentiates the MSiBA from the other business analytics programs in the UC system, one potential concern is that it might not provide enough differentiation with respect to the standard MBA programs offered by the Gary Anderson School of Management, or by other UC campuses. The proposers might want to consider expanding the list of elective sequences to allow students to get further technical skills in statistics and data analysis if they so desire.

At nine months, the proposed program is also somewhat shorter than the rest of the business analytics programs offered in the UC system (which are typically 11 to12 month long). While there are some high-ranking programs that have a similar length (e.g., University of Arizona), and the shorter duration provides another important differentiator within California, this is a very accelerated time table. Students often need some time to fully absorb and integrate concepts. One way in which other programs have dealt with this issue has been by (1) integrating required courses through shared projects, and (2) requiring a series of capstone/professional development courses that build on each other and

provide opportunities for students to use skills acquired in different courses. I wonder if a similar approach could be helpful in the case of the MSiBA.

In spite of these small caveats, I would like to emphasize that this is a strong and well designed program that will serve a clear need in terms of workforce development. I wish you and Prof. Cui success with the review and launch of the program. Please do not hesitate to contact me if you need any further information.

Sincerely,

Abel Rodríguez

Professor

Department of Applied Math & Statistics Associate Dean for Graduate Affairs

Baskin School of Engineering e-mail: abel@soe.ucsc.edu

phone: +831 459 1047



# FINANCE AND BUSINESS ECONOMICS DEPARTMENT

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance Professor of Finance and Business Economics

August 30, 2018

Dean Kathryn Uhrich CNAS Geology 2258 Riverside CA 92507

Dear Dean Uhrich,

Professor Jean Helwege asked me to provide an assessment of the UCR proposal of a MS in Business Analytics. In this letter I express my opinion on the proposal she has sent me.

First, I have to emphasize the relevance and timing of such a program. It is no secret that companies of all types and industries depend more on data analysis for their decisions and need to hire people who are able to do such an analysis. This is especially the case in marketing and finance. However, they often have to hire graduates with technical backgrounds —as computer science and statistics—because the students with business background lack the data analysis knowledge required by many jobs. This is by no means a perfect solution because these graduates lack an understanding of the business aspects of the organizations and require a lot of guidance and, at least initially, cannot have managerial responsibilities. In sum, there is a large market for the proposed program that universities in our region are not attending.

In fact, the only similar program in the area —as pointed out in the proposal—is our own MS in Marshall. I was the Vice Dean for graduate programs responsible for its launching. I initially faced strong resistance from the administration, but I can reassure you that they could not be happier now that they went along with the proposal. The program receives many hundreds of applications every year—last time I checked over one thousand—but can only accept a small number of students for capacity limitations—determined by faculty size and classrooms availability. There is plenty of room for similar programs in the area. Furthermore, the program proposed has its own emphasis that makes it different from ours and would be preferable for many students.

University of Southern California



In particular, our program focuses on the data analysis and somehow overlooks the applications. I think this is a result of our large size that makes departments very protective of their turf and leads programs to miss on the interdisciplinary opportunities that your proposal exploits and will probably make it more marketable.

Finally, I have to point out that, in my opinion, timing is very important. It is a matter of time before other schools in the area offer similar programs. As you know rankings are sticky and being early in the game provides the opportunity to establish a reputation and achieve a good ranking before the market saturates.

I will be happy to elaborate more if you think that will be useful.

Best wishes,

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance

Professor of Finance and Business Economics

# UNIVERSITY OF MIAMI SCHOOL of BUSINESS ADMINISTRATION



Department of Management Science 5250 University Drive, KE 401 Coral Gables, FL 33146 Phone: 305-284-6595 Fax: 305-284-2321

To: Professor Kathryn Uhrich
Dean of the College of Natural and Agricultural Sciences
University of California at Riverside

Dear Professor Uhrich,

I am writing to offer my support to your proposed Master of Science in Business Analytics (MSiBA) program at UCR. In recent years, many MS programs similar to the proposed MSiBA program have been developed in the US, including the MS in Business Analytics (MSBA) program that we offer at the Miami Business School. These programs are designed to meet the ever increasing demand of analytical talents from nearly all sectors of business and industry. A program like this typically takes about a year or less, and graduates from such programs are well placed in the job market. The trend is here to stay, and I believe that programs alike will be self-sustainable for a long term.

I am the Leslie O. Barnes Professor and Chair of Management Science at the Miami Business School. I am also Director of the Deloitte Institute for Research and Practice in Analytics at the University of Miami. I previously held positions as Assistant and Associate Professors at Yale University and Assistant Professor at the University of Miami. I became the chair of Management Science in 2013. Under my leadership, our school launched the MSBA program in 2014. The number of enrolment for this program has been steadily increasing, with 11 in 2014 to more than 90 students in 2018. So far, we have had four cohorts of graduates, who found employment in big name companies such as Amazon, Capital One, Deloitte, NBC Universal, Visa amongst others. Their starting salary varies greatly with experiences, ranging from 60k to over 100k. Interests in this degree have increased dramatically – we received more than 500 applications for this program in 2017-2018, which nearly doubled the number of applications that we received in 2016-2017.

The MSBA program not only provides additional revenue to the university, but also creates new synergy to support faculty research. We currently charge 2030 dollars on tuition per credit hour. With more than 90 students and after having deducted scholarships, we are expected to generate well over 4 million dollars of revenue this year. To boost the reputation of our program, we have hired four tenure-track faculty members since 2014. The new faculty bring new expertise in areas such as statistics, machine learning, and operations research.

As a business professor with background training in statistics, I fully understand the importance of analytical skills in contemporary business operations. With an additional year of business training to students with analytical background (such as statistics, computer science and math), or analytical training to students with business background, the students are better prepared for the job market. The proposed curriculum is well-conceived and the proposed new courses on Statistics for Business Analytics and Statistical Data Mining are much needed in a program like this.

As mentioned in the proposal, there are not many similar programs in California, which hosts the headquarters of many technology companies. Although somewhat surprising, this presents a great opportunity for UCR to establish itself as a frontrunner and leader in this area. Based on my knowledge of the faculty at UCR Statistics Department and the Business School, I believe that they are well-positioned to develop such a program. I therefore support the proposed program fully.

You're sincerely,

Yongtao Guan

Leslie O. Barnes Professor and Chair of Management Science

The Miami Business School

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SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS & THE ERNEST & JULIO GALLO MANAGEMENT PROGRAM

UNIVERSITY OF CALIFORNIA, MERCED 5200 NORTH LAKE ROAD MERCED, CA 95343 (209) 228-7742 (209) 228-4007 FAX

To: Jean Helwege, Professor of Finance, UC Riverside

From: Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Re: M.S. in Business Analytics

Date: September 6, 2018

Having read the joint proposal by faculty in the School of Business and by the faculty in the Department of Statistics, and based on my direct experience with several schools, such as the University of Illinois, Urbana-Champaign, where I taught Business Statistics, North Carolina State University, where I taught Corporate Finance, Harvard Business School and UC Merced, I am writing in strong support of the proposed M.S. in Business Analytics at UC Riverside.

Because Business Analytics involves harnessing the information provided by data (including big data) and models via statistical and quantitative methods in order to improve business performance, a joint proposal by the School of Business and the Department of Statistics will allow the exploitation of synergies between the two academic units while reducing operational expenses. At the same time, the joint degree will offer an avenue for students with an undergraduate degree in a quantitative business major to enhance their skills via rigorous training in Statistics through the Statistics track, and to students with an undergraduate major in Statistics to improve marketability via the acquisition of business skills through the Business track. The distinction between two tracks, enables the delivery of the Master's program in three quarters, which is inline with the current trend of one-year professional degrees. In fact, our own new MM (Master's in Management) is a one-year professional degree. Unlike two-year MBA degrees that require substantial prior business experience and can be quite expensive both to students and in terms of delivery costs, one-year fast-track professional degrees can be deployed quickly with existing resources and are more appealing to both parties.

What distinguishes this proposal from other existing fast-track and traditional Master's programs is the cooperation with the Statistics Department and the rigorousness ascertained through the emphasis on quantitative and statistical methods. By contrast, MBA degrees attract students with a variety of backgrounds and frequently rely on quick back of the envelope calculations.

To conclude, based on my professional experience, as well as on my Senate service as a member of the UC Merced DivCo for three years and on the systemwide Academic Senate for one year, I have no hesitation in strongly recommending this proposal.

Tel: (209) 228-4640 E-mail: ftsoulouhas@ucmerced.edu Web page: http://tsoulouhas.info BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



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WEB: www.rady.ucsd.edu

Yunzeng Wang Dean, School of Business University of California, Riverside Riverside, CA 92521-0203

September 15, 2018

Dear Dean Wang,

Thank you for providing me with a copy of the program proposal for a Master of Science in Business Analytics at UC Riverside, School of Business. I am currently the co-chair of the MSBA degree program at UC San Diego, Rady School of Management. I worked with Professor Vincent Nijs to design the program here at Rady and have also helped to organize our Center for Business Analytics. Over the past few years, we have reached out to many corporate stakeholders in the greater San Diego region to better understand their unmet needs in the area of business analytics and ensure that our degree program and research center were viewed as synergistic. We are now in the third year of offering our MSBA degree program and have learned quite a bit along the way. I served as a reviewer of the MSBA degree program proposals at UC Davis, UCLA, and UC Irvine and am therefore familiar with all of the degree programs in business analytics within the UC system.

With this backdrop, I would like to convey my impression of the proposed program at UC Riverside and offer some feedback as well. First, the program is uniquely designed in comparison to existing programs by strategically focusing on admitting undergraduates with either statistics or quantitative business backgrounds. To me, this is a clever design in that it reduces the variance of inputs and will make it easier to ensure students working in teams are close in their abilities. Our program at Rady has relatively broader acceptance criteria, which has certainly presented challenges over the past few years. One of the reasons I believe this aspect of UC Riverside's MSiBA proposal is a safe one is because the demand for this degree is very large. At Rady, we have seen applications grow from just over 300 in year 1, to over 700 in year 2, and approximately 950 this year. There are way more qualified students than we can possibly admit, and having more business analytics degree programs within the UC system would better serve the needs of individuals seeking to become business analytics professionals. Because I expect UC Riverside to also face strong demand, even a focused strategy on statistics and business undergraduate majors would not be a limiting one.

Second, this proposal seems to be a relatively more efficient one in its use of existing courses in the graduate degree programs currently offered by the School of Business and Statistics

department. Because existing sections of these courses are not operating at capacity, this proposal will be able to generate substantial revenue for the school while filling empty seats. It's good to see a proposal that aims to make more efficient use of resources; this is a problem sadly facing many of our schools. The associated cost savings above may justify some future electives that are specifically catered to business analytics students. At Rady, students find our Customer Analytics course to be a critical elective because it has students practicing the application of statistical and machine learning models on business problems over and over again. In this sense, it is the elective that best prepares students for the capstone projects in our program.

Third, having specialization tracks in the areas of operations, marketing and finance is unique in the UC system. Explicit tracks will enable students to focus on a specific business function and also create sub-cohorts that can be managed together. Overall, I like this structure. My experience has also taught me to be careful with self-imposed constraints. In that vein, I might suggest adding in the ability to have increased flexibility (perhaps by exception or suggested tracks as opposed to mandatory). From what I've seen at Rady, students are interested in *particular* courses, independent of discipline. We have also had many international students with degrees in business that are already specialized in finance. These students typically have minimal operations or marketing exposure, and may benefit from mixing across our marketing and operations electives.

In closing, I am supportive of the MSiBA program presented in this proposal. It is very well thought out and designed with aspects that make it unique within the UC system. I think it will be a very attractive one particularly for students who have majored in statistics and are looking to better understand business functions and the application of their knowledge in the business domain. I anticipate that the program will be successful in achieving its goals.

Sincerely,

Terrence August

Fenerce Logust

Associate Professor of Innovation, Technology and Operations Rady School of Management University of California, San Diego

taugust@ucsd.edu (858) 822-7452

# UNIVERSITY OF CALIFORNIA, BERKELEY

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PHILIP M. KAMINSKY
EXECUTIVE ASSOCIATE DEAN AND CHANCELLOR'S PROFESSOR OF ENGINEERING
UNIVERSITY OF CALIFORNIA
COLLEGE OF ENGINEERING
320 McLAUGHLIN HALL # 1700
BERKELEY, CA 94720-1700

TELEPHONE: (510) 642 5771 FACSIMILE: (510) 642-9178 email: kaminsky@berkeley.edu

September 19, 2018

Jean Helwege University of California -- Riverside Riverside, CA 9251

RE: <u>Proposal for an Interdepartmental Graduate Program Leading to the Master of Science in</u>
<u>Business Analytics</u>

Dear Professor Helwege:

I am writing to express my support for the proposed Master of Science in Business Analytics (MSiBA) degree at UC Riverside. I am on the faculty of the Department of Industrial Engineering and Operations Research at UC Berkeley, a department whose course offerings overlap with the contents of this new degree.

There is no doubt in my mind that the MSiBA will meet a growing need (indeed, similar to the need met by some of the graduates of our professional master's degree). Businesses are facing increasing amounts of data, and are desperate for employees with the training to use that data to make effective business decisions. I have observed a constant clamor from our industrial advisory board for the type of students that this program will train, knowledgeable in both analytics, and the basics of business.

I've reviewed the degree proposal, and several things stand out. The proposed program clearly covers the key topics necessary in this area, and it does so efficiently, in a way that expands career opportunities for students in just nine months. It also does so, as far as I can tell, primarily by using existing campus resources. Furthermore, the two semester capstone component will prepare students to use these skills in a real-world setting.

In summary, the proposal strikes me as well thought out, well written, and comprehensive. This degree seems to be a low-risk addition to the UCR degree portfolio, one that will meet a definite need in the state, and do so in a way that is likely to enhance the reputation of UC Riverside.

Sincerely,

Philip M. Kaminsky Executive Associate Dean College of Engineering

### UNIVERSITY OF CALIFORNIA, SANTA BARBARA

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DEPARTMENT OF STATISTICS AND APPLIED PROBABILITY SANTA BARBARA, CA 93106-3110 805-893-2129 \* FAX 805-893-2334 www.pstat.ucsb.edu

Jean-Pierre Fouque
Distinguished Professor
Director of the Center for
Financial Mathematics and Actuarial Research
fouque@pstat.ucsb.edu
http://www.pstat.ucsb.edu/faculty/fouque

September 24, 2018

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

### Comments on the proposed Master of Science in Business Analytics

Data Science is multi-disciplinary in nature, ranging from Statistics, Computer Science, and application areas. The proposed Master in Business Analytics is based on Statistics and applications to Business. I find the idea very appealing and extremely well-suited to a one-year master program. Of coure, the admitted students need to be well-prepared in one of these two areas. This is clearly stated in the description of the program which is jointly administered by the School of Business and by the Statistics Department.

There is no question about the need of training in business decisions made by using the enormous amount of data in this area and the machine learning techniques. As described in the document, this program is at the right level (Master), it targets the right students (with strong undergraduate background in either Statistics or Quantitative Business), and it fits well the STEM designation. The program is also well-positioned with respect to the more classical MBAs.

Regarding its relationship with other similar programs in the UC system, the most comparable one is at UCSD but most of the other campuses do not offer one yet. If UC Santa Barbara had a Business School, I would be the first to promote the idea of such a program.

The details of the description, administration, admission, curriculum, evaluation, and resources, are well thought out and, in my opinion, this program will be very successful and competitive in the growing job market in this area.

As a UCSB faculty, I can only applaud and support this initiative at UCR.

Sincerely,

Jean-Pierre Fouque Distinguished Professor Director of the CFMAR

Director of the CF



#### Charles J. Corbett

IBM Chair in Management Professor Of Operations Management and Sustainability

Tel +1 (310) 825-1651 Fax +1 (310) 206-3337 charles.corbett@anderson.ucla.edu

Los Angeles, September 24, 2018

To whom it may concern,

This brief letter serves to express my support for the proposed Master of Science in Business Analytics (MSiBA), to be offered by the Anderson Graduate School of Management at UC Riverside.

Offering such a program at UC Riverside seems a sensible move, for the reasons mentioned in the proposal. There are numerous synergies with the programs already offered by the Department of Statistics and by the School of Business at UCR. The proposal mentions that the program is expected to be a significant source of revenue; the enormous volume of applications to the Masters of Science in Business Analytics that we recently launched at the UCLA Anderson School of Management would support such an expectation.

The design of the program is appealing, with slightly different areas of emphasis for students depending on whether their prior training is more in business vs. more in statistics.

The skills needed to teach courses in this program are generally closely aligned with those of many faculty in business schools (and statistics departments). Especially many recent PhD graduates and current PhD students are increasingly expert in the analytical methods that underlie the MSiBA program, so the fit between faculty expertise and program needs will likely become even better over time.

I hope this letter is helpful

John Cubur

Sincerely,

Charles

# EXHIBIT VIII BIOGRAPHIES OF SELECTED PARTICIPATING FACULTY

Exhibit XI includes biographies of the following professors:

# Statistics:

Xinping Cui, Department Chair and Professor James Flegal, Associate Professor Daniel Jeske, Professor Yehua Li, Professor

#### **Business:**

Subramanian (Bala) Balanchander, Professor Alexander Barinov, Assistant Professor Mohsen El Hafsi, Professor Long Gao, Associate Professor Elodie Goodman, Associate Professor Jean Helwege, Professor Iva Kalcheva, Assistant Professor Charles Zhang, Assistant Professor

# Bala Balachander

Subramanian "Bala" Balachander is Professor and the Albert O. Steffey Chair in Marketing at the School of Business Administration of the University of California, Riverside. Prior to his current position, he was a Professor of Management at Purdue University. Professor Balachander has a Ph. D. in Industrial Administration from Carnegie Mellon University, an MBA from IIM, Calcutta and a B. Tech in Chemical Engineering from IIT, Madras. His research studies competitive marketing strategy, pricing, bundling, sales promotions and market signaling, and uses methods of game theory and structural econometric models. His teaching interests are in pricing, marketing strategy and marketing models. A 2012 study published in the Journal of Product Innovation Management ranked Professor Balachander No. 16 among the world's top innovation management scholars based on articles published in the top marketing journals. Professor Balachander currently teaches MGT 257, Marketing Strategy.

### Alexander Barinov

Dr. Barinov is an Assistant Professor of Finance at A. Gary Anderson School of Business Administration, University of California Riverside. Prior to joining UCR in 2015, he taught at the University of Georgia. He earned his Ph.D. and his M.S. in Finance from the University of Rochester. He also holds a M.A. degree in Economics from New Economic School (Moscow) and a B.A. in Economics from Lomonosov Moscow State University. Dr. Barinov's work centers

around the idea that firms with high levels of firm-specific uncertainty and option-like equity beat the CAPM when expected aggregate volatility increases, and therefore serve as a hedge against aggregate volatility risk. His work is related to phenomena in the stock market known as the value effect, the small growth anomaly, the new issues puzzle, the idiosyncratic volatility discount and the analyst disagreement effect. Dr. Barinov currently teaches MGT 295G and MGT 252, which focus on investments in the stock market.

# Xinping Cui

Dr. Cui is a Professor of Statistics at the University of California –Riverside, a position she has held since 2014. She joined UCR in 2002, after working as a statistical analyst at Reed Neurological Research Center. Dr. Cui became chair of the Statistics department in 2016. She earned her Ph.D. in biostatistics at UCLA and an M.S. in applied statistics at Bowling Green State University. Dr. Cui's undergraduate degree is in mathematics, which she studied at Nankai University in Tianjin, China. She also has a M.S. degree in math from Nankai University. In addition to receiving grants from the National Institutes of Health to study statistical aspects of health and disease, Dr. Cui has worked with researchers at the UCR Agricultural Experimental Station. She currently teaches STAT 231A, Statistics for Biological Sciences, as well as several undergraduate statistics courses.

# Mohsen El Hafsi

Mohsen Elhafsi received both Ph.D. and M.S. in 1995 in industrial engineering from the University of Florida. He received a "Qualified Engineer" degree from the Ecole Nationale d'Ingenieurs de Tunis, Tunisia, in 1988. Dr. El Hafsi joined the School of Business at UCR as a tenure-track faculty member in 1997. In 2007, he was awarded a \$10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems.

# James Flegal

Dr. Flegal is an Associate Professor of Statistics at the University of California –Riverside. Professor Flegal received his Ph.D. from the University of Minnesota. Dr. Flegal has worked with researchers at NASA in the organization known as FIELDS, or Fellowships and Internships in Extremely Large Data Sets: A Training and Research Program in Big Data and Visualization. His research focuses on Monte Carlo methods and Markov chains. He currently teaches STAT 206, Statistical Computing.

# Long Gao

Dr. Gao is an Associate Professor of Management in the area of Operations and Supply Chain Management at the University of California –Riverside. He earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. Professor Gao currently teaches MGT 239, Simulation for Business and MGT 207, Operations Management for Competitive Advantage.

### Elodie Goodman

Dr. Goodman is an Associate Professor in the area of management science in the School of Business. She joined the University of California – Riverside in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d'Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and healthcare payment systems. She currently teaches MGT 201, Quantitative Analysis and MGT 221, Decision-Making Under Uncertainty.

# Jean Helwege

Dr. is a professor in the Finance area of the School of Business at UC Riverside. Before joining the group, she held the J. Henry Fellers Professorship in Business Administration at the University of South Carolina. Her prior experience also includes faculty positions at Penn State, the University of Arizona, and Ohio State University. From 1988 to 1998 she worked in the Federal Reserve System as an economist. She holds a Ph.D. in economics from UCLA and she received a Bachelor of Arts in linguistics from the University of Chicago. Her research interests include corporate bonds, bank regulation, financial distress, initial public offerings and capital structure. She currently teaches MGT 227, Fixed Income.

# Dan Jeske

Dr. Jeske is a Professor in the Statistics department at the University of California –Riverside, where he has worked since 2003. Prior to joining UCR, Professor Jeske held positions at Rutgers University and Bell Laboratories. He is the editor of *The American Statistician*, and has served on the editorial board of *Applied Stochastic Models in Business and Industry* and *Technometrics*. He earned his Ph.D. and his M.S. degrees in statistics at lowa State University. Dr. Jeske's undergraduate degree is in mathematics and computer science from Austin Peay State University. Dr. Jeske runs the Statistical Collaboratory Consulting Project at UCR, which has

cumulative revenues of over \$1 million. He currently teaches STAT 208, Statistical Data Mining.

# Ivalina Kalcheva

Dr. Kalcheva is an Assistant Professor of Finance in the School of Business at UCR. She joined the Business department in 2014 after having taught at the University of Arizona from 2007-2014. Professor Kalcheva earned her Ph.D. in Business Administration from the University of Utah. She has an M.B.A. from Saginaw Valley State University and she studied for her B.A. in economics in Bulgaria. Dr. Kalcheva's research focuses on the stock market and trading execution. She has taught MGT 252, Investment and Portfolio Management and MGT 202, Financial Management.

### Yehua Li

Dr. Li is a Professor of Statistics at the University of California –Riverside. Professor Li joined UCR in 2018 after having taught at Iowa State and the University of Georgia. He received his Ph.D. from Texas A&M University in 2006 and his undergraduate degree in applied math from Tsinghua University in Beijing, China. Dr. Li's research interests are in big data, bootstrapping, large sample theory, measurement error and nonparametric approaches. He has statistical methods for electrical engineers and applied experimental design.

# **Charles Zhang**

Dr. Zhang is an Assistant Professor of Management in the marketing area at the University of California –Riverside. Professor Zhang joined UCR in 2014 after having taught at Boston College. He received his Ph.D. in marketing from the University of Michigan and degrees in statistics from University College, London and Fudan University. Dr. Zhang's research interests are judgment and decision making with an emphasis on numerical judgment and inference. Some of his published work is focused on how the granularity of communicated numbers conveys information that goes beyond the magnitude of the numbers. Professor Zhang currently teaches MGT 233, Marketing Research.

Office of the Dean

900 University Avenue, Anderson Hall, Riverside, CA, 92521

Tel: 951.827.4237 Fax: 951.827.3970 e-mail: <a href="mailto:yunzeng.wang@ucr.edu">yunzeng.wang@ucr.edu</a> web-site: <a href="mailto:http://soba.ucr.edu">http://soba.ucr.edu</a>

March 23, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**RE:** Master of Arts in Business Analytics

# Dear Committee Members:

I am writing to endorse the proposed Master of Arts in Business Analytics. This is a well-designed program to meet the strong demand from students who has an analytical background and are interested in professional careers in business administration. The program has the potential to significantly differentiate UCR's Business School and to raise the reputation of the School and the Campus. The program will provide a stream of revenue to help improve faculty and student support.

Like the faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang

Dean



# College of Natural and Agricultural Sciences Agricultural Experiment Station and Cooperative Extension Office of the Dean – 2258D Geology Building

Office of the Dean – 2258D Geology Building Riverside, CA 92521-0127

To: CNAS Executive Committee

From: Kathryn Uhrich

Dean, CNAS

Date: April 12, 2017

RE: Proposal for an Interdepartmental Graduate Program Leading to the Master of

Science in Business Analytics

The Department of Statistics along with faculty of the School of Business and the A. Gary Anderson Graduate School of Management have proposed a valuable degree program that allows students to obtain a MS degree in Business Analytics. The degree program will be offered as a three-quarter 48 units program for graduates of a baccalaureate degree that provides sufficient quantitative background to enable successful completion of the program. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in statistics and business. The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree. All but three courses are existing courses and have been offered in at least one of the last two academic years. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields.

I fully support this proposed Master of Science degree program in Business Analytics.



March 28, 2018

To: Dylan Rodriguez, Chair of the Academic Senate

From: Jerayr Haleblian, School of Business Department Chair

Re: MSiBA

Dear Dylan,

I would like to strongly support the joint effort between the business school and the department of statistics to create a Master of Science in Business Analytics (MSiBA) at UC-Riverside. This program will develop the analytical abilities students and allow them to apply these abilities to business data. A recent trend has emerged in which businesses have access to vast amounts of data. Analyzing such data on customers, competitors, and costs can be used to improve strategy, forecasting, and operations. Programs in Business Analytics are emerging around the country, and are fast becoming the most in demand programs within business school program portfolios.

The UC Riverside School of Business has designed a Business Analytics program that is unique in that it trains its students in both business and statistics by drawing on both the school of Business and Department of Statistics. The resulting program has the potential to offer superior training in appropriate statistical analysis than can typically be offered when programs only reside in the business school.

From the perspective of the business school, we would like to emphasize the following:

- 1. The business school has sufficient resources to offer the classes in this program. Specifically, the proposed curriculum is based on courses we already offer. The only exceptions are two capstone courses (one in statistics and one in business) and a new statistics course. Accordingly, the business school needs to only staff one new course. Moreover, most of the existing courses that MSiBA students will take already have capacity for additional students. Therefore, the business school currently has the resources required to deliver the program with only minimal additional resource requirements.
- 2. The program is rigorous, and as a result with enhance the reputation of the business school. The UCR School of Business is currently ranked among the top 100 business schools in the US, and this program will only help enhance this reputation.
- 3. There is strong demand for business analytics programs across the country, and we fully expect that our program will be in high demand as worldwide businesses continue to move in the direction of increased large data set analyses.

4. The joint set up with the department of statistics gives us a competitive advantage, as we can offer superior data analytic training, which we believe will help sustain the program in the long term.

\_la\_y-Holoblian

Jerayr Haleblian Department Chair School of Business

#### UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY ● DAVIS ● IRVINE ● LOS ANGELES ● MERCED ● RIVERSIDE ● SAN DIEGO ● SAN FRANCISCO



DEPARTMENT OF STATISTICS RIVERSIDE, CALIFORNIA 92521-0138

April 15, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**Dear Committee Members:** 

I am writing in strong support for the proposed inter-departmental Master program in Business Analytics at UCR. Business Analytics has grown out of the need to integrate business and statistical approaches to processing and interpreting business data. It is experiencing a rapid and unplanned growth. The program addresses critical shortage of college graduates trained in business analytics in the industry and government. The proposed program will provide a synergistic approach to real world business problem solving, one that leverages the content in statistics but using case-based focus and hands-on approach. Creating this program will also help differentiate and raise the reputation of UCR's Statistics Department. This self-support program is also expected to generate substantial revenue to help improve the support in students and faculty in Statistics Department.

Our Statistics Department is enthusiastically and fully committed to the establishment and the success of Business Analytics Program at UCR.

Sincerely,

Dr. Xinping Cui

Dinging Cui

Professor and Chair

**Department of Statistics** 

University of California, Riverside



April 10, 2018

#### To Whom It May Concern:

I write in support of the proposed MS in Business Analytics. With more, and more varied types of data available, businesses require professionals skilled and trained within this area. More than ever before businesses need managers and leaders who are able to make decisions informed by data. Graduates from this program will be well-prepared either for a transition to a PhD program in business or to transition to a career in the business world. This latter is especially relevant to our region where skills such as these are in short supply. Graduates from such programs elsewhere in the US are highly sought after. The program at UCR will contribute to the reputation of AGSM as a school of innovation in business learning. The proposed program builds on existing expertise within the school and is both rigorous and well-thought out and will provide students with the combination of analytical and technical skills necessary to succeed in this area.

Sincerely,

Shaun Bowler

Dean of the Graduate Division

Stran Benter



May 15, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Ward Beyermann, Chair, Executive Committee College of Natural and Agricultural Science

Re: Campus Review: Proposed Degree Program, Masters of Science in Business

Analytics (MSiBA)

The CNAS Executive Committee discussed the revised proposal for a Masters of Science in Business Analytics (MSiBA) at its May 8, 2018 meeting. The committee feels the concept has merit and supports the proposal.

Yours sincerely,

Ward Beyermann, Chair

**CNAS Executive Committee** 

Ward Beyerm



#### **MEMORANDUM**

DATE: October 4, 2018

TO: Dylan Rodriguez, Chair

Riverside Division of Academic Senate

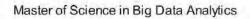
FROM: Jean Helwege, Chair

School of Business Executive Committee

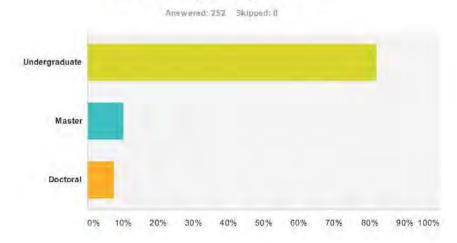
Re: Proposal for a Master of Science in Business Analytics (MSiBA)

The executive committee (EC) of the School of Business met to discuss the proposed MSiBA degree in February 2017. The members of the EC voted by electronic ballot on the proposal and the chair of the EC at the time, Peter Chung, sent an email on March 18 to the EC members indicating that the proposal was approved. For the sake of completeness and symmetry with the EC vote from CNAS, this memo will be added to the proposal to indicate that the School of Business EC is in favor of starting the MSiBA degree program.

### Exhibit XVI November 2013 UCSD Rady School's Market Demand Survey



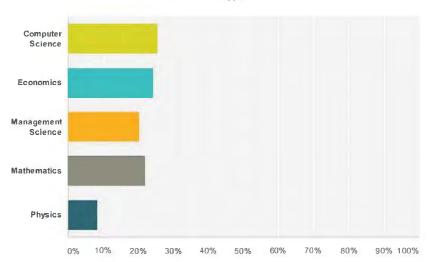
#### Q1 What is your degree level?



Answer Choices	Responses	
Undergraduate	82.14%	207
Master	10.32%	26
Doctoral	7.54%	19
otal		252

#### Q2 What is your area of study?

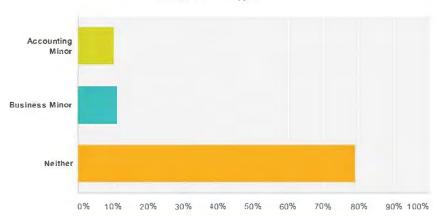
Answered: 252 Skipped: 0



Answer Choices	Responses	
Computer Science	25.40%	64
Economics	24.21%	61
Management Science	20.24%	51
Mathematics	21.83%	55
Physics	8.33%	21
otal		252

### Q3 Are you an accounting or business minor?

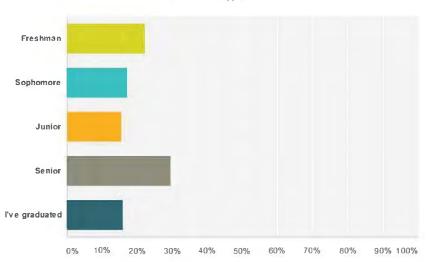




10.32%	26
11.11%	28
78.97%	199
	78.97%

#### Q4 What is your class level?

Answered: 252 Skipped: 0



Answer Choices	Responses	
Freshman	22.22%	56
Sophomore	17.06%	43
Junior	15.48%	39
Senior	29.37%	74
I've graduated	15.87%	40
Fotal		252

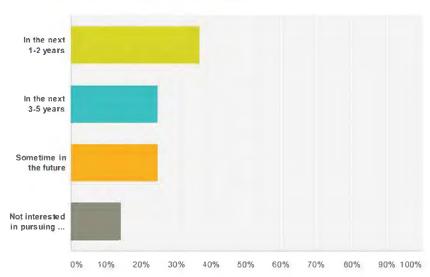
### Q5 Would you be interested in pursuing a Master of Science degree in Big Data Analytics?



Answer Choices	Responses	
Yes	42.46%	107
No	14.68%	37
Maybe	42.86%	108
otal		252

#### Q6 When?

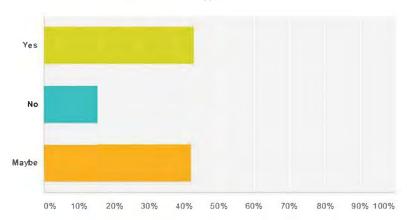
Answered: 252 Skipped: 0



Answer Choices	Responses	
In the next 1-2 years	36.51%	92
In the next 3-5 years	24.60%	62
Sometime in the future	24.60%	62
Not interested in pursuing a Master of Finance degree.	14.29%	36
Fotal Control of the		252

## Q7 Would you be interested in receiving a Master of Science degree in Big Data Analytics from the Rady School of Management?





Answer Cholces	Responses	
Yes	42.86%	108
No	15.08%	38
Maybe	42.06%	106
otal		252



#### **MEMORANDUM**

DATE: February 24, 2019

Boris Maciejovsky, Chair Committee on TO:

Diversity and Equal Opportunity

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - revised proposal

In 2018, CoDEO sent comments to Xinping Cui and myself about the joint CNAS/Business proposal for a masters in business analytics. The specific question asked by the committee was "how the proposed program supports the mission of UCR in terms of achieving a diverse student body." We respond as follows:

The program is meant to offer training in business analytics to students in the Inland Empire, which is a geographic region with a very diverse population. In contrast, existing programs at UCSD, UCI and Cal State LA are focused on their respective areas of Southern California, which are not as diverse as the Inland Empire. Their programs are not as convenient for students in our part of California to attend, especially for those who wish to live at home and continue to work in the area. The program includes scholarships of 10% of revenue (see Exhibit III), which will be used at least in part to attract students who live in the area. The program hopes to attract a large number of students who attended UCR as undergraduates. UCR has one of the most diverse undergraduate populations of any university in the country, so this should add to the diversity of the program's student body. The program will add to economic opportunity for all its students given that STEM degrees lead to above average incomes, which means the more diverse student body will benefit as well. Some of the students will work in or near Riverside after graduation, helping the economic viability of the cities near UCR and adding to the overall economic opportunities of the area's population. Finally, students of the program who go on to successful careers are more likely than other UCR alumni to have more disposable income and thus the means to make donations to the university's financial aid funds.



#### **MEMORANDUM**

**DATE:** February 24, 2019

**TO:** Jason Stajich, Chair Graduate Council

FROM: Jean Helwege

School of Business

Re: Proposal for a Master of Science Degree in Business Analytics

In 2018, the Graduate Council sent comments to myself and Xinping Cui on our proposed MSiBA degree. In this memo, we address the three issues raised in the committee's response. Our specific answers are listed below.

1) Admissions and Standards: Based on the text, it isn't clear whether the admissions to the graduate program requires GRE scores.

"All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE)."

Which test scores will be reviewed for admission (page 6)? The Council needs to know more about the admissions standards. What are the planned GRE and GPA cutoffs or how will scores be used in deciding admissions? Will GMAT be used instead of GRE or will both be used? It is not specified as to how these scores will be used in deciding admissions. Will a holistic review approach be used for admission which incorporates the entire application of the student, GPA, experience, letters and GRE/GMAT tests?

Response: The previous version of the proposal included the following statements: "Business and Statistics will establish a joint steering committee. The steering committee will consist of three faculty from the AGSM and three faculty from the Department of Statistics. The steering committee will collaborate to work on admissions criteria, but the expectation is that heavy emphasis will be placed on quantitative training and test scores. (page 4)" and "The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses (page 5)." and "All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). (page 6)" The sentence on page 4 makes it clear that there is a holistic approach to admissions as it refers to the "chief consideration" (indicating that more than one factor is considered for admission) and it includes the statement that a "heavy emphasis will be placed on quantitative training and test scores" (indicating that the committee will consider more than just a test score and indicating that previous training and the associated GPA will be a factor). Most Aighly selective business schools require a

GMAT score of 700 or higher (or its equivalent of 160 on the GRE), but if the program is not as competitive it is forced to take in students who score lower on these standardized tests. Nonetheless, no one who has any familiarity with these tests would consider a score of 275 on the GRE to be "evidence of a high capacity for learning quantitative skills." It is up to the admissions committee to determine the exact cutoff while ensuring that UCR only admit students who are viable candidates for the program. The word "or" in the sentences that appear on pages 5 and 6 means the GMAT could be used instead of the GRE score and that the admissions committe will not require both.

2) Use of Resources: How will the program track the statistics versus business students and the associated costs since students can matriculate with either a statistics or business degree? Since the faculty work load and the utilized resources will be different depending on a student's course of study, how will this be tracked so that cost recovery is appropriate? For example, a high proportion of students end up needing to take the Stats class, to make sure the self-supporting requisite cost recovery to Stats/CNAS occurs, there needs to be a tracking system in place as to how the resources the program uses from each college are tracked and appropriately repaid.

Response: All self-supporting programs are required to track expenses in order to provide evidence of their financial sustainability to UCOP. To calculate the costs of faculty, one would calculate the number of students taught in the program by a particular faculty member as a fraction of all the students the professor teaches and use this ratio to determine the costs of the professor's time allocated to the program. This is done for each instructor in the program as well as for the staff's time. In the process of calculating the total cost for the program, it is easy to split the costs according to whether they belong to Stats/CNAS or Business. The CFOs of CNAS and Business would be expected to rely on such information when assisting their respective deans, who are responsible for implementation of the program and negotiating the fair allocation of resources between the two schools.

3) Advising: The Council feels that staff support is needed for this program. Stating that the drop in MBA student numbers means that current staff is not as busy and will have more time to devote to this program does not appear wise. What happens when MBA numbers increase, and that staff is then needed to advise MBA students again? Since this program will be self-supporting, revenue from the program should be used to pay for the program's own staff.

Response: The program proposal does assume that the program will pay for its own staff. This is a requirement of self-supporting programs. The October version of the proposal and the initial version both included an allocation of the current staff's time for advising in the budget (shown in Exhibit III). Furthermore, the budget allowed for an increase in staff as the program grows. The statement about declining MBA enrollments was merely to indicate that the current personnel, who are expert in graduate business programs, can be deployed immediately to begin this program. It does not mean that the costs of their time are ignored in the financial report to UCOP or in Exhibit III of the proposal. The program's own staff may be dedicated personnel in the future or they may be people who work on several programs at once, with their time allocation to each determining how their salary is included in the costs of the specific programs.



#### **MEMORANDUM**

**DATE:** February 24, 2019

Katherine Kinney, Chair

Committee on Planning and Budget

Jean Helwege

FROM: School of Business

Re: Master of Science in Business Analytics - revised proposal

In January 2019, the Committe on Planning and Budget (CPB) sent comments to the Senate Chair on the proposed MSiBA degree. In this memo, Xinping Cui and I address the concerns raised by your committee.

Specifically, the committee wrote:

"the proposal does not mention indirect costs or return-to-aid. The cost of renting classrooms and giving scholarships is not a fully adequate answer to the questions of indirect cost and return-to-aid. P&B needs clarification about the campus policy on self-supporting programs (SSP) returning funds to the campus before making final comments."

Response: The two previous versions of the proposal included detailed financial analysis of the program but the tables did not include the indirect costs as they are imposed by UCOP and UCR. Exhibit III has been revised in the current proposal to include these costs and to format the budget in line with the format of existing SSPs. The new indirect costs reduce the net revenue available to CNAS and the School of Business, but they do not lead to a negative annual surplus in any year. The new proposed budget continues to be very conservative in estimating modest enrollments and in assuming a very competitive tuition. Return to aid is not a requirement of a SSP but the proposal includes scholarships that equal 10% of revenue. The scholarships are unchanged from the two previous versions of the proposal.



#### COMMITTEE ON DIVERSITY, EQUITY, AND INCLUSION

April 15, 2019

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Boris Maciejovsky, Chair

Committee on Diversity, Equity, and Inclusion

Re: Proposed Degree Program: 3<sup>rd</sup> Round: Masters of Science in Business

**Analytics (MSiBA)** 

CoDEI reviewed the 3<sup>rd</sup> round of revisions to the Masters of Science in Business Analytics (MSiBA) proposal and has no substantial comments to offer.



#### **GRADUATE COUNCIL**

April 8, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Jason Stajich, Chair

**Graduate Council** 

**RE:** Third Round of Review – Master of Science in Business Analytics (MSiBA)

The Graduate Council reviewed the revised proposal for a Master of Science in Business Analytics at their March 21, 2019 meeting. The Council appreciates the clarification provided by the School of Business in how admissions standards will be applied and the expectation of tracking and accounting for resources and faculty time used by the program. The Council approves the proposal at this time. However, the Council would like to strongly advise that the program add an assessment component or some form of tracking of student success after students are admitted to the program.



March 25, 2019

To: Dylan Rodriguez, Chair

**Riverside Division** 

From: Jiayu Liao

Committee on Library and Information Technology

Frage line

Re: [Campus Review] 3rd Round Masters of Science in Business Analytics MSiBA

The Committee on Library and Information Technology reviewed the 3rd Round Masters of Science in Business Analytics MSiBA at their March 21, 2019 meeting and did not note any concern relating to the Committee's charge of Library and Information Technology.



#### PLANNING & BUDGET

April 12, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Katherine Kinney, Chair Vinney

Committee on Planning and Budget

RE: Proposed Degree Program: 3rd Round - Master of Science in Business Analytics

(MSiBA)

Planning and Budget discussed the third revision of the proposal for a Master of Science in Business Analytics at their April 9, 2019 meeting. The proposal now devotes 10% of tuition revenues to return-to-aid and set indirect costs at 30.7% and the Committee on Planning and Budget approves the proposal in its current form. We note that we are making this determination in the absence of campus policy regarding standards for evaluating appropriate levels of return-to-aid and accounting for indirect costs. Policy will need to be developed to guide SSPs in the future.



April 8, 2019

To: Dylan Rodriguez, Chair

**Riverside Division** 

From: Louis Santiago, Chair, Executive Committee

College of Natural and Agricultural Science

Re: Comments on Proposed Degree Program – 3rd Round Masters of Science in

lows Smity

**Business Analytics** 

The CNAS Executive Committee discussed the proposed Masters of Science in Business Analytics. Although our committee has already voted to approve the program, and we support the effort, we noticed several inconsistencies in the proposal. First, there is no mention of how the profits of the professional Masters program would be shared between the School of Business Administration and the Department of Statistics. Second, there are no increases in the costs of many of the columns over many years. We know that faculty salaries go up with merits and promotions, so we could not understand why these numbers were stagnant. Finally, there was no mention of differences in salary scales between the School of Business Administration and the Department of Statistics and it was not clear how this would affect their calculations of the cost of the program.



April 16, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Thomas Kramer

Chair, Committee on Physical Resources Planning

Re: Campus Review-Proposed Degree Program: 3rd Round: Masters of Science in

Thomas Warmer

Business Analytics (MSiBA)

The Committee on Physical Resources Planning has reviewed the Proposed Degree Program: 3nd Round: Masters of Science in Business Analytics (MSiBA) and is supportive of the revised program.

The committee does however note that there's a typo in the language below.

The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty (one each). In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are expected until the program is well established, if at all. Therefore, only minimal additional classroom space is required.

Chair Kramer confirmed with the School of Business Executive Committee Chair, Jean Helwege, that this should read as "so new sections of the existing courses are <u>not</u> expected until the program is well established, if at all."

## PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### **University of California Riverside**

October 2018

#### Status:

Approved by School of Business Executive Committee: 3/18/2017

Approved by School of Business Faculty: 5/24/2017

Approved by the Department of Statistics Faculty: 6/8/2017

Approved by the College of Natural and Agricultural Sciences Executive Committee:

3/20/2018

Submitted to Graduate Division: 3/26/2018

Approved by Graduate Council: Approved by UCR Academic Senate:

#### **GRADUATE DEGREE PROGRAM PROPOSAL**

#### **Lead Proposers:**

- The faculty of the School of Business and the A. Gary Anderson Graduate School of Management (AGSM)
- The faculty in the Department of Statistics
- The faculty members in the area of Operations and Supply Chain Management (OSCM)
- The faculty members in the area of Marketing
- The faculty members in the area of Finance
- Jean Helwege
- Xinping Cui

#### **Contact Information:**

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

Tel: 951.827.4284

Email: jean.helwege@ucr.edu

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# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### § 1.0 INTRODUCTION

With the availability of more detailed data and the ease with which businesses can use faster and cheaper computers to analyze data, the need for well-trained employees in the area of business analytics (BA) has increased dramatically in recent years. BA overlaps substantially with the area known as data analytics or data science, especially in its emphasis on statistics and software, but it differs in that the focus is on business applications. BA uses data and statistical tools to analyze the potential for increasing revenue, decreasing costs and identifying new profit opportunities.

Many business schools are aware of the demand for graduates of BA programs and see an opportunity to elevate their reputations by offering these degrees. According to Poets & Quants, roughly a third of the top 100 business schools have introduced BA masters programs. While BA can be and is taught at the undergraduate level, by its nature the degree is best structured as a graduate program that allows students to extend and strengthen their knowledge of statistics and business. We expect students entering this program to have completed an undergraduate degree in either a quantitative business major or in statistics. Reflecting this logic, the proposed degree is jointly offered by School of Business and by the Statistics Department.

#### 1.1 Aims and Objectives

The Master of Science in Business Analytics (MSiBA) program will expand the training of students with analytical backgrounds to allow them to apply their skills to business data. Businesses have access to increasingly large amounts of data about their customers, costs, and suppliers and they can use this information to improve operations, increase the yield on marketing programs and understand pricing and financing better, which all are methods of obtaining higher profits. The personnel required to do this work must be well trained in both statistics and business.

The proposed MSiBA offers a rigorous program that allows these students to gain the degree in three quarters. Students will have studied either statistics or a quantitative business discipline as undergraduates and will continue their studies at the master's level by following one of two tracks. The statistics track is for students who majored in one of the business disciplines as undergraduates (finance, operations/supply chain, or marketing) and the business track is for students who majored in statistics as undergraduates. Both tracks culminate in a two-quarter capstone class that applies their understanding of business analytics to a project.

The program will take advantage of existing courses in business and statistics. The main new proposed courses for this degree are a two-quarter sequence of capstone courses that allow students to work on a specific project with data tailored to their individual interests. There is also one new statistics course proposed for the MSiBA degree.

There are several objectives of the program that will benefit UCR, CNAS, and the School of Business. The

<sup>&</sup>lt;sup>1</sup> http://poetsandquants.com/2016/01/18/business-analytics-masters-at-the-top-100-b-schools/. This site includes links to the top schools with programs.

program offers a degree in a fast-growing area that requires rigorous training. By offering this program, the job placements, average salary and training of UCR alumni increase and this enhances UCR's reputation, as well as that of the Statistics Department and School of Business. In addition, the program aims to attract more high quality students. This is especially helpful for School of Business, which currently mainly trains undergraduates who tend to study aspects of business that rely less on the most quantitative business skills. The program will be especially helpful to the Statistics Department in creating a path for undergraduates. Many of the statistics majors at UCR have excellent training in the general area of statistics, but are ill-prepared to use their skills in business. Another goal is financial security for UCR. As a self-supporting program offering a professional degree, not only will the MSiBA work as a stand-alone program without requiring support from the state, but it is also expected to be a significant source of revenue for UCR each year. Finally, UCR is currently the UC with the largest number of students studying business. The MSiBA program will enhance that standing further, not just in numbers and breadth of choices, but by helping UCR's reputation as the best UC campus for studying business.

#### 1.2 Historical Development of the Field and Departments' Strengths

Before the advent of the personal computer in the 1980s, students could only be trained in the area of statistical computing on a mainframe, where capacity was limited and undergraduates rarely had access. With cheap computing power and improved statistical functions in Excel, the level of statistical analysis of business data has improved at all levels of higher education over the years. Social media and point of sales systems, and other electronic sources of big data have combined with the higher level of statistical training to lower the cost of analyzing data for the purpose of increasing corporate profits. The first college of business in the U.S. to offer a business analytics degree at the undergraduate, Masters and MBA level was UT Austin in 2010. We expect that students will use increasingly sophisticated methods to analyze the wealth of data available. Therefore, the number of students enrolled in BA degree programs is likely to expand.

The faculty in the School of Business and the professors in Statistics are well-positioned to offer the MSiBA degree. Both sets of professors are highly trained in both statistics and business disciplines and they use business analytic tools in their research on a regular basis.

In the School of Business, the majority of professors do empirical research. Since so many ladder-rank professors use statistical techniques to analyze business data in their research, there are many professors in the school who can teach students how to use statistical analysis to answer business questions. And most of the faculty do empirical analysis with fairly large or very large databases and therefore have the skills to lead students into the area of big data. A smaller fraction of the faculty have taught programming as part of their business courses, while others have assigned homework that incorporates statistical analysis that can be carried out in Excel. The finance area implemented a policy in 2016-17 academic year in the Masters of Finance (MFin) program of providing incentives to students to complete statistical analysis in SAS rather than Excel. The faculty are well-positioned to supervise student projects in the proposed capstone courses.

The Department of Statistics has tremendous expertise in teaching statistics and in teaching statistical computing. Their role in the program is less focused on applications of statistical analysis to business and more teaching the fundamental skills need to analyze data with statistical computing packages. The MFin program has already hired faculty in the Statistics department to teach statistical computing (SAS) that is geared to business professionals, so they are also well-positioned to deliver the relevant course material and train students so that they have the statistical computing and analytical skills needed for the capstone courses.

#### 1.3 Timetable

The School of Business and the Department of Statistics are prepared to launch the program in the fall of 2019. We have conservatively projected enrollments at 15 students in the first year and gradually increasing to a projected maximum of 50 students by the fifth year. As a comparison, Arizona State University currently offers a 9-month masters of business analytics degree with 153 students enrolled.

The program requires three new courses, while the remainder of the program uses courses that are already in place. Two of the new courses are capstone courses that will be offered in Winter 2020 and Spring 2020 and the third is a statistics course. These courses have already been submitted by the School of Business and the Department of Statistics for approval by the relevant parties in the shared governance process.

#### 1.4 Relation to Existing Programs and Campus Academic Plan

The program fits the overall strategic plans of UCR, the School of Business and CNAS to increase the university and the schools' presence and reputation. The program helps on a number of fronts: it is more rigorous and technical than some other professional degree programs; it will attract students with backgrounds that are more quantitative and therefore require above average intelligence; the job prospects for students in the program are better than in many other programs, so placement records should help our reputation; and the program can charge a reasonably high tuition to reflect the value-added advantages of this type of education.

The specialized skills taught in the MSiBA program should prepare students well for professional employment. Besides the high demand for business analytics professionals, which should lead to good placements, this program is likely to be recognized by the United State government as a STEM program. Foreign students who graduate from designated STEM programs are allowed to work for extended periods with OPT visas (currently 29 months vs. one year for a regular OPT visa).

The new degree program is a self-supported program that will rely extensively on existing courses in AGSM and Statistics. This means there will be no immediate need for more faculty and existing faculty can teach the majority of the material in existing courses to more students. Students will graduate having taken a common set of classes for most of the program but will be given a chance to apply their skills to a particular area in business, such as marketing, operations, or finance.

If this self-supported program grows and requires that more faculty be hired in response to its growth the additional faculty will help build critical mass in the School of Business and in Statistics, allowing UCR to advance its research mission. Students admitted to the MSiBA program will be strong quantitatively and will contribute positively to the classroom experience. MSiBA may also draw from the more quantitatively-oriented students in UCR undergraduate programs. If they are successful in completing this program and working in business analytics careers, the program may eventually help draw better students to our existing undergraduate programs in statistics and quantitative business disciplines.

Another advantage of the program is that it should gain in popularity compared to the traditional MBA. Business schools around the country are experiencing declining enrollments in full-time MBA programs. AGSM is no exception to this problem, and thus the number of students in a section is smaller than capacity and there are few electives that are offered more than once a year. By offering marketing, finance and operations courses to students in a growing field, UCR expands its opportunities to use more of its graduate business training capacity.

The program is distinctly different from the existing UCR program in Data Science, which is an online program jointly offered by Statistics and BCOE. By having the Statistics Department involved in both programs, the faculty

can monitor the two programs to make sure that one is not cannibalizing the other. The Data Science degree is designed to focus on the computing and database management. It does not involve strategies to maximize revenue, minimize cost or otherwise improve specific business applications.

#### 1.5 Interrelationships with the Programs of Other Institutions, Market and Competition

A few other UC schools and Cal State universities offer BA programs but most do not. UC Davis, UC San Diego and UC Irvine have one year masters degrees. Cal State East Bay has a nine-month program. UCLA just began its program in Fall 2018. UC Berkeley has online certificate programs. Cal State LA also has a certificate program but it is so new that no details are listed on its website.

TFE Times ranks business masters of business analytics programs and the only ranked program in California is USC (ranked #1). Outside of California there are several hundred schools that offer BA programs, although the TFE Times list only ranks the top 30 or so. Most programs are for a year of full-time study or less. Our proposal is for a nine-month program that allows students to graduate in spring, which puts them in a good position for the job market. Several programs that go longer than nine months do not have more units than what is proposed for UCR, but instead reduce the course load in some quarters and add one or two courses in the summer. For example, the number of courses in UCSD's business analytics program is the same as the one proposed here except that UCSD has two 1-unit professional development courses. Several nine-month programs are ranked high on the TFE Times list – for example, Arizona State (#5), Southern Methodist University (#18) - and many others are for 10 or 11 months (e.g., #4 Rochester and #6 UT Austin).

In addition, there are many other schools that offer data analytics or computer science programs, but these do not focus on business and are not in direct competition.

Exhibit VII includes letters of support for the proposed program, including one from Terrence August, who is currently the co-chair of the MSBA degree program at UCSD's Rady School of Business. He and Professor Vincent Nijs designed the program, so he has been involved in this relatively new program from inception. Professor August writes that the demand for this degree is very large and notes that applications to UCSD's program grew from 300 in year 1 to over 700 in year 2 and to approximately 950 this year. Prior to beginning this highly desirable program, Rady surveyed students in November 2013 to determine interest in the degree. The results are included in Exhibit XVI.

#### 1.6 Administration

The interdepartmental program will be administered by two departments, Statistics and Business. Because the program is joint between two departments, the program requires its own set of by-laws. These are included in Exhibit IX. The two departments will have equal control over the program and will split the revenues and costs in proportion to their teaching contributions and recruiting successes. The financial elements of the program are to be determined by the deans of CNAS and Business, with input from the co-directors of the program.

Business and Statistics will establish a joint steering committee. The steering committee will consist of three faculty from the AGSM and three faculty from the Department of Statistics. The steering committee will collaborate to work on admissions criteria, but the expectation is that heavy emphasis will be placed on quantitative training and test scores. The program director will be chosen among these six faculty, will serve for three years, alternating between the two colleges (AGSM and CNAS). The Deans of the two colleges will alternate nominating the program director to the Provost/EVC, after consultation with the other Dean and steering committee. The nominated director may or may not be from the Dean's own college.

As with the current setup for admissions into the MBA program, a large fraction of the work related to admissions will be done through the AGSM graduate staff. In particular, AGSM staff are responsible for ensuring that application materials are complete and submitted on time, for sending out rejections to candidates that are far below the standards expected of the program, and for making sure that the program is appropriate for the career goals of the applicants. Given the declining enrollment in MBA enrollments, the current size of the AGSM staff should be sufficient to deal with MSiBA applicants in the short-run. Once the program is more established and at steady state enrollment, a dedicated Director of Recruiting and Admissions is expected to bee appointed and will assist the program director and the steering committee.

The program will be marketed on the Statistics and AGSM websites, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever School of Business decides to participate in such forums for the purpose of MBA recruiting.

Formal student advising will be administered by the steering committee. Because students are expected to have either an undergraduate statistics or business degree, some separate advising will occur based on previous training. In these situations, students with business degrees will likely receive advice from the Statistics members of the steering committee and students with statistics degrees will be advised by the business faculty on the steering committee. The program director will hold information sessions that cover most of the common ground. All steering committee members will be provided course roadmaps to ensure that individual advising is effective and efficient. Given that the Statistics Department is smaller than the combined finance, marketing and operations faculty within the School of Business, and that there are more support staff in the School of Business, Statistics is expected to undertake a smaller fraction of the work related to information sessions and marketing.

#### 1.7 Plan for Evaluation

AGSM and Statistics will continuously evaluate the program based on the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alumni.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

#### § 2.0 PROGRAM

#### 2.1 Undergraduate Preparation for Admission

The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses. Students who have weaker statistical training but otherwise show promise are required to take STAT 171 or similar courses before entering the program. Students who do not have an undergraduate degree in statistics or the quantitative business disciplines may be considered for admission on a case by case basis, but the expectation is that all

admitted students will have sufficient training in either statistics or quantitative business topics to be able to complete the degree in a timely fashion. Students with quantitative backgrounds who are not familiar with either business or statistics will be advised to enroll in the MBA program or the masters in Statistics program.

Because of the need to communicate the results of the analysis, such as that completed in the two-quarter capstone class, strong English skills are also required. The admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency. Preference will be given to applicants who have worked in industry for two or more years.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction.

Additionally each applicant must submit at least one letter of recommendation. The admissions committee will determine in time whether additional letters are appropriate. All other application requirements are specified in the graduate application or in the General UCR catalog.

#### 2.2 Foreign Language

The program has no foreign language requirement.

#### 2.3 Program of Study

#### 2.3.A Fields of emphasis

The MSiBA core specific field of emphasis is Business Analytics. Within this field, students can do a concentration in either operations, finance or marketing.

#### 2.3. B Plan(s)

**Plan I (Thesis)** will not be an option for the Master of Science Business Analytics program. Given this is a three quarter (9 months) program, a Plan I (Thesis) option will not be feasible for students.

**Plan II (Comprehensive Examination)** will be the format for the MSiBA degree. In addition to the course requirements associated with Plan II set forth by the Graduate Division (i.e, at least 18 units must be in graduate level courses taken at a UC campus), every candidate must take a comprehensive examination. The comprehensive exam will be determined by the faculty involved in teaching the MSiBA students.

#### 2.3. C Unit requirements

The Master of Science in Business Analytics will be offered as a three-quarter program (48 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

#### 2.3. D Required and recommended courses

All students in the program are required to take three courses (12 units) that focus on analytical tools for

business. In addition, students must take a two-quarter capstone sequence (8 units) in which they complete a project that uses the tools acquired in the area of business analytics. These five courses are required for all students in the program. Another set of four required courses (16 units) is designed to enhance their previous training as undergraduates and these vary with a student's undergraduate major. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in both statistics and business. Students who have double majored are treated as if they majored in statistics as undergraduates. The remaining 12 units (3 courses) are elective courses that allow students to concentrate in a particular area of business. The three elective tracks are marketing, operations and finance. Descriptions of the courses are included in Exhibit I.

#### Required courses for all MSiBA students

- MGT 286A-B Capstone in Business Analytics (2 quarter course) NEW
- MGT 256 Business Analytics for Management
- STAT 208 Statistical Data Mining
- STAT 232 Statistics for Business Analytics NEW

#### Required courses for students with an undergraduate business degree

•	STAT 205	Discrete Data Analysis
•	STAT 206	Statistical Computing
•	MGT 233	Marketing Research

MGT 267 Applied Business Forecasting

#### Required courses for students with an undergraduate statistics degree

MGT 202 Financial Management

MGT 204 Cost and Management Accounting

MGT 207 Operations Management for Competitive Advantage

MGT 209 Marketing Management

#### Electives – Choose a group of three from below

•	MGT 221	Decision Making Under Uncertainty
•	MGT 258	Logistics and Supply Chain Management

MGT 239 Simulation for Business

Or

MGT 228 or MGT 257 Consumer Behavior or Marketing Strategy

MGT 253 Internet Marketing
 MGT 251 Market Assessment

Or

MGT 252 or MGT 295F
 Investments and Portfolio Management or Empirical Methods in Finance

MGT 232 Derivatives

MGT 244 or MGT 227 Corporate Risk Management or Fixed Income

All but three courses, MGT 286A-B and STAT 232, are existing courses and have been offered in at least one of

the last two academic years. Exhibit I contains a copy of the catalog entries for the existing courses. Given current MBA enrollments, there is sufficient capacity in the existing classes to accommodate the needs of the MSiBA students. Over time, if the programs expand, it may be necessary to offer multiple sections of the courses. Upon approval of the program, the new courses will be offered at least annually and will require staffing. The cluster hire search in business analytics should be sufficient to meet the additional staffing needs in AGSM. The Statistics Department is confident that it currently has the personnel needed to offer new courses required for the program.

#### 2.4 Sample Program (full time)

Below are two sample programs. The first is for a student whose undergraduate training is in statistics and who has chosen to focus on operations. The second is for one whose undergraduate training is in business and has decided to continue with marketing.

#### Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

- MGT 256 Business Analytics for Management
- MGT 207 Operations Management for Competitive Advantage
- MGT 202 Financial Management
- STAT 232 Statistics for Business Analytics

#### Quarter 2

- MGT 286A Capstone in Business Analytics I
- MGT 221 Decision Making Under Uncertainty
- MGT 204 Cost and Management Accounting
- MGT 209 Marketing Management

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 239 Simulation for Business
- MGT 258 Logistics and Supply Chain Management
- STAT 208 Statistical Data Mining Methods

#### Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

- STAT 206 Statistical Computing
- STAT 205 Discrete Data Analysis
- MGT 256 Business Analytics for Management

STAT 232 Statistics for Business Analytics

#### Quarter 2

- MGT 257 Marketing Strategy
- MGT 286A Capstone in Business Analytics I
- MGT 253 Internet Marketing
- MGT 233 Marketing Research

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 251 Market Assessment
- MGT 267 Applied Business Forecasting
- STAT 208 Statistical Data Mining Methods

#### 2.5 Certifications

The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree.

#### 2.6 Normative time from matriculation to degree (full-time)

Plan II students should be able to complete the coursework for this program three quarters (9 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, all of which must be spent at the Riverside campus.

Only courses in which grades of B- or above or "S" are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal when

- 1. They have 12 or more units of "I" grades (incomplete course work) outstanding
- 2. The guarterly GPA falls below 3.00 for two consecutive guarters
- 3. They fail to fulfill program requirements in a timely and satisfactory manner, or
- 4. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

#### § 3.0 PROJECTED NEED

#### 3.1 Student Demand for the Program

The demand is large and increasing, as attested below:

- The Wall Street Journal says: "B-school students can't get enough of big data. Neither can recruiters. Interest in specialized, one-year master's programs in business analytics, the discipline of using data to explore and solve business problems, has increased lately, prompting at least five business schools to roll out stand-alone programs in the past two years. The growing interest in analytics comes amid a broader shift in students' ambitions. No longer content with jobs at big financial and consulting firms, the most plum jobs for B-school grads are now in technology or in roles that combine business skills with data acumen, say school administrators."<sup>2</sup>
- Robert Half, an internationally recognized recruiting firm, surveyed CFOs and found that 61
  percent considered business analytics mandatory for some or all of their accounting and finance
  employees.<sup>3</sup>
- Poets & Quants, the MBA-focused website, reports that "business schools have rolled out...[business analytics]...programs, in response to fast-rising demand for workers trained to wrangle and analyze the big data streams that are getting bigger by the second."4

Business schools are creating programs in business analytics at a rapid pace, but, as noted earlier, there are few UC schools with such graduate programs and California is the home state of only one of the ranked programs. Poets & Quants lists all of the top 100 business schools with a business analytics programs and the only ones in California are USC and UC San Diego. Since the Rady School program's first class entered in fall 2016, it is not yet established. This strong and increasing nationwide demand for graduates of master's level business analytics programs, combined with an underserved market here in Southern California, offers an opportunity to gain market share and establish a reputation as a leading school in the discipline. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena, will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program. Exhibit II provides information on existing business analytics programs offered in California.

In addition, some programs that are labeled as business analytics programs focus more on data science than on business, which overstates the degree of competition in this space. For example, the program at USC is offered by the Data Science and Operations (DSO) Department at USC. DSO has 27 tenure-track faculty as well as a dozen clinical professors. Among the tenure-track, 10 are listed as belonging to the area of Statistics, while the rest are either in Operations or Information Systems. The flavor of the program reflects the fact that it is only offered by DSO, not the whole school, and that DSO is in part a statistics department. In particular, their one-year program requires six courses that emphasize statistics and three electives chosen from a list that includes seven statistics or database courses, while only two required course are clearly focused on business. The only business elective is Marketing Analytics and there are no courses that allow a student to apply business analytics specifically to finance or operations. That is, the focus is on data science rather than applications to business.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded business analytics masters programs. UC San Diego charges \$1,058 per credit unit for their 50 credit

<sup>&</sup>lt;sup>2</sup> Big Data Gets Master Treatment at B-Schools: The Wall Street Journal, November 5, 2014. <a href="http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y">http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y</a>

<sup>&</sup>lt;sup>3</sup> How Business Analytics and Other Key Skills Can Boost Your Career, Robert Half Finance and Accounting Blog, November 23, 2015.

<sup>&</sup>lt;sup>4</sup> Business Analytics Master's At 100 Top B-Schools, Poets & Quants, January 18, 2016.

degree program, for a total tuition of \$52,900. Our program has two fewer units, but is otherwise similar. We believe it would be prudent to charge slightly less, about \$1000 per credit unit, or \$48,000. USC's program started in 2014 with a tuition set at \$47,000 and is currently at \$51,300. Our intent is to develop the MSiBA as a full-time program and we expect that initial enrollments will be of full-time students, but since many of our MBA classes are at night, the program may attract many part-timers as well. Exhibit III includes financial projections associated with the new program.

Evidence from other programs indicates that students with master's degrees are able to command materially higher compensation than undergraduates. Several sources on the internet suggest starting salaries near \$90,000. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Applicants seem to agree - more than 300 people applied for 87 spots in Arizona State's 2014 class. As noted earlier, the high cost of the UCSD program has not diminished the number of applications at all. Given that there is a ready market for such students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program themselves.

# 3.2 Opportunities for Placement of Graduates

According to McKinsey, there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the firm predicts, the US alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the data.<sup>6</sup>

# 3.3 Importance of the Discipline

Business analytics is highly important to several disciplines, especially operations, marketing and finance. With the recent developments in technology and communications and data-rich environments, business analytics is indispensable for managers in all three areas, as well as for CEOs and CFOs.

## 3.4 Ways in Which the Program Will Meet the Needs of Society

Graduates of the program will obtain jobs with above average pay that are even higher than the salaries obtained with other graduate business degrees. The Master of Science in Business Analytics program will help students in the Inland Empire advance their careers by helping to obtain these desirable positions. The program address an unmet need for graduate business education in Southern California in general. The program will contribute to UCR's reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration and the Department of Statistics maintain financial stability.

Students in the UCR Master of Science in Business Analytics program will acquire the knowledge and tools necessary to effectively manage their organizations. Their understanding of business analytics will help their organizations operate more efficiently. They will understand that effective use of business analytics give businesses a competitive advantage in the marketplace.

<sup>&</sup>lt;sup>5</sup> Big Data Gets Master Treatment at B-Schools, Wall Street Journal, November 5, 2014.

<sup>&</sup>lt;sup>6</sup> See www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation.

# 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The Master of Science in Business Analytics program fits well with the research strengths of the School of Business and Statistics faculty. Moreover, as a self-supporting program, revenues from the MSiBA program will help to support databases that are important to the research activities of the faculty, will provide competent research assistants, and will help to provide funding for the Ph.D. programs. In addition, by having more students enrolled in graduate level management and statistics courses, faculty are more likely to teach two sections of the same topic. Given the current workload of four sections per year, this makes it more likely that faculty can complete their teaching obligations with two types of courses (two preps), allowing more time for research. This is particularly helpful for younger faculty.

# § 4.0 FACULTY

The faculty members in the School of Business and the Department of Statistics are quantitatively and qualitatively strong. In particular, the OCSM faculty, several of the quantitative marketing researchers, and the finance faculty are well-suited to delivering successful quantitative business courses. The faculty in Statistics are currently delivering not only statistics courses to their students, but the computer and software classes that are required for business analytics. The strength of the faculty for this program is evident from the number of courses that already exist and the fact that only three new courses would be required at UCR. Exhibit X includes the brief biographies of faculty who will teach in the program.

## § 5.0 COURSES

In the first quarter of the Master of Science in Business Analytics program, students will be expected to take core courses in the areas that they did not study as undergraduates. In the second quarter, building onto the fundamentals, students are exposed to more advanced coursework and will focus their studies in one of three business disciplines: Operations, Marketing or Finance. They will also begin the design and data collection work related to their two-quarter capstone class. In the third quarter, students are expected to build on what they learned and complete their individual capstone projects. They will also expand into more detailed work in some topics and finish up required courses outside their main area. Descriptions of the courses are included in Exhibit I.

## § 6.0 RESOURCE REQUIREMENTS

This proposal is for a self-supporting program, which by definition does not draw down existing resources. Indeed, an important goal of the program is to create a revenue base for Statistics and Business that will allow both departments to expand their faculty, provide summer research support, and create an alumni base that will be financially suited to donating to UCR. In addition, the program is designed to take advantage of existing capacity in the School of Business and CNAS. Both the Statistics and the Business departments have recently expanded their faculty, so no additional resource requirements involve faculty lines. Over time, if the program gains in popularity it will provide the resources to hire more faculty. Support staff for recruiting and administering the program are already in place and are expected to have more time given the declining enrollments in MBA programs.

The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty (one each). In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are expected until the program is well established, if at all. Therefore only minimal additional classroom space is required.

Students are expected to have their own computers. Most software is already provided to students through a UCR site license, but if new software is needed to analyze data the students are expected to purchase it on their own, in the same way that they are expected to purchase their own books. The students can use data that the School of Business already purchases or they can obtain their own data using their own funds. There is no additional equipment needed for the MSiBA program nor are there any new library acquisitions required for it.

The program is likely to add greater pressure on parking. However, many of the Management courses are taught at night when parking is more plentiful. The School of Business has recently begun offering Saturday classes, which will also help alleviate parking pressures.

Most of the courses will be taught by School of Business faculty, with the rest being taught by faculty in the Department of Statistics. The split between the two depends on the backgrounds of the students in the program. If there are more students who studied undergraduate business, Statistics Department will have a greater portion of the MSiBA students in their classes. The more statistics undergrads who apply, the more the work for School of Business faculty. The new capstone course will require FTE faculty, which would be from the School of Business and Statistics (one for each quarter course).

Similar to existing graduate programs in the School of Business (MBA, Professional MBA, MFin and MPAcc), the program will require support staff to aid students in advising, to provide career counseling and to discuss admissions/recruit new students. Currently, the existing graduate programs staff in the School of Business has excess capacity to provide these services, especially as enrollment in the full-time MBA program is expected to remain low for the foreseeable future. If the MSiBA program is successful, the staff required for admissions and recruiting may increase and a dedicated director of admissions and recruiting will likely be required. Thus, the expected costs included in Exhibit III represent a portion of the salary of one full-time employee for each of the staff areas (advising, career services and recruiting/admissions) and a future dedicated director. In steady state, the amount will increase for each category to recognize the needs of a larger MSiBA student population.

The program is self-sufficient, given the existing courses, and does not require state resources. Therefore, there is no separate entry for the costs or revenues related to the campus or the system. As a stand-alone professional program, it is expected to generate positive financial resources after considering all costs, as shown in Exhibit III. Given the existing capacity of existing classes and the minimal upfront costs shown in Exhibit III, the program is expected to have a net revenue that is positive in the first year of existence. If it were to be the case that demand for space in the program is sharply lower than that indicated by the experience of UCSD, the costs of the program would be adjusted downwards to recognize the reduced time spent on advising and career development.

# § 7.0 GRADUATE STUDENT SUPPORT

The Master of Science in Business Analytic program will offer graduate student support by reserving 10% of the gross fee revenue for student financial aid. As the program grows, the School of Business Development officers will strive to attain donor commitments for scholarships for the Master of Science in Business Analytics graduate students.

In addition to financial aid in the form of tuition reductions, graduate students in the program may serve as readers for undergraduate courses or as research assistants for professors who work on applied statistical research.

# § 8.0 GOVERNANCE

The program will be directed by an interdepartmental group of faculty that will include all of the faculty in AGSM and all of the faculty housed in Statistics. AGSM will have oversight through its Executive Committee. At the same time, CNAS will have oversight through its Executive Committee. Further oversight will be in place with the creation of a new Advisory Board for the program that includes all ladder-rank faculty from the Department of Statistics and from the OCSM, Marketing and Finance areas of the School of Business. Executives of Southern California firms and UCR alumni with appropriate expertise will be asked to serve on the board as well.

# § 9.0 CHANGES IN SENATE REGULATIONS

The Master of Science in Business Analytics program will not require any changes in Senate Regulations at the Divisional level or in the Academic Assembly.

# EXHIBIT I COURSE DESCRIPTIONS

# **Statistics Courses:**

# STAT 205 Discrete Data Analysis (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160A, STAT 160B, STAT 160C or equivalents; or consent of instructor. Contingency tables, log-linear models, information theory models, maximum likelihood estimation, goodness of fit, measures of association, computational procedures.

# STAT 206 Statistical Computing (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160C or consent of the instructor. Topics include statistical programming, simulation studies, smoothing and density estimation, generating random variables, optimization, Monte Carlo methods, Bootstrap, permutation methods, cross-validation.

# STAT 208 Statistical Data Mining Methods (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 201A, STAT 201B, STAT 202A or equivalents; or consent of the instructor. Covers principal data-mining methodologies and applications. Includes Bayes and LDA classifiers, logistic regression and neural network classifiers, support vector classifiers, classification trees, predictive modeling, ridge and lasso regressions, k-mean and Dendogram clustering methods, business analytics and mining association rules. Features SAS and R programming language.

# STAT 232 Statistics for Business Analytics (4) NEW

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 023, 100B or equivalent, or consent of the instructor. Covers analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data with applications in business.

# MGT 233 Marketing Research (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

# MGT 267 Applied Business Forecasting (4)

Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

# **Core Management Courses:**

# MGT 202 Financial Management (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): graduate standing or consent of instructor; MGT 201 (may be taken previously or concurrently), MGT 211 (may be taken previously or concurrently) or equivalents. Provides a foundation in theories of finance. Topics include time

value of money, security valuation, financial institutions, theories of risk measurements, managing a firm's investment decisions, capital structure, and sources of financing for a firm.

# MGT 204 Cost and Management Accounting (4)

Lecture, 3 hours; outside projects, 3 hours. Prerequisite(s): MGT 211 or equivalent. A study of accounting information for managerial planning and control. Topics include managerial applications for product costing, budgeting, and performance evaluation; accounting techniques for modern manufacturing systems; activity-based accounting and cost management; international cost accounting systems; and the behavioral implications of accounting information.

# MGT 207 Operations Management for Competitive Advantage (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

# MGT 209 Marketing Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

# **Business Analytics Courses:**

# MGT 256 Business Analytics for Management (4)

Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet Management / 332 environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

# MGT 286A Capstone in Business Analytics I (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will propose a topic of inquiry that will use a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical techniques used to answer questions related to business operations and profitability.

# MGT 286B Capstone in Business Analytics II (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; MGT 286A or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will work on a project that was initiated in MGT 286A that uses a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical

techniques used to answer questions related to business operations and profitability.

# **Operations Electives Courses:**

# MGT 221 Decision Making Under Uncertainty (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

# MGT 239 Simulation for Business (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

# MGT 258 Logistics and Supply Chain Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

# **Marketing Electives Courses:**

# MGT 228 Consumer Behavior (4)

Lecture, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. Analyzes why people buy and examines purchase decision processes and outcomes. Studies current models of consumer behavior. Topics include brand equity, customer delight, global marketing, behavior modification, and strategic market analysis.

## MGT 251 Market Assessment (4)

Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines advanced topics in marketing, with emphasis on quantitative tools to aid marketing decision making. Topics include demand and market-share forecasting, conjoint analysis, market segmentation and cluster analysis, brand positioning and competitive market structures, and assessing market response to price, advertising, promotion, distribution, and sales force.

# MGT 253 Internet Marketing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 209 or consent of instructor. Examines the role of the Internet in an organization's overall marketing framework. Discusses marketing applications of personalization, traffic generation, online search, community, online experience, and other current Internetenabled marketing techniques. Emphasizes Internet retailing.

# MGT 257 Marketing Strategy (4)

Seminar, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. A framework is developed for strategic marketing planning. Topics emphasized include market audits and futures research, product-market identification, product portfolio balancing, target market strategy, and integrated marketing program planning. Relies heavily on an extensive computer-based market simulation.

# Finance Electives Courses:

# MGT 227 Fixed Income (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): MGT 201. Covers analytical techniques related to fixed-income securities. Includes basic analytical tools in fixed-income markets. Topics include relative pricing of fixed-income securities, yield-curve estimation, securities with embedded options, and trading strategies. Utilizes interest rates swaps, mortgage-backed securities, and credit derivatives.

# MGT 232 Derivatives and Asset Pricing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Explores the pricing of derivatives-based securities. Covers various topics in derivatives markets. Introduces pricing techniques for forwards, futures, options, swaps, and other derivatives. Utilizes empirical data and financial modeling.

# MGT 244 Corporate Risk Management (4)

Lecture, 3 hours; written case analyses and reports, 3 hours. Prerequisite(s): MGT 202. Provides an overview of derivative financial instruments. Focuses on the use of derivatives to manage risk in a corporate setting. Utilizes the case-method to develop strategies and policies for managing the risk exposure of an enterprise, as well as to assess the relations between risk management and value creation.

# MGT 252 Investments and Portfolio Management (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Discusses standard asset pricing models, portfolio theory, and empirical uses of securities data. Addresses pricing in the capital markets and empirical issues in testing asset pricing models. Other topics include risk-adjusted portfolio performance, term structure, bond pricing, and bond portfolio management.

# MGT 295F Empirical Methods in Finance (4)

Seminar, 3 hours; individual study, 3 hours. Prerequisite(s): ECON 205A or equivalent or consent of instructor; doctoral standing in Management or consent of instructor. Covers econometric approaches to analyzing common problems encountered when conducting empirical research. Focuses on hypothesis testing, specification tests, general methods of moments estimation, the capital asset pricing model, multifactor asset pricing models, event studies, operating performance studies, simultaneous equations models, and endogeneity issues. Demonstrates programming in SAS and/or Gauss.

# EXHIBIT II SCHOOLS THAT OFFER BUSINESS ANALYTICS PROGRAMS IN CALIFORNIA

2017 TFE	Times
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University	Ranking	Location	Program	Length	Tuition
UCLA	Begins Fall 2018	Los Angeles	M.S. in Business Analytics	13 months	\$62,579
USC	1	Los Angeles	M. S. in Business Analytics	18 months	\$58,674
UC San Diego	unranked	San Diego	M. S. in Business Analytics	12 months	\$52,900
UC Davis	unranked	Davis	M. S. in Business Analytics	12 months	\$50,729
Cal State East Bay	unranked	Hayward	M. S. in Business Analytics	9 months	\$26,595
Cal State LA	certificate	Los Angeles	<b>Business Analytics Certificate</b>	9 units	\$6,300
UC Berkeley Extension	certificate	online	Predictive Analytics Certificate	10 units	\$4,000
UC Irvine Extension	certificate	online	<b>Business Analytics Certificate</b>	11 units	\$3,985
Santa Clara University	unranked	Santa Clara	M.S. Business Analytics	15 months	\$55,076

# EXHIBIT III FINANCIAL PROJECTION

	2019-20	2020-2021	2021-2022	Steady State
Revenues:				
Number of students	15	20	30	50
Total tuition fees (\$48,000 per student)	720,000	960,000	1,440,000	2,400,000
Scholarships	72,000	96,000	144,000	240,000
Total new revenues	648,000	864,000	1,296,000	2,160,000
Expenses:				
Faculty:				
Additional faculty per capstone section	150,000	150,000	150,000	150,000
Number of capstone sections per year	2	2	2	4
Additional faculty for other courses	50,000	50,000	50,000	100,000
Cost of additional faculty	350,000	350,000	350,000	700,000
Additional staff				
Career services specialist	30,000	30,000	30,000	60,000
Graduate student advising staff	35,000	35,000	35,000	70,000
Admissions and recruiting staff	35,000	35,000	35,000	70,000
Cost of additional staff	100,000	100,000	100,000	200,000
Additional expenses related to classroom				
use (rent, maintenance, etc.)	30,000	30,000	30,000	60,000
Marketing and recruiting materials	100,000	100,000	100,000	100,000
Total new costs	580,000	580,000	580,000	1,060,000
Net new cash flow: <sup>7</sup>	68,000	284,000	716,000	1,100,000

<sup>&</sup>lt;sup>7</sup> Assumes new sections of existing courses will not be needed because business analytics students will fill remaining seats in these courses. These include the following STAT and MGT courses (with recent excess classroom capacity noted): STAT 205 (12 of 36 seats in Winter 2017); STAT 206 (11of 30 seats in Fall 2017); STAT 208 (12 of 30 seats in Spring 2017); MGT 202 Financial Management (offered in two quarters each year; 14 of 65 seats and 24 of 70 seats for sections 1 and 2, respectively, in Spring 2017 and 14 of 36 seats in Fall 2017); MGT 203 Economics for Management (1 of 74 seats and all 36 seats for sections 1 and 2, respectively, in Winter 2017); MGT 204 Cost and Management Accounting (29 of 65 seats in Fall 2017); MGT 207 Operations Management for Competitive Advantage (5 of 65 seats and 23 of 70 seats for sections 1 and 2, respectively, in Spring 2017); MGT 209 Marketing Management (6 of 77 seats and 4 of 35 seats for sections 1 and 2, respectively, in Winter 2017); MGT 221 Decision Making Under Uncertainty (all 30 seats filled in Fall 2017 but can be expanded to a larger room); MGT 227 Fixed Income (40 of 75 seats in Spring 2017); MGT 228 Consumer Behavior (8 of 60 seats in Fall 2017); MGT 232 Derivatives and Asset Pricing (7 of 36 seats in Winter 2017); MGT 233 Marketing Research (2 of 36 seats in Winter 2017); MGT 239 Simulation for Business (17 of 36 seats in Spring 2017); MGT 244 Corporate Risk Management (29 of 70 seats in Winter 2017); MGT 251 Market Assessment (6 of 36 seats remain); MGT 252 Investments and Portfolio Management (53 of 70 seats in Spring 2017); MGT 253 Internet Marketing (12 of 36 seats in Spring 2017); MGT 256 Business Analytics for Management (27 of 36 seats in Spring 2017); MGT 257 Marketing Strategy (4); MGT 258 Logistics and Supply Chain Management (10 of 36 seats in Winter 2017); MGT 267 Applied Business Forecasting (24 of 36 in Winter 2017); and MGT 295F Empirical Methods in Finance (1 of 16 seats in Winter 2017)

# EXHIBIT IV COURSE SCHEDULE AND COURSES

# Sample Program I (student has a B.S. in Statistics)

# Quarter 1

•	MGT 256	Business Analytics for Management
•	MGT 207	Operations Management for Competitive Advantage
•	MGT 202	Financial Management

# • STAT 232 Statistics for Business Analytics

# Quarter 2

•	MGT 286A	Capstone in Business Analytics I
•	MGT 221	Decision Making Under Uncertainty
•	MGT 209	Marketing Management
•	MGT 204	Cost and Management Accounting

# Quarter 3

•	MGT 286B	Capstone in Business Analytics II
•	MGT 239	Simulation for Business
•	MGT 258	Logistics and Supply Chain Management
•	STAT 208	Statistical Data Mining Methods

# Sample Program II (Student has a B.S. or B.A. in Business)

# Quarter 1

• STAT 206 Statistical Computing

• STAT 205 Discrete Data Analysis

• MGT 256 Business Analytics for Management

• STAT 232 Statistics for Business Analytics

# Quarter 2

• MGT 257 Marketing Strategy

MGT 286A Capstone in Business Analytics I

MGT 253 Internet Marketing

• MGT 233 Marketing Research

# Quarter 3

MGT 286B Capstone in Business Analytics II

• MGT 251 Market Assessment

• STAT 208 Statistical Data Mining Methods

MGT 267 Applied Business Forecasting

# **EXHIBIT V**

# ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC

# 1. Name of Program:

Master in Business Analytics

#### 2. Campus:

University of California Riverside

#### 3. Degree/Certificate:

Master's Degree

4. CIP Classification: (to be completed by the Office of the President)

#### 5. Date to be started:

September 1, 2018

6. If modification of existing program, identify that program & explain changes.

Not Applicable.

# 7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?

# **Program Differentiation**

There is a large and increasing demand and professional need for specialized masters programs in Business Analytics. Our program is designed to extend the training of students who have already shown an aptitude for quantitative analysis and expands their skill set to sophisticated analytics in operations, marketing and finance. This makes the program focused on the business applications of statistics and quantitative analysis rather than the tools for handling large amounts of data, which is in contrast to the program at UC Davis or the online Data Science degree offered by UCR. An increasing number of schools are offering masters level programs in business analytics, but the only ranked program in our area is that offered by the University of Southern California. Their program is much too small to serve the demands of Southern California and it is tilted towards data science rather than business. UCR will be unique in the UC system in offering a nine month Master of Business Analytics master's degree and will be one of only three UC universities to offer the degree. The program is also unique in that it is joint between Statistics and Business, which ensures rigorous quantitative training while ascertaining that the program coursework differ from the curriculum in a data science program.

# 8. Type(s) of students to be served:

The Master in Business Analytics will be offered as a 9-month program (48 units) for graduates of a baccalaureate degree in either statistics or a quantitative business discipline. The program will extend the training of students along two tracks so that both sets of students will have similar skill sets by the end of the program.

## 9. If program is not in current campus academic plan give reasons for proposing program now:

Computing power and sophistication of software products has evolved to such a degree that there is now an entire new field combining business acumen with statistical analysis. Traditionally, students have focused on business with limited ability to analyze data or have focused on data analytics without much knowledge of its application to business. The demand for this degree is fairly new and UCR would be at the forefront of schools offering the degree. In addition, the regional market is underserved and this program will be an immediate source of net revenue.

## 10. If program requires approval of licensure board, what is the status of such approval? Not Applicable

## 11. Please list special features of the program:

The program has two tracks serving two types of students, depending on their undergraduate studies. This allows all graduates of the program to reach the same level of expertise in business analytics by graduation.

## 12. List all courses required:

The following four courses are required courses for all MSiBA students: MGT 286A-B (Capstone in Business Analytics, a 2 quarter sequence), MGT 256 (Business Analytics for Management), STAT 208 (Statistical Data Mining Methods) and STAT 232 (Statistics for Business Analytics). In addition, students with an undergraduate business degree are required to take STAT 205 (Discrete Data Analysis), STAT 206 (Statistical Computing), MGT 233 (Marketing Research) and MGT 267 (Applied Business Forecasting). Required courses for students with an undergraduate statistics degree are MGT 202 (Financial Management), MGT 204 (Cost and Management Accounting), MGT 207 (Operations Management for Competitive Advantage) and MGT 209 (Marketing Management).

In addition, students are required to take three electives that form a concentration. The electives must be a group of three courses in either operations, marketing or finance.

# 15. List any related program offered by the proposing institution and explain relationship.

We anticipate that the program will help us fill empty seats in the more technical courses offered in the existing MBA program.

# 16. Summarize employment prospects for graduates of the proposed program.

The program will educate individuals for employment in all types of businesses that collect and organize data for the purpose of maximizing profits. These include large industrial firms, financial services firms and consulting businesses. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

# 17. Give estimated enrollment for the first 5 years and state basis for estimate.

We project 15 students in the first year, increasing each year to reach 50 students in about five years.

# 18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.

Exhibit III contains our financial projections. Library Acquisitions, Computing, Facilities and Equipment are considered to be "in-direct costs" and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program. An increase in faculty FTE is shown by the increase in costs allocated to the Business School or Statistics Faculty. There will be only incremental facilities cost as we will use available capacity in existing classrooms, including statistical computing rooms. Over time as the program expands we anticipate having more students and likely a few more sections of that require more classroom space. The incremental rent, equipment and other elements of classroom space are included in the budget. We do not have specific equipment needs for the MSiBA program. Direct costs for the program include marketing and recruiting costs, and additional support staff, and financial aid at 10% of gross revenue.

## 19. How and by what agencies will the program be evaluated.

An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter

# EXHIBIT VI BYLAWS FOR THE INTERDEPARTMENTAL MASTERS DEGREE PROGRAM IN BUSINESS ANALYTICS

# University of California, Riverside

Masters of Science Degree in Business Analytics (MSiBA) Program Faculty Approval Date:	
Graduate Council Approval Date:	

# **Article I. Objective**

The mission of the Master's of Science in Business Analytics (MSiBA) program is to deliver graduate level courses that will lead to the awarding of a M.S degree that combines business education with training in statistical analysis. This degree program shall be operated in conformance with the rules and procedures of the Graduate Division of the Riverside Campus of University of California. The expectation is that graduates from this program will assume positions in leading companies that have resources to carry out detailed analyses of marketing, operations, and financial data. To achieve this objective, a combination of rigorous coursework in both statistics and the technical areas of business (operations, marketing and finance) will produce students who are capable of analyzing datasets in ways that will enhance company profits.

As an interdepartmental program, the MSiBA program will involve faculty from Statistics and from Business. If in the future, the School of Business were to separate into more than one department the program will involve Statistics and whichever departments house faculty in operations, marketing and finance.

# Article II. Degree Offered by the Program

The program offers the Master of Science (M.S.) degree (comprehensive examination Plan I).

# Article III. Membership

# A. Qualifications for Program Faculty Membership

The program faculty shall consist of persons at the University of California, Riverside, who are ladder-rank faculty in the School of Business and all ladder-rank faculty in the Statistics Department. Other faculty members may teach courses that are required for obtaining the degree, but the administration of the program will be conducted by the above-mentioned faculty.

All program faculty members will have the same full rights and privileges regarding the governance of the program, with the exception of the Program Director. The Director will belong to the School of Business or the Department of Statistics.

# Article IV. Organization and Administration

The administration of the program and its activities will be supervised by the Director.

#### A. Program Director

The Director will be chosen by the deans of CNAS and Business. The director will be a faculty member in Statistics or Business. The director from the School of Business must belong to one of the following areas: Finance, SCOM, or Marketing. The Director is responsible for the overall organization and leadership of the program. The Director shall serve as the chief officer and spokesperson for the program and shall call and preside over meetings of the program faculty. The Director represents the program at the Business School Dean's meetings and at the CNAS Dean's meetings.

The appointment of the Director shall be in accordance with the regulations of the UCR Graduate Council. The Director will be appointed by the Chancellor for a term of three years, upon the recommendation of the Dean of the Graduate Division and the Deans of CNAS and the School of Business. The Director will alternate between the Statistics and Business Departments. Each respective school's EC shall solicit the names of nominees for a new Director when the position turns over to a professor from their school. The Graduate Dean, in consultation with the respective Deans, will forward his/her recommendation to the Chancellor, who makes the appointment.

## **Article V. Committees**

## A. Steering Committee

The members of the Steering Committee will be selected by the Director on an annual basis. All members of the Admissions and Recruitment Committee must be program faculty who are AGSM or Statistics Department faculty members. The Admissions and Recruitment Committee shall consist of

- The Graduate Program Director, who supervises the committee
- Six program faculty that represent as many different major field areas in the program as possible. Three will be from the Department of Statistics and three from the School of Business.

The functions of this committee shall include setting admissions criteria for the program and recommendations for their financial support. Admissions decisions are made by the Committee with input from the program faculty and in coordination with the admissions and recruiting staffs of AGSM and Statistics. The Committee will also be responsible for oversight of recruitment strategies, organization of prospective student visits to campus, and appropriate updating of the program website and print brochures. The committee is expected to work closely with the graduate admissions and recruiting staffs of AGSM and Statistics. The Committee is also responsible for the oversight of academic advising.

## **Article VI. Meetings**

At least one annual meeting of the program faculty must be held in the Fall at the beginning of the academic year. Other meetings may be called as frequently and for such purposes as deemed desirable by the Graduate Program Director. Meetings will be conducted according to Robert's Rules of Order. Minutes of the meetings shall be kept by the AGSM or CNAS staff and shall be distributed to all program faculty within ten days of the meeting.

# **Article VII. Quorum**

A quorum consists of 50% of the eligible program faculty. Passage of motions shall require a simple majority of the MSiBA program members who are present at the meeting. Voting may also be done by electronic ballot.

# **Article VIII. Amendments**

Amendments and revisions to the bylaws may be proposed by either the AGSM faculty or the Statistics Department Faculty by petition of 20% or more of the faculty in either department. Proposed amendments shall be either discussed at a meeting which satisfies quorum requirements or distributed by electronic mail to the program faculty members at least one week before distribution of the relevant ballot. Passage of an amendment to the bylaws will require at least a majority of those voting by electronic mail. All amendments and revisions must be submitted to the UCR Graduate Council for review and approval.

# EXHIBIT VII LETTERS OF SUPPORT FOR THE PROPOSED MASTERS IN BUSINESS ANALYTICS PROGRAM (MSiBA)

Exhibit VII includes letters of support from the following individuals:

Professor Sanjiv Das, Co-Director Masters of Business Analytics Program, Santa Clara University

Ms. Payal Shah, UCR Alumna, Ph.D. Statistics

Mr. Jesse Cota, UCR Alumnus, B.A. Business Economics

Mr. Minh Ly, UCR Alumnus, B.S. Statistics

Ms. Tricia Haderlie, School of Business Career Development Center Advisory Board member

Professor Karsten Hansen, Professor of Marketing, UC San Diego

Mr. Jefferson Hammann, Walmart

Professor Steve Sault, Interim Director, Research School of Finance, Actuarial Studies and Statistics, Australian National University

Professor Abel Rodriguez, Professor of Applied Math & Statistics and Associate Dean for Graduate Affairs, UC Santa Cruz

Professor Fernando Zapatero, Professor of Finance and Business Economics, University of Southern California

Professor Yongtao Guan, Professor of Management Science, University of Miami

Professor Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Professor Terrence August, Associate Professor of Innovation, Technology and Operations, UC San Diego

Professor Philip Kaminsky, Executive Associate Dean and Professor of Engineering, UC Berkeley

Professor Jean-Pierre Fouque, Professor of Statistics, UC Santa Barbara

Professor Charles Corbett, Professor of Operations Management and Sustainability, UCLA



Ocotober 21, 2017.

To: Professor Jean Helwege

Re: UCR Business Analytics Masters Program (MSiBA)

I am writing in support of your MS in Business Analytics proposal. I believe that with less than an additional year of coursework, your undergraduate students with a grounding in subjects such as math, statistics, quantitative business, engineering, etc., would be able to rotate into analytics and graduate with a Masters degree with sufficient training to be employed as entry-level hires in the vast array of Analytics jobs that remain unfilled today. In short, the basic proposition of the degree is well thought out, based on market demand, and satisfies a need in the job market.

I am the William and Janice Terry Professor of Finance and Data Science at Santa Clara University, and previously held appointments as Associate Professor at Harvard and Berkeley. My fields are quantitative finance and theoretical and applied computer science. I work at the interface of both fields, and supervise undergraduate and graduate students in both areas. My CV is available at <a href="http://srdas.github.io/">http://srdas.github.io/</a>. I am also a member of the advisory board of MIT's Consortium for Risk Analytics, and a Senior Fellow at the FDIC. I am the founder and co-director of the MS in Business Analytics (MSBA) program at SCU and we are based in the heart of Silicon Valley (Santa Clara county is Silicon Valley), so I am keenly aware of the growing demand for analytics skills.

I believe the goals of the program are differentiated well from other offerings. The key idea is that this program is not meant to produce more "data scientists" — a programmer with data and statistics skills. Data scientists play more technical roles at the intersection of computer science and statistics, but do not have business perspective. There is a greater proportional shortage of people who can ideate business propositions from data. Such people need a solid grounding in economics, finance, marketing, supply chains, where knowledge of business paradigms is key. I believe that the MSiBA will fill a huge gap for "business analysts" in the job market, as opposed to the gap for data scientists. My own estimation is that there are many more jobs for data scientists, which are being filled by software engineers with some coursework in handling data using machine learning. But, even though there are fewer jobs for business analysts, the percentage of these roles being filled is much smaller. This is the niche you are trying to fill and

it is a big opportunity. My own program at SCU is aimed at exactly the same market. We graduated our first cohort and placed them all, and this year we have tripled the size of the program for the cohort beginning in Fall 2017.

When we began our MSBA program, the intention was identical to yours, i.e., track our undergrads into it and enable them to continue on for a value-add degree. We were surprised and overwhelmed by the external demand for the degree, which led us to open it up to an external market. I suspect you may end up doing the same. As many of the major tech names begin to build and extend campuses in the LA region, you will find a natural home for some of your graduates, but the demand from startups is also high, especially for people who are not just programmers, but business thinkers as well. I think the courses you have will serve the students well, and the only course I see that would be useful to add on is a course on machine learning, which is an essential part of the training that analytics students must have.

Your proposal envisages a small initial cohort of 15 students. Your program will change rapidly as you learn from doing with feedback from employers, but I would also give thought to how to scale the program as you will likely be pleasantly surprised by the demand for it. There will be a need for faculty to rotate into teaching a skill set that extends beyond what is currently the provenance of business school education. This is a good challenge to have, and your program will add a new energy to both, your undergraduate and graduate programs. I believe it is a well thought out proposal, and I heartily support it.

Sincerely,

Sanjiv R. Das | William and Janice Terry Professor of Finance | Leavey School of Business | Santa Clara University |Tel: (408)-554-2776 | srdas@scu.edu | <a href="http://srdas.github.io/">http://srdas.github.io/</a>

November 1, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

Dear Dean Uhrich,

I am writing to offer my support of the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Math and Statistics, M.S. in Statistics, and a PhD in Applied Statistics. Since graduating with my PhD, I have spent the last eight plus years in a career building statistical models to use as a tool in making important business decisions. I currently work in the Consumer Modeling and Analytics team at Bank of America as Senior Vice President, Quantitative Operations Manager.

I believe this program is helpful in preparing students for similar careers. Many people who have extensive training in statistics have little formal training in business. Time must be invested to learn this on the job, while graduates of this program would start the job with more of the relevant skills and training required on the business front as well.

In particular, the Statistics UG track with the finance concentration would really help someone with a strong statistical background who wants to work in a quantitative realm within the financial industry be better prepared. Hence, I truly believe this program will be a great resource and want for students with similar career interests.

Sincerely,

Payal Shah

Pshah1122@gmail.com

(951) 237-3517

Jesse Cota Senior Financial Analyst Agua Caliente Band of Cahuilla Indians jesse@cota.email (760) 625-4843

November 20, 2017

University of California Riverside Riverside, CA 92521

Honorable Members and Chairs of the different relevant departments:

As a member of the Inland Empire community and an alumnus of UCR, I am honored and enthusiastic in making a case for the one-year Master of Science in Business Analytics (MSiBA) program. I graduated in 2010 with a B.A. degree in Business Economics. My theoretical background was very well cemented, but I found myself lacking the practical skills in business analytics needed to be competitive in the labor market. It was only after a few years in the workforce and after having completed a master's degree from the School of Advanced International Studies at Johns Hopkins University (SAIS) that I began to obtain and improve skills in statistical analysis, econometric methods, data modeling, data management, and business intelligence among others.

Given today's abundance of professionals with bachelor's degrees, being able to differentiate oneself from the many is key. In addition, the current trend of corporations, government agencies, NGOs, and other organizations to make only decisions that are driven by data will continue to increase as server memory and computing power improve. With the proper advice, undergraduate students of accounting, business, economics, finance, statistics and related disciplines may guide their studies toward the goal of being admitted to the MSiBA program and hence make themselves competitive with the right mix in their skillset.

As a professional in the sector of business analytics, I witness on a day-to-day basis the need for better efficiency, analysis, and management of operations data. If more students graduate with the acumen and knowledge on how to treat, extract, transform, load, and analyze data, organizations hiring them will increase their added-value and efficiency. Therefore, I strongly recommend the creation of the one-year MSiBA program to the members and chairs of the different relevant departments within the University of California, Riverside. Should you have any questions, or would like further information, please do not hesitate to contact me at the email or phone number above.

Faithfully yours, Jesse Cota November 3, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

# Dear Dean Uhrich,

I am writing to give my support to the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Statistics – Quantitative Management in 2004, and have since then built a career in business operations. I currently work at Gigamon as Senior Manager, Demand Planning.

When I heard about the proposed MSiBA program, in particular, the Statistics UG track with the Operations concentration, I knew this would be a great program for students who are trained in Statistics have a better understanding of business operations. These are both tools that are used daily in my field. I think this will be a great program to prepare people, who are considering similar careers, with the relevant skills.

Best Regards,

Minh Ly

Minh.P.Ly@outlook.com

(909) 382-1618



February 12, 2018

Yunzeng Wang, Ph.D Dean, University of California, Riverside School of Business Riverside, CA 92521

Dear Dean Wang,

I am writing to offer my support for Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM. Businesses are in need of qualified professionals who have demonstrated their knowledge, skills and abilities by achieving a master's degree in this field.

Our organization is a non-profit and as such, it is vital for us to better understand the large amounts of data we have about our customers, programs, and costs in order to improve our operations and services, especially in a time when grant dollars are not readily available. Over the past two years, our organization had the privilege to host a couple of MBA Fellows; both concentrated on analytics and their work made an impact for us. A program dedicated to this would be instrumental in the non-profit and for profit worlds.

Sincerely,

Tricia Haderlie

SVP, Talent & Training

Satura and Anderlie











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Karsten T. Hansen Professor of Marketing Rady School of Management E-mail:k4hansen@ucsd.edu Phone: (858) 822 7462

February 14, 2018

Yunzeng Wang Dean, School of Business University of California – Riverside Riverside, CA 92521

Re.: Degree proposal of MSiBA program, UC Riverside

Dear Dean Wang,

I am writing to offer my support for a new program in business analytics at UC Riverside. The proposed MS degree in business analytics (MSiBA) program will provide a valuable service to students in the Inland Empire as well as to the businesses that hire them. For reference, my background is 15 years of research in Quantitative Marketing with a specialty in "big data" analytics. Furthermore, my own school at UC San Diego launched a similar MSBA program in 2016 and I am quite familiar with many of the details in setting up a program like the one UC Riverside is proposing.

The MSiBA program is designed to ensure a high level of scholarship by combining the expertise of both statistics and business professors who will teach in this interdepartmental program. The admissions criteria also help ensure a high level of scholarship, as only those students who have already been trained in one of the two areas of study will enter the program. The two quarters of capstone courses also add to my confidence that graduates of this program will be able to apply their training in a real business environment.

The need for students trained in the area of business analytics is large and growing. This is a great opportunity for students from underrepresented groups to obtain professional training that will enhance both the financial aspects and prestige of their future careers. As a university that values the diversity of its undergraduate population, UCR will benefit greatly from extending this environment to its professional schools.

Overall, I think the directors of the proposed program have put together a very clear, detailed presentation of the program proposal and I think they make a convincing case for starting a MSiBA degree program at UCR. In sum, I believe this program will greatly enhance the reputation of UCR, the economy of the Inland Empire, and opportunities for underrepresented groups.

Best,

Karsten T. Hansen

February 22, 2018

Dr. Yunzeng Wang Dean, UCR School of Business University of California, Riverside Riverside, CA 92507

Dear Dean Wang,

From our first meeting in 2014 through my work on the CDC Advisory Board to the A. Gary Anderson Graduate School of Management, I have enjoyed unrivaled academic partnerships and community support, as well as lasting professional relationships and camaraderie which will transcend our formal assignments to our respective institutions. Through our board work, I have recently learned of Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM.

Having worked in corporate supply chain with Walmart for more than 16 years, as well as seven years with various governmental agencies, I would be remiss to not offer support to this proposal. I have taken the opportunity to review the related materials as well as reflect on the applications of such training to professionals in my field. Data analytics applications in complex business problem-solving are at the forefront of my field, and we are always in search of such talent that can leverage continued growth into our business.

Supply chain in general, and the retail sector in particular, are becoming increasingly competitive in an omni-channel world. Such a track of study would certainly have interested me had it been available at the time I pursued masters-level work. I would look forward to seeing this program in implementation and action, particularly with regard to the professionals that will graduate to successful careers in the supply chain space.

My thanks in advance for your consideration.

Sincerely,

Jefferson Hammann

jeffersonhammann@gmail.com

951.675.1979 mobile

Australian National University

**Associate Professor Steve Sault** 

Interim Director Research School of Finance, Actuarial Studies and Statistics College of Business and Economics

> T: +61 2 6125 4869 E: stephen.sault@anu.edu.au

3 August 2018

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

**RE: Master of Science in Business Analytics** 

Dear Dean Uhrich,

I write in strong support of the proposal for a Master of Science in Business Analytics to be offered at UC Riverside. Indeed, at the Australian National University we developed a similar program in 2015 in which the School of Finance, Actuarial Studies and Statistics teaches the statistics component. Particular strengths of the proposed program at UCR include:

- The cross-collaboration nature of the of the program which is being instructed across both the School of Business and Department of Statistics – this ensures that each course is instructed by academics with expertise in the particular subject matter, rather than courses being instructed by academics in a different field.
- The focus of the program on emphasising the three business topics of marketing, finance and operations also sets the program apart from traditional "data science" centric programs which concentrate on computer coding etc. This enables the program to capture a strong market interest in business analytics within finance and operations.
- The requirement that students come from a cognate background in quantitative business or statistics is a good approach and ensures that by the end their studies, all students will be at the same level of competence in business and statistics. While studying, students can focus on areas that they are less "proficient" in, to ensure that as graduates they have the skill set necessary to be attractive to employers.

The Australian National University | Canberra ACT 2601 Australia | CRICOS Provider No. 00120C

A highlight of the program are the two quarters of capstone courses offered within the program. These capstone courses will help to ensure high quality, well-trained

graduates.

As mentioned previously, the Australian National University developed a similar program in

2015, the Master of Applied Data Analytics. While this program also has a computer science

element, it is similar to the proposed Master of Science in Business Analytics as it involves

a cross-collaboration between three Colleges (College of Business and Economics, College

of Arts and Social Sciences and College of Engineering and Computer Science). Our School

teaches the statistics component into the degree. This program also has a heavy focus on

business, statistical analysis while also encompassing public policy initiatives. Within the

past 3 years, this program has grown to a student cohort of 50 students, a number similar

to the goal of the proposed program at UCR.

In summary I believe that the proposed program at UCR has been well crafted and will prove

to be robust and popular. I am certain it will attract a high quality student cohort, and be

sustainable in terms of the numbers attracted. I also trust that the program will enhance the

reputation of UCR for delivering programs of excellence that are in demand.

Yours sincerely,

Steve Sault

Interim Director

# UNIVERSITY OF CALIFORNIA, SANTA CRUZ

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+1 (831) 459-4822 FAX +1 (831) 459-4829

APPLIED MATHEMATICS & STATISTICS BASKIN ENGINEERING BUILDING SANTA CRUZ, CALIFORNIA 95064

August 26, 2018

Jean Helwege Professor of Finance School of Business Administration University of California, Riverside

Re: Proposal for a Self-Supporting MS Program in Business Analytics

Dear Dr. Helwege,

I am writing to express my support for the new Master of Science in Business Analytics (MSiBA) program being jointly proposed by the Department of Statistics and the Gary Anderson Graduate School of Management at the University of California, Riverside. The structure of the program, which brings together expertise from faculty in business and statistics, is a key strength of the program that will appeal to students interested in business but with a strong quantitative training.

For background, I am a Professor of Statistics at the University of California Santa Cruz. In addition, I currently serve as Associate Dean for Graduate Affairs in Baskin School of Engineering and as Associate Director of the Center for Data, Discovery and Decisions. In the past, I have served as the Chair of our Division's Senate Committee on Planning and Budget, and our representative to its university-wide counterpart. Because of this background, I have substantial experience both in the design and review of Self Supporting Programs, and I think I can provide a unique perspective on the proposal being put forward.

The program aims to "expand the training of students with analytical backgrounds to allow them to apply their skills to business data". The curriculum, which is rigorous, reflects this goal. Unlike most other programs in business analytics, the curriculum of the MSiBA at Riverside is biased towards traditional courses on business and management. According to the proposal, this has the additional advantage of using spare capacity in existing courses. While this choice of curriculum clearly differentiates the MSiBA from the other business analytics programs in the UC system, one potential concern is that it might not provide enough differentiation with respect to the standard MBA programs offered by the Gary Anderson School of Management, or by other UC campuses. The proposers might want to consider expanding the list of elective sequences to allow students to get further technical skills in statistics and data analysis if they so desire.

At nine months, the proposed program is also somewhat shorter than the rest of the business analytics programs offered in the UC system (which are typically 11 to12 month long). While there are some high-ranking programs that have a similar length (e.g., University of Arizona), and the shorter duration provides another important differentiator within California, this is a very accelerated time table. Students often need some time to fully absorb and integrate concepts. One way in which other programs have dealt with this issue has been by (1) integrating required courses through shared projects, and (2) requiring a series of capstone/professional development courses that build on each other and

provide opportunities for students to use skills acquired in different courses. I wonder if a similar approach could be helpful in the case of the MSiBA.

In spite of these small caveats, I would like to emphasize that this is a strong and well designed program that will serve a clear need in terms of workforce development. I wish you and Prof. Cui success with the review and launch of the program. Please do not hesitate to contact me if you need any further information.

Sincerely,

Abel Rodríguez

Professor

Department of Applied Math & Statistics Associate Dean for Graduate Affairs

Baskin School of Engineering e-mail: abel@soe.ucsc.edu

phone: +831 459 1047



# FINANCE AND BUSINESS ECONOMICS DEPARTMENT

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance Professor of Finance and Business Economics

August 30, 2018

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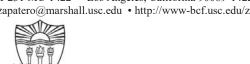
Dean Kathryn Uhrich CNAS Geology 2258 Riverside CA 92507

Dear Dean Uhrich,

Professor Jean Helwege asked me to provide an assessment of the UCR proposal of a MS in Business Analytics. In this letter I express my opinion on the proposal she has sent me.

First, I have to emphasize the relevance and timing of such a program. It is no secret that companies of all types and industries depend more on data analysis for their decisions and need to hire people who are able to do such an analysis. This is especially the case in marketing and finance. However, they often have to hire graduates with technical backgrounds —as computer science and statistics—because the students with business background lack the data analysis knowledge required by many jobs. This is by no means a perfect solution because these graduates lack an understanding of the business aspects of the organizations and require a lot of guidance and, at least initially, cannot have managerial responsibilities. In sum, there is a large market for the proposed program that universities in our region are not attending.

In fact, the only similar program in the area —as pointed out in the proposal—is our own MS in Marshall. I was the Vice Dean for graduate programs responsible for its launching. I initially faced strong resistance from the administration, but I can reassure you that they could not be happier now that they went along with the proposal. The program receives many hundreds of applications every year—last time I checked over one thousand—but can only accept a small number of students for capacity limitations—determined by faculty size and classrooms availability. There is plenty of room for similar programs in the area. Furthermore, the program proposed has its own emphasis that makes it different from ours and would be preferable for many students.



In particular, our program focuses on the data analysis and somehow overlooks the applications. I think this is a result of our large size that makes departments very protective of their turf and leads programs to miss on the interdisciplinary opportunities that your proposal exploits and will probably make it more marketable.

Finally, I have to point out that, in my opinion, timing is very important. It is a matter of time before other schools in the area offer similar programs. As you know rankings are sticky and being early in the game provides the opportunity to establish a reputation and achieve a good ranking before the market saturates.

I will be happy to elaborate more if you think that will be useful.

Best wishes,

Fernando Zapatero

Robert G. Kirby Chair in Behavioral Finance

Professor of Finance and Business Economics

# UNIVERSITY OF MIAMI SCHOOL of BUSINESS ADMINISTRATION



Department of Management Science 5250 University Drive, KE 401 Coral Gables, FL 33146 Phone: 305-284-6595 Fax: 305-284-2321

To: Professor Kathryn Uhrich
Dean of the College of Natural and Agricultural Sciences
University of California at Riverside

Dear Professor Uhrich,

I am writing to offer my support to your proposed Master of Science in Business Analytics (MSiBA) program at UCR. In recent years, many MS programs similar to the proposed MSiBA program have been developed in the US, including the MS in Business Analytics (MSBA) program that we offer at the Miami Business School. These programs are designed to meet the ever increasing demand of analytical talents from nearly all sectors of business and industry. A program like this typically takes about a year or less, and graduates from such programs are well placed in the job market. The trend is here to stay, and I believe that programs alike will be self-sustainable for a long term.

I am the Leslie O. Barnes Professor and Chair of Management Science at the Miami Business School. I am also Director of the Deloitte Institute for Research and Practice in Analytics at the University of Miami. I previously held positions as Assistant and Associate Professors at Yale University and Assistant Professor at the University of Miami. I became the chair of Management Science in 2013. Under my leadership, our school launched the MSBA program in 2014. The number of enrolment for this program has been steadily increasing, with 11 in 2014 to more than 90 students in 2018. So far, we have had four cohorts of graduates, who found employment in big name companies such as Amazon, Capital One, Deloitte, NBC Universal, Visa amongst others. Their starting salary varies greatly with experiences, ranging from 60k to over 100k. Interests in this degree have increased dramatically – we received more than 500 applications for this program in 2017-2018, which nearly doubled the number of applications that we received in 2016-2017.

The MSBA program not only provides additional revenue to the university, but also creates new synergy to support faculty research. We currently charge 2030 dollars on tuition per credit hour. With more than 90 students and after having deducted scholarships, we are expected to generate well over 4 million dollars of revenue this year. To boost the reputation of our program, we have hired four tenure-track faculty members since 2014. The new faculty bring new expertise in areas such as statistics, machine learning, and operations research.

As a business professor with background training in statistics, I fully understand the importance of analytical skills in contemporary business operations. With an additional year of business training to students with analytical background (such as statistics, computer science and math), or analytical training to students with business background, the students are better prepared for the job market. The proposed curriculum is well-conceived and the proposed new courses on Statistics for Business Analytics and Statistical Data Mining are much needed in a program like this.

As mentioned in the proposal, there are not many similar programs in California, which hosts the headquarters of many technology companies. Although somewhat surprising, this presents a great opportunity for UCR to establish itself as a frontrunner and leader in this area. Based on my knowledge of the faculty at UCR Statistics Department and the Business School, I believe that they are well-positioned to develop such a program. I therefore support the proposed program fully.

You're sincerely,

Yongtao Guan

Leslie O. Barnes Professor and Chair of Management Science

The Miami Business School

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SCHOOL OF SOCIAL SCIENCES, HUMANITIES AND ARTS & THE ERNEST & JULIO GALLO MANAGEMENT PROGRAM

UNIVERSITY OF CALIFORNIA, MERCED 5200 NORTH LAKE ROAD MERCED, CA 95343 (209) 228-7742 (209) 228-4007 FAX

To: Jean Helwege, Professor of Finance, UC Riverside

From: Fanis Tsoulouhas, Professor of Financial Management, UC Merced

Re: M.S. in Business Analytics

Date: September 6, 2018

Having read the joint proposal by faculty in the School of Business and by the faculty in the Department of Statistics, and based on my direct experience with several schools, such as the University of Illinois, Urbana-Champaign, where I taught Business Statistics, North Carolina State University, where I taught Corporate Finance, Harvard Business School and UC Merced, I am writing in strong support of the proposed M.S. in Business Analytics at UC Riverside.

Because Business Analytics involves harnessing the information provided by data (including big data) and models via statistical and quantitative methods in order to improve business performance, a joint proposal by the School of Business and the Department of Statistics will allow the exploitation of synergies between the two academic units while reducing operational expenses. At the same time, the joint degree will offer an avenue for students with an undergraduate degree in a quantitative business major to enhance their skills via rigorous training in Statistics through the Statistics track, and to students with an undergraduate major in Statistics to improve marketability via the acquisition of business skills through the Business track. The distinction between two tracks, enables the delivery of the Master's program in three quarters, which is inline with the current trend of one-year professional degrees. In fact, our own new MM (Master's in Management) is a one-year professional degree. Unlike two-year MBA degrees that require substantial prior business experience and can be quite expensive both to students and in terms of delivery costs, one-year fast-track professional degrees can be deployed quickly with existing resources and are more appealing to both parties.

What distinguishes this proposal from other existing fast-track and traditional Master's programs is the cooperation with the Statistics Department and the rigorousness ascertained through the emphasis on quantitative and statistical methods. By contrast, MBA degrees attract students with a variety of backgrounds and frequently rely on quick back of the envelope calculations.

To conclude, based on my professional experience, as well as on my Senate service as a member of the UC Merced DivCo for three years and on the systemwide Academic Senate for one year, I have no hesitation in strongly recommending this proposal.

Tel: (209) 228-4640 E-mail: ftsoulouhas@ucmerced.edu Web page: http://tsoulouhas.info BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



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9500 GILMAN DRIVE #0553 LA JOLLA, CALIFORNIA

WEB: www.rady.ucsd.edu

Yunzeng Wang Dean, School of Business University of California, Riverside Riverside, CA 92521-0203

September 15, 2018

Dear Dean Wang,

Thank you for providing me with a copy of the program proposal for a Master of Science in Business Analytics at UC Riverside, School of Business. I am currently the co-chair of the MSBA degree program at UC San Diego, Rady School of Management. I worked with Professor Vincent Nijs to design the program here at Rady and have also helped to organize our Center for Business Analytics. Over the past few years, we have reached out to many corporate stakeholders in the greater San Diego region to better understand their unmet needs in the area of business analytics and ensure that our degree program and research center were viewed as synergistic. We are now in the third year of offering our MSBA degree program and have learned quite a bit along the way. I served as a reviewer of the MSBA degree program proposals at UC Davis, UCLA, and UC Irvine and am therefore familiar with all of the degree programs in business analytics within the UC system.

With this backdrop, I would like to convey my impression of the proposed program at UC Riverside and offer some feedback as well. First, the program is uniquely designed in comparison to existing programs by strategically focusing on admitting undergraduates with either statistics or quantitative business backgrounds. To me, this is a clever design in that it reduces the variance of inputs and will make it easier to ensure students working in teams are close in their abilities. Our program at Rady has relatively broader acceptance criteria, which has certainly presented challenges over the past few years. One of the reasons I believe this aspect of UC Riverside's MSiBA proposal is a safe one is because the demand for this degree is very large. At Rady, we have seen applications grow from just over 300 in year 1, to over 700 in year 2, and approximately 950 this year. There are way more qualified students than we can possibly admit, and having more business analytics degree programs within the UC system would better serve the needs of individuals seeking to become business analytics professionals. Because I expect UC Riverside to also face strong demand, even a focused strategy on statistics and business undergraduate majors would not be a limiting one.

Second, this proposal seems to be a relatively more efficient one in its use of existing courses in the graduate degree programs currently offered by the School of Business and Statistics

department. Because existing sections of these courses are not operating at capacity, this proposal will be able to generate substantial revenue for the school while filling empty seats. It's good to see a proposal that aims to make more efficient use of resources; this is a problem sadly facing many of our schools. The associated cost savings above may justify some future electives that are specifically catered to business analytics students. At Rady, students find our Customer Analytics course to be a critical elective because it has students practicing the application of statistical and machine learning models on business problems over and over again. In this sense, it is the elective that best prepares students for the capstone projects in our program.

Third, having specialization tracks in the areas of operations, marketing and finance is unique in the UC system. Explicit tracks will enable students to focus on a specific business function and also create sub-cohorts that can be managed together. Overall, I like this structure. My experience has also taught me to be careful with self-imposed constraints. In that vein, I might suggest adding in the ability to have increased flexibility (perhaps by exception or suggested tracks as opposed to mandatory). From what I've seen at Rady, students are interested in *particular* courses, independent of discipline. We have also had many international students with degrees in business that are already specialized in finance. These students typically have minimal operations or marketing exposure, and may benefit from mixing across our marketing and operations electives.

In closing, I am supportive of the MSiBA program presented in this proposal. It is very well thought out and designed with aspects that make it unique within the UC system. I think it will be a very attractive one particularly for students who have majored in statistics and are looking to better understand business functions and the application of their knowledge in the business domain. I anticipate that the program will be successful in achieving its goals.

Sincerely,

Terrence August

Fenerce Logust

Associate Professor of Innovation, Technology and Operations Rady School of Management University of California, San Diego taugust@ucsd.edu (858) 822-7452

## UNIVERSITY OF CALIFORNIA, BERKELEY

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PHILIP M. KAMINSKY
EXECUTIVE ASSOCIATE DEAN AND CHANCELLOR'S PROFESSOR OF ENGINEERING
UNIVERSITY OF CALIFORNIA
COLLEGE OF ENGINEERING
320 McLAUGHLIN HALL # 1700
BERKELEY, CA 94720-1700

TELEPHONE: (510) 642 5771 FACSIMILE: (510) 642-9178 email: kaminsky@berkeley.edu

September 19, 2018

Jean Helwege University of California -- Riverside Riverside, CA 9251

RE: <u>Proposal for an Interdepartmental Graduate Program Leading to the Master of Science in</u>
<u>Business Analytics</u>

Dear Professor Helwege:

I am writing to express my support for the proposed Master of Science in Business Analytics (MSiBA) degree at UC Riverside. I am on the faculty of the Department of Industrial Engineering and Operations Research at UC Berkeley, a department whose course offerings overlap with the contents of this new degree.

There is no doubt in my mind that the MSiBA will meet a growing need (indeed, similar to the need met by some of the graduates of our professional master's degree). Businesses are facing increasing amounts of data, and are desperate for employees with the training to use that data to make effective business decisions. I have observed a constant clamor from our industrial advisory board for the type of students that this program will train, knowledgeable in both analytics, and the basics of business.

I've reviewed the degree proposal, and several things stand out. The proposed program clearly covers the key topics necessary in this area, and it does so efficiently, in a way that expands career opportunities for students in just nine months. It also does so, as far as I can tell, primarily by using existing campus resources. Furthermore, the two semester capstone component will prepare students to use these skills in a real-world setting.

In summary, the proposal strikes me as well thought out, well written, and comprehensive. This degree seems to be a low-risk addition to the UCR degree portfolio, one that will meet a definite need in the state, and do so in a way that is likely to enhance the reputation of UC Riverside.

Sincerely,

\* 0

Philip M. Kaminsky Executive Associate Dean College of Engineering

#### UNIVERSITY OF CALIFORNIA, SANTA BARBARA

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DEPARTMENT OF STATISTICS AND APPLIED PROBABILITY SANTA BARBARA, CA 93106-3110 805-893-2129 • FAX 805-893-2334 www.pstat.ucsb.edu

Jean-Pierre Fouque
Distinguished Professor
Director of the Center for
Financial Mathematics and Actuarial Research
fouque@pstat.ucsb.edu
http://www.pstat.ucsb.edu/faculty/fouque

September 24, 2018

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

#### Comments on the proposed Master of Science in Business Analytics

Data Science is multi-disciplinary in nature, ranging from Statistics, Computer Science, and application areas. The proposed Master in Business Analytics is based on Statistics and applications to Business. I find the idea very appealing and extremely well-suited to a one-year master program. Of coure, the admitted students need to be well-prepared in one of these two areas. This is clearly stated in the description of the program which is jointly administered by the School of Business and by the Statistics Department.

There is no question about the need of training in business decisions made by using the enormous amount of data in this area and the machine learning techniques. As described in the document, this program is at the right level (Master), it targets the right students (with strong undergraduate background in either Statistics or Quantitative Business), and it fits well the STEM designation. The program is also well-positioned with respect to the more classical MBAs.

Regarding its relationship with other similar programs in the UC system, the most comparable one is at UCSD but most of the other campuses do not offer one yet. If UC Santa Barbara had a Business School, I would be the first to promote the idea of such a program.

The details of the description, administration, admission, curriculum, evaluation, and resources, are well thought out and, in my opinion, this program will be very successful and competitive in the growing job market in this area.

As a UCSB faculty, I can only applaud and support this initiative at UCR.

Sincerely,

Jean-Pierre Fouque Distinguished Professor Director of the CFMAR



#### Charles J. Corbett

IBM Chair in Management Professor Of Operations Management and Sustainability

Tel +1 (310) 825-1651 Fax +1 (310) 206-3337 charles.corbett@anderson.ucla.edu

Los Angeles, September 24, 2018

To whom it may concern,

This brief letter serves to express my support for the proposed Master of Science in Business Analytics (MSiBA), to be offered by the Anderson Graduate School of Management at UC Riverside.

Offering such a program at UC Riverside seems a sensible move, for the reasons mentioned in the proposal. There are numerous synergies with the programs already offered by the Department of Statistics and by the School of Business at UCR. The proposal mentions that the program is expected to be a significant source of revenue; the enormous volume of applications to the Masters of Science in Business Analytics that we recently launched at the UCLA Anderson School of Management would support such an expectation.

The design of the program is appealing, with slightly different areas of emphasis for students depending on whether their prior training is more in business vs. more in statistics.

The skills needed to teach courses in this program are generally closely aligned with those of many faculty in business schools (and statistics departments). Especially many recent PhD graduates and current PhD students are increasingly expert in the analytical methods that underlie the MSiBA program, so the fit between faculty expertise and program needs will likely become even better over time.

I hope this letter is helpful

John Cubur

Sincerely,

Charles

## EXHIBIT VIII BIOGRAPHIES OF SELECTED PARTICIPATING FACULTY

Exhibit XI includes biographies of the following professors:

#### Statistics:

Xinping Cui, Department Chair and Professor James Flegal, Associate Professor Daniel Jeske, Professor Yehua Li, Professor

#### **Business:**

Subramanian (Bala) Balanchander, Professor Alexander Barinov, Assistant Professor Mohsen El Hafsi, Professor Long Gao, Associate Professor Elodie Goodman, Associate Professor Jean Helwege, Professor Iva Kalcheva, Assistant Professor Charles Zhang, Assistant Professor

#### Bala Balachander

Subramanian "Bala" Balachander is Professor and the Albert O. Steffey Chair in Marketing at the School of Business Administration of the University of California, Riverside. Prior to his current position, he was a Professor of Management at Purdue University. Professor Balachander has a Ph. D. in Industrial Administration from Carnegie Mellon University, an MBA from IIM, Calcutta and a B. Tech in Chemical Engineering from IIT, Madras. His research studies competitive marketing strategy, pricing, bundling, sales promotions and market signaling, and uses methods of game theory and structural econometric models. His teaching interests are in pricing, marketing strategy and marketing models. A 2012 study published in the Journal of Product Innovation Management ranked Professor Balachander No. 16 among the world's top innovation management scholars based on articles published in the top marketing journals. Professor Balachander currently teaches MGT 257, Marketing Strategy.

#### Alexander Barinov

Dr. Barinov is an Assistant Professor of Finance at A. Gary Anderson School of Business Administration, University of California Riverside. Prior to joining UCR in 2015, he taught at the University of Georgia. He earned his Ph.D. and his M.S. in Finance from the University of Rochester. He also holds a M.A. degree in Economics from New Economic School (Moscow) and a B.A. in Economics from Lomonosov Moscow State University. Dr. Barinov's work centers

around the idea that firms with high levels of firm-specific uncertainty and option-like equity beat the CAPM when expected aggregate volatility increases, and therefore serve as a hedge against aggregate volatility risk. His work is related to phenomena in the stock market known as the value effect, the small growth anomaly, the new issues puzzle, the idiosyncratic volatility discount and the analyst disagreement effect. Dr. Barinov currently teaches MGT 295G and MGT 252, which focus on investments in the stock market.

## Xinping Cui

Dr. Cui is a Professor of Statistics at the University of California –Riverside, a position she has held since 2014. She joined UCR in 2002, after working as a statistical analyst at Reed Neurological Research Center. Dr. Cui became chair of the Statistics department in 2016. She earned her Ph.D. in biostatistics at UCLA and an M.S. in applied statistics at Bowling Green State University. Dr. Cui's undergraduate degree is in mathematics, which she studied at Nankai University in Tianjin, China. She also has a M.S. degree in math from Nankai University. In addition to receiving grants from the National Institutes of Health to study statistical aspects of health and disease, Dr. Cui has worked with researchers at the UCR Agricultural Experimental Station. She currently teaches STAT 231A, Statistics for Biological Sciences, as well as several undergraduate statistics courses.

#### Mohsen El Hafsi

Mohsen Elhafsi received both Ph.D. and M.S. in 1995 in industrial engineering from the University of Florida. He received a "Qualified Engineer" degree from the Ecole Nationale d'Ingenieurs de Tunis, Tunisia, in 1988. Dr. El Hafsi joined the School of Business at UCR as a tenure-track faculty member in 1997. In 2007, he was awarded a \$10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems.

## James Flegal

Dr. Flegal is an Associate Professor of Statistics at the University of California –Riverside. Professor Flegal received his Ph.D. from the University of Minnesota. Dr. Flegal has worked with researchers at NASA in the organization known as FIELDS, or Fellowships and Internships in Extremely Large Data Sets: A Training and Research Program in Big Data and Visualization. His research focuses on Monte Carlo methods and Markov chains. He currently teaches STAT 206, Statistical Computing.

## Long Gao

Dr. Gao is an Associate Professor of Management in the area of Operations and Supply Chain Management at the University of California –Riverside. He earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. Professor Gao currently teaches MGT 239, Simulation for Business and MGT 207, Operations Management for Competitive Advantage.

#### Elodie Goodman

Dr. Goodman is an Associate Professor in the area of management science in the School of Business. She joined the University of California – Riverside in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d'Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and healthcare payment systems. She currently teaches MGT 201, Quantitative Analysis and MGT 221, Decision-Making Under Uncertainty.

## Jean Helwege

Dr. is a professor in the Finance area of the School of Business at UC Riverside. Before joining the group, she held the J. Henry Fellers Professorship in Business Administration at the University of South Carolina. Her prior experience also includes faculty positions at Penn State, the University of Arizona, and Ohio State University. From 1988 to 1998 she worked in the Federal Reserve System as an economist. She holds a Ph.D. in economics from UCLA and she received a Bachelor of Arts in linguistics from the University of Chicago. Her research interests include corporate bonds, bank regulation, financial distress, initial public offerings and capital structure. She currently teaches MGT 227, Fixed Income.

#### Dan Jeske

Dr. Jeske is a Professor in the Statistics department at the University of California –Riverside, where he has worked since 2003. Prior to joining UCR, Professor Jeske held positions at Rutgers University and Bell Laboratories. He is the editor of *The American Statistician*, and has served on the editorial board of *Applied Stochastic Models in Business and Industry* and *Technometrics*. He earned his Ph.D. and his M.S. degrees in statistics at lowa State University. Dr. Jeske's undergraduate degree is in mathematics and computer science from Austin Peay State University. Dr. Jeske runs the Statistical Collaboratory Consulting Project at UCR, which has

cumulative revenues of over \$1 million. He currently teaches STAT 208, Statistical Data Mining.

#### Ivalina Kalcheva

Dr. Kalcheva is an Assistant Professor of Finance in the School of Business at UCR. She joined the Business department in 2014 after having taught at the University of Arizona from 2007-2014. Professor Kalcheva earned her Ph.D. in Business Administration from the University of Utah. She has an M.B.A. from Saginaw Valley State University and she studied for her B.A. in economics in Bulgaria. Dr. Kalcheva's research focuses on the stock market and trading execution. She has taught MGT 252, Investment and Portfolio Management and MGT 202, Financial Management.

#### Yehua Li

Dr. Li is a Professor of Statistics at the University of California –Riverside. Professor Li joined UCR in 2018 after having taught at Iowa State and the University of Georgia. He received his Ph.D. from Texas A&M University in 2006 and his undergraduate degree in applied math from Tsinghua University in Beijing, China. Dr. Li's research interests are in big data, bootstrapping, large sample theory, measurement error and nonparametric approaches. He has statistical methods for electrical engineers and applied experimental design.

## **Charles Zhang**

Dr. Zhang is an Assistant Professor of Management in the marketing area at the University of California –Riverside. Professor Zhang joined UCR in 2014 after having taught at Boston College. He received his Ph.D. in marketing from the University of Michigan and degrees in statistics from University College, London and Fudan University. Dr. Zhang's research interests are judgment and decision making with an emphasis on numerical judgment and inference. Some of his published work is focused on how the granularity of communicated numbers conveys information that goes beyond the magnitude of the numbers. Professor Zhang currently teaches MGT 233, Marketing Research.



Office of the Dean

900 University Avenue, Anderson Hall, Riverside, CA, 92521

Tel: 951.827.4237 Fax: 951.827.3970 e-mail: yunzeng.wang@ucr.edu web-site: http://soba.ucr.edu

March 23, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**RE:** Master of Arts in Business Analytics

#### Dear Committee Members:

I am writing to endorse the proposed Master of Arts in Business Analytics. This is a well-designed program to meet the strong demand from students who has an analytical background and are interested in professional careers in business administration. The program has the potential to significantly differentiate UCR's Business School and to raise the reputation of the School and the Campus. The program will provide a stream of revenue to help improve faculty and student support.

Like the faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang

Dean



## **College of Natural and Agricultural Sciences Agricultural Experiment Station and Cooperative Extension**

Office of the Dean - 2258D Geology Building Riverside, CA 92521-0127

To: **CNAS Executive Committee** 

Kathryn Uhrich From:

Date: April 12, 2017

RE: Proposal for an Interdepartmental Graduate Program Leading to the Master of

Science in Business Analytics

The Department of Statistics along with faculty of the School of Business and the A. Gary Anderson Graduate School of Management have proposed a valuable degree program that allows students to obtain a MS degree in Business Analytics. The degree program will be offered as a three-quarter 48 units program for graduates of a baccalaureate degree that provides sufficient quantitative background to enable successful completion of the program. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in statistics and business. The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree. All but three courses are existing courses and have been offered in at least one of the last two academic years. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields.

I fully support this proposed Master of Science degree program in Business Analytics.

Page | 58



March 28, 2018

To: Dylan Rodriguez, Chair of the Academic Senate

From: Jerayr Haleblian, School of Business Department Chair

Re: MSiBA

Dear Dylan,

I would like to strongly support the joint effort between the business school and the department of statistics to create a Master of Science in Business Analytics (MSiBA) at UC-Riverside. This program will develop the analytical abilities students and allow them to apply these abilities to business data. A recent trend has emerged in which businesses have access to vast amounts of data. Analyzing such data on customers, competitors, and costs can be used to improve strategy, forecasting, and operations. Programs in Business Analytics are emerging around the country, and are fast becoming the most in demand programs within business school program portfolios.

The UC Riverside School of Business has designed a Business Analytics program that is unique in that it trains its students in both business and statistics by drawing on both the school of Business and Department of Statistics. The resulting program has the potential to offer superior training in appropriate statistical analysis than can typically be offered when programs only reside in the business school.

From the perspective of the business school, we would like to emphasize the following:

- 1. The business school has sufficient resources to offer the classes in this program. Specifically, the proposed curriculum is based on courses we already offer. The only exceptions are two capstone courses (one in statistics and one in business) and a new statistics course. Accordingly, the business school needs to only staff one new course. Moreover, most of the existing courses that MSiBA students will take already have capacity for additional students. Therefore, the business school currently has the resources required to deliver the program with only minimal additional resource requirements.
- 2. The program is rigorous, and as a result with enhance the reputation of the business school. The UCR School of Business is currently ranked among the top 100 business schools in the US, and this program will only help enhance this reputation.
- 3. There is strong demand for business analytics programs across the country, and we fully expect that our program will be in high demand as worldwide businesses continue to move in the direction of increased large data set analyses.

4. The joint set up with the department of statistics gives us a competitive advantage, as we can offer superior data analytic training, which we believe will help sustain the program in the long term.

\_la-y-Halablian

Jerayr Haleblian Department Chair School of Business

## UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY ● DAVIS ● IRVINE ● LOS ANGELES ● MERCED ● RIVERSIDE ● SAN DIEGO ● SAN FRANCISCO



DEPARTMENT OF STATISTICS RIVERSIDE, CALIFORNIA 92521-0138

April 15, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**Dear Committee Members:** 

I am writing in strong support for the proposed inter-departmental Master program in Business Analytics at UCR. Business Analytics has grown out of the need to integrate business and statistical approaches to processing and interpreting business data. It is experiencing a rapid and unplanned growth. The program addresses critical shortage of college graduates trained in business analytics in the industry and government. The proposed program will provide a synergistic approach to real world business problem solving, one that leverages the content in statistics but using case-based focus and hands-on approach. Creating this program will also help differentiate and raise the reputation of UCR's Statistics Department. This self-support program is also expected to generate substantial revenue to help improve the support in students and faculty in Statistics Department.

Our Statistics Department is enthusiastically and fully committed to the establishment and the success of Business Analytics Program at UCR.

Sincerely,

Dr. Xinping Cui

Dinging Cui

Professor and Chair

Department of Statistics

University of California, Riverside



April 10, 2018

## To Whom It May Concern:

I write in support of the proposed MS in Business Analytics. With more, and more varied types of data available, businesses require professionals skilled and trained within this area. More than ever before businesses need managers and leaders who are able to make decisions informed by data. Graduates from this program will be well-prepared either for a transition to a PhD program in business or to transition to a career in the business world. This latter is especially relevant to our region where skills such as these are in short supply. Graduates from such programs elsewhere in the US are highly sought after. The program at UCR will contribute to the reputation of AGSM as a school of innovation in business learning. The proposed program builds on existing expertise within the school and is both rigorous and well-thought out and will provide students with the combination of analytical and technical skills necessary to succeed in this area.

Sincerely,

Shaun Bowler

Dean of the Graduate Division

Stran Benter



May 15, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Ward Beyermann, Chair, Executive Committee College of Natural and Agricultural Science

Re: Campus Review: Proposed Degree Program, Masters of Science in Business

Analytics (MSiBA)

The CNAS Executive Committee discussed the revised proposal for a Masters of Science in Business Analytics (MSiBA) at its May 8, 2018 meeting. The committee feels the concept has merit and supports the proposal.

Yours sincerely,

Ward Beyermann, Chair

**CNAS Executive Committee** 

Ward Beyerm



#### **MEMORANDUM**

**DATE:** October 4, 2018

TO: Dylan Rodriguez, Chair

Riverside Division of Academic Senate

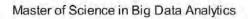
FROM: Jean Helwege, Chair

School of Business Executive Committee

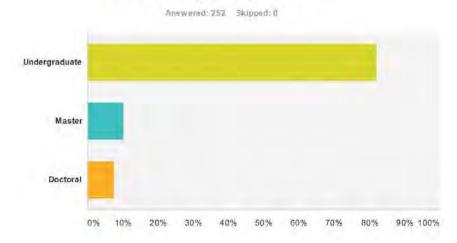
Re: Proposal for a Master of Science in Business Analytics (MSiBA)

The executive committee (EC) of the School of Business met to discuss the proposed MSiBA degree in February 2017. The members of the EC voted by electronic ballot on the proposal and the chair of the EC at the time, Peter Chung, sent an email on March 18 to the EC members indicating that the proposal was approved. For the sake of completeness and symmetry with the EC vote from CNAS, this memo will be added to the proposal to indicate that the School of Business EC is in favor of starting the MSiBA degree program.

# Exhibit XVI November 2013 UCSD Rady School's Market Demand Survey



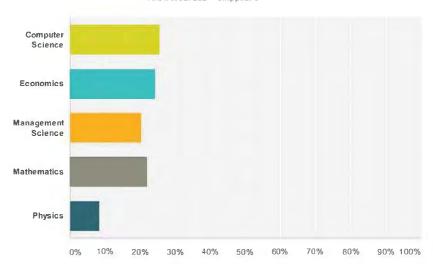
## Q1 What is your degree level?



Answer Choices	Responses	
Undergraduate	82.14%	207
Master	10.32%	26
Doctoral	7.54%	19
otal		252

## Q2 What is your area of study?

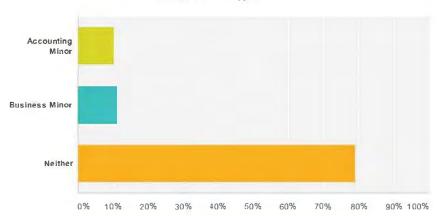
Answered: 252 Skipped: 0



Answer Choices	Responses	
Computer Science	25.40%	64
Economics	24.21%	61
Management Science	20.24%	51
Mathematics	21.83%	55
Physics	8.33%	21
otal		252

## Q3 Are you an accounting or business minor?

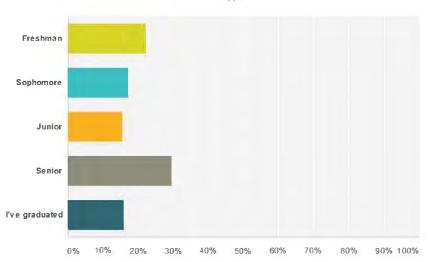




Responses	
26	
28	
199	

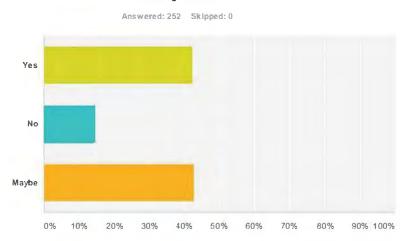
## Q4 What is your class level?

Answered: 252 Skipped: 0



nswer Choices	Responses	
Freshman	22.22%	56
Sophomore	17.06%	43
Junior	15.48%	39
Senior	29.37%	74
I've graduated	15.87%	40
otal		252

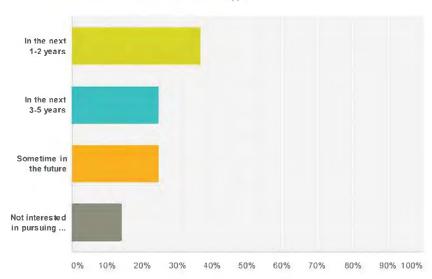
# Q5 Would you be interested in pursuing a Master of Science degree in Big Data Analytics?



Answer Choices	Responses	
Yes	42.46%	107
No	14.68%	37
Maybe	42.86%	108
otal		252

## Q6 When?

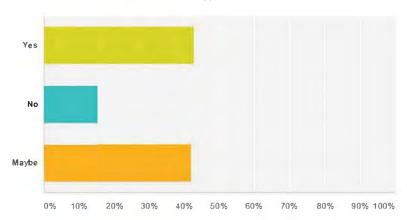
Answered: 252 Skipped: 0



Answer Choices	Responses	
In the next 1-2 years	36.51%	92
In the next 3-5 years	24.60%	62
Sometime in the future	24.60%	62
Not interested in pursuing a Master of Finance degree.	14.29%	36
Fotal Control of the		252

# Q7 Would you be interested in receiving a Master of Science degree in Big Data Analytics from the Rady School of Management?





Answer Choices	Responses	
Yes	42.86%	108
No	15.08%	38
Maybe	42.06%	106
otal		252



#### **MEMORANDUM**

**DATE:** October 24, 2018

**TO:** Jason Stajich, Chair Graduate Council

FROM: Jean Helwege

School of Business

Re: Proposal for a Master of Science Degree in Business Analytics

In May 2018, the Graduate Council sent comments to myself and Xinping Cui on our proposed MSiBA degree. We are pleased to hear that the committee is supportive of the proposal. In this memo, we address the five questions and concerns sent to us by the (then) Grad Council chair, Christiane Weirauch. Our specific answers are listed below.

1) The Council noticed that most of the letters of support were from students and very few from faculty from other institutions. Outside faculty letters are a requirement and CCGA stresses their importance in their review of the proposal.

Response: The updated proposal now includes substantially more letters from professors.

2) The admissions process and criteria were not clearly outlined. Stating that the admissions process will be "similar to that which is currently used for the MBA program" does not seem to provide sufficient information.

<u>Response:</u> Section 1.6 of the proposal now includes greater detail on the admissions process.

3) There was mention of revenue splitting according to teaching load and recruiting success. The concept of splitting by teaching loads seems clear, but the Council wondered how review splitting be recruiting process would work and how the two would be balanced.

Response: The proposal is supported by the professors in Statistics and in Business as well as by faculty in CNAS, but its ultimate implementation depends on resources allocated by the deans of the two schools. Thus, while the proposal suggests a fair split of the workload and revenue, the actual budget decisions are administrative. We propose that the split be based both on the amount of work involved in teaching the students and the respective efforts of the two departments in attracting students. If this self-supporting program is to grow in size enough to be a significant revenue source for UCR, both departments must have the incentive to attract students.

4) The proposal states that student advising will be conducted through faculty-led advising/information sessions. It was not clear to the Council how faculty advisors will be selected/appointed (balance between SoBA and Statistics?) and if this constitutes a significant new workload or not.

<u>Response</u>: The proposal now makes it clear that advising will be done by faculty and staff. The faculty provide advise to groups of students at orientation, at information sessions and by providing information to the graduate staff members, who do individual advising. Given that the faculty would advise in infrequent group sessions, the workload largely falls to the graduate advising staff.

5) Finally, if this is a proposal for a self-supporting program, it is not made clear from the proposal. It should be stated very clearly in the proposal, not the cover email from Prof. Helwege. Financial aspects for self-supporting programs that show how and when the program will become self-supporting should also be part of the proposal – please follow Appendix K, Guidelines for Review of New and Continuing Self-Supporting Graduate Professional Degree Programs.

Response: The proposal now clearly states that the program is self-supporting. The previous version of the proposal included Exhibit III, which has substantial detail on the costs and net revenue. We have amended Exhibit III to make sure that all possible indirect costs of the program are covered in the financial analysis. Even with such conservative estimates and a prediction of a small initial class size, the program is expected to be profitable in year 1. The main reason it will be profitable is that the revenue is very high. The second most important reason is that the costs are quite low because the students are expected to fit into sections of courses that already exist, thereby allowing the existing faculty to teach all the courses in the program.



#### **MEMORANDUM**

**DATE:** October 24, 2018

Katherine Kinney, Chair

Committee on Planning and Budget

Jean Helwege

FROM: School of Business

Re: Proposal for a Master of Science Degree in Business Analytics

In May 2018, the Committe on Planning and Budget (CPB) sent comments to myself and Xinping Cui on our proposed MSiBA degree. In this memo, we address the four issues raised by the (then) committe chair, Christian Shelton. Our specific answers are listed below.

1) The CPB found that it does not follow the proper format or guidelines for self-supporting program proposals, particularly in regard to accounting for indirect costs back to the department, college, and campus. CPB would also recommend some type of market analysis, common on self-supporting program proposals, to help justify the tuition and enrollment numbers.

Response: Exhibit III in the previous version of the proposal included detailed financial analysis of the program. The updated proposal now includes even greater detail and shows that the program will be profitable to the two departments and colleges and the campus. Market analysis is more complete in that we now have letters from professors at other schools that indicate tremendous demand for such programs. Further evidence is included in the form of a survey conducted by UC San Diego in late 2013.

2) CPB had questions about admission into the program, particularly for students whose background is outside of undergraduate business or statistics (for instance, economics, mathematics, or engineering). It is unusual to have separate degree requirements by undergraduate major and this curriculum leaves out students who do not fall into one of the enumerated categories. This may unnecessarily restrict the enrollment.

Response: The program aims to have a reputation as a selective admissions school that provides rigorous training in this very quantitative subject. To do so requires that students have both talent and the relevant background. While there may be some students in computer science or engineering who have taken the appropriate courses in statistics or business prior to applying, most of them will require more time than the nine months that would be spent in this program. We recommend that such students consider the other programs in the Anderson Graduate School of Management. In sum, we disagree that the restriction is unnecessary.

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January 10, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Sandra Kirtland Turner, Acting Chair, Executive Committee

College of Natural and Agricultural Sciences

Re: Campus Review: Proposed Degree Program: 2<sup>nd</sup> Round: Masters of Science in Business Analytics (MSiBA)

The CNAS Executive Committee discussed the revised proposal for creation of a Masters of Science in Business Analytics at its November 20, 2018 meeting. The committee expressed its support for the proposed degree program.



December 11, 2018

To: Dylan Rodriguez

Riverside Division Academic Senate

From: Boris Maciejovsky, Chair

Committee on Diversity & Equal Opportunity

Re: Proposed Degree Program. 2nd Round. Masters of Science in Business

Analytics (MSiBA)

CoDEO would like to request some information on how the proposed program supports the mission of UCR in terms of achieving a diverse student body.



#### **GRADUATE COUNCIL**

February 1, 2019

TO: Dylan Rodriguez, Chair

**Riverside Division** 

FR: Jason Stajich, Chair

Graduate Council

RE: [Campus Review] Proposed Degree Program: 2nd Round: Master of Science in Business Analytics (MSiBA)

The Graduate Council evaluated the proposed Master of Science in Business Analytics October 2018 proposal at their December 13, 2018 meeting.

The Council identified the following areas which had insufficient description or needed improvement:

#### Admissions & standards

Based on the text, it isn't clear whether the admissions to the graduate program requires GRE scores.

"All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE)."

Which test scores will be reviewed for admission (page 6)? The Council needs to know more about the admissions standards. What are the planned GRE and GPA cutoffs or how will scores be used in deciding admissions? Will GMAT be used instead of GRE or will both be used? It is not specified as to how these scores will be used in deciding admissions. Will a holistic review approach be used for admission which incorporates the entire application of the student, GPA, experience, letters and GRE/GMAT tests?

#### Use of resources

How will the program track the statistics versus business students and the associated costs since students can matriculate with either a statistics or business degree? Since the faculty work load and the utilized resources will be different depending on a student's course of study, how will this be tracked so that cost recovery is appropriate? For

example, a high proportion of students end up needing to take the Stats class, to make sure the self-supporting requisite cost recovery to Stats/CNAS occurs, there needs to be a tracking system in place as to how the resources the program uses from each college are tracked and appropriately repaid.

## Advising

The Council feels that staff support is needed for this program. Stating that the drop in MBA student numbers means that current staff is not as busy and will have more time to devote to this program does not appear wise. What happens when MBA numbers increase, and that staff is then needed to advise MBA students again? Since this program will be self-supporting, revenue from the program should be used to pay for the program's own staff.



December 17, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Jiayu Liao

Committee on Library and Information Technology

Jung lin

Re: Campus Review. 2nd Round Masters of Science in Business Analytics MSiBA

The Committee on Library and Information Technology reviewed the 2nd Round Masters of Science in Business Analytics MSiBA proposal at their December 13, 2018 meeting. The committee sees no significant increase on library and IT resources, thus the committee approves the proposal.



#### PLANNING & BUDGET

January 15, 2019

To: Dylan Rodriguez, Chair

Riverside Division

From: Katherine Kinney, Chair Vinney

Committee on Planning and Budget

RE: Master of Science in Business Analytics – revised proposal

The committee on Planning & Budget (P&B) reviewed and discussed the revised proposal and noted that the proposal does not mention indirect costs or return-to-aid. The cost of renting classrooms and giving scholarships is not a fully adequate answer to the questions of indirect cost and return-to-aid. P&B needs clarification about the campus policy on self-supporting programs (SSP) returning funds to the campus before making final comments. Future SSP policies may well apply to this program.



December 21, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Thomas Kramer

Chair, Committee on Physical Resources Planning

Re: Campus Review-Proposed Degree Program: 2nd Round: Masters of Science in

Thomas Warmer

Business Analytics (MSiBA)

The Committee on Physical Resources Planning has reviewed the Proposed Degree Program: 2nd Round: Masters of Science in Business Analytics (MSiBA) and is supportive of the revised program and does not have any further comments.

## **Cherysa P Cortez**

From: Jean Helwege <helwege@ucr.edu> Sent: Thursday, April 19, 2018 10:13 AM

To: Cherysa P Cortez; Xinping Cui; Ana Kafie; Michelle Butler; Dylan Rodríguez

**Subject:** Proposal for a new program in business analytics

**Attachments:** Proposal for a Master of Science in Business Analytics April 2018 v2 letters.pdf

#### Cherysa and Dylan,

The Statistics Department and the Business Department are proposing a new masters of science program in business analytics (MSiBA for short). This will be a self-supporting program with a STEM designation that trains students in statistics and business. The program differs from the existing data science degree (joint between Statistics and BCOE) in that it emphasizes three business topics (marketing, finance and operations) and it does not deal with computer hardware or algorithms.

As you can see from the attached document, we have the approval of the faculty in each department, the approval of their respective ECs, the support of the CNAS and Business deans and the support of the graduate division. We also have letters of support from industry and other universities.

Because the program will be set up as an interdepartmental program, the proposal also includes a set of by-laws for governing the program.

Xinping Cui and I are the proposers of the program. We believe we have completed all the steps necessary before submitting it to the Senate. So at this time we ask the Senate to take up the matter.

Best regards,

Jean Helwege **UC** Riverside jean.helwege@ucr.edu 951-827-4284

# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### **University of California Riverside**

April 2018

#### **Status:**

Approved by School of Business Executive Committee: 3/18/2017

Approved by School of Business Faculty: 5/24/2017

Approved by the Department of Statistics Faculty: 6/8/2017

Approved by the College of Natural and Agricultural Sciences Executive Committee:

3/20/2018

Submitted to Graduate Division: 3/26/2018

Approved by Graduate Council: Approved by UCR Academic Senate:

#### **GRADUATE DEGREE PROGRAM PROPOSAL**

#### **Lead Proposers:**

- The faculty of the School of Business and the A. Gary Anderson Graduate School of Management (AGSM)
- The faculty in the Department of Statistics
- The faculty members in the area of Operations and Supply Chain Management (OSCM)
- The faculty members in the area of Marketing
- The faculty members in the area of Finance
- Jean Helwege
- Xinping Cui

#### **Contact Information:**

Jean Helwege Professor of Finance School of Business Administration University of California Riverside Riverside, CA 92521

Tel: 951.827.4284

Email: jean.helwege@ucr.edu

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# PROPOSAL FOR AN INTERDEPARTMENTAL GRADUATE PROGRAM LEADING TO THE MASTER OF SCIENCE IN BUSINESS ANALYTICS

#### § 1.0 INTRODUCTION

With the availability of more detailed data and the ease with which businesses can use faster and cheaper computers to analyze data, the need for well-trained employees in the area of business analytics (BA) has increased dramatically in recent years. BA overlaps substantially with the area known as data analytics or data science, especially in its emphasis on statistics and software, but it differs in that the focus is on business applications. BA uses data and statistical tools to analyze the potential for increasing revenue, decreasing costs and identifying new profit opportunities.

Many business schools are aware of the demand for graduates of BA programs and see an opportunity to elevate their reputations by offering these degrees. According to Poets & Quants, roughly a third of the top 100 business schools have introduced BA masters programs. While BA can be and is taught at the undergraduate level, by its nature the degree is best structured as a graduate program that allows students to extend and strengthen their knowledge of statistics and business. We expect students entering this program to have completed an undergraduate degree in either a quantitative business major or in statistics. Reflecting this logic, the proposed degree is jointly offered by School of Business and by the Statistics Department.

#### 1.1 Aims and Objectives

The Master of Science in Business Analytics (MSiBA) program will expand the training of students with analytical backgrounds to allow them to apply their skills to business data. Businesses have access to increasingly large amounts of data about their customers, costs, and suppliers and they can use this information to improve operations, increase the yield on marketing programs and understand pricing and financing better, which all are methods of obtaining higher profits. The personnel required to do this work must be well trained in both statistics and business.

The proposed MSiBA offers a rigorous program that allows these students to gain the degree in three quarters. Students will have studied either statistics or a quantitative business discipline as undergraduates and will continue their studies at the master's level by following one of two tracks. The statistics track is for students who majored in one of the business disciplines as undergraduates (finance, operations/supply chain, or marketing) and the business track is for students who majored in statistics as undergraduates. Both tracks culminate in a two-quarter capstone class that applies their understanding of business analytics to a project.

The program will take advantage of existing courses in business and statistics. The main new proposed courses for this degree are a two-quarter sequence of capstone courses that allow students to work on a specific project with data tailored to their individual interests. There is also one new statistics course proposed for the MSiBA degree.

There are several objectives of the program that will benefit UCR, CNAS, and the School of Business. The

<sup>&</sup>lt;sup>1</sup> http://poetsandquants.com/2016/01/18/business-analytics-masters-at-the-top-100-b-schools/. This site includes links to the top schools with programs.

program offers a degree in a fast-growing area that requires rigorous training. By offering this program, the job placements, average salary and training of UCR alumni increase and this enhances UCR's reputation, as well as that of the Statistics Department and School of Business. In addition, the program aims to attract more high quality students. This is especially helpful for School of Business, which currently mainly trains undergraduates who tend to study aspects of business that rely less on the most quantitative business skills. The program will be especially helpful to the Statistics Department in creating a path for undergraduates. Many of the statistics majors at UCR have excellent training in the general area of statistics, but are ill-prepared to use their skills in business. Another goal is financial security for UCR. As a program offering a professional degree, not only will the MSiBA work as a stand-alone program without requiring support from the state, but it is also expected to be a significant source of revenue for UCR each year. Finally, UCR is currently the UC with the largest number of students studying business. The MSiBA program will enhance that standing further, not just in numbers and breadth of choices, but by helping UCR's reputation as the best UC campus for studying business.

#### 1.2 Historical Development of the Field and Departments' Strengths

Before the advent of the personal computer in the 1980s, students could only be trained in the area of statistical computing on a mainframe, where capacity was limited and undergraduates rarely had access. With cheap computing power and improved statistical functions in Excel, the level of statistical analysis of business data has improved at all levels of higher education over the years. Social media and point of sales systems, and other electronic sources of big data have combined with the higher level of statistical training to lower the cost of analyzing data for the purpose of increasing corporate profits. The first college of business in the U.S. to offer a business analytics degree at the undergraduate, Masters and MBA level was UT Austin in 2010. We expect that students will use increasingly sophisticated methods to analyze the wealth of data available. Therefore, the number of students enrolled in BA degree programs is likely to expand.

The faculty in the School of Business and the professors in Statistics are well-positioned to offer the MSiBA degree. Both sets of professors are highly trained in both statistics and business disciplines and they use business analytic tools in their research on a regular basis.

In the School of Business, the majority of professors do empirical research. Since so many ladder-rank professors use statistical techniques to analyze business data in their research, there are many professors in the school who can teach students how to use statistical analysis to answer business questions. And most of the faculty do empirical analysis with fairly large or very large databases and therefore have the skills to lead students into the area of big data. A smaller fraction of the faculty have taught programming as part of their business courses, while others have assigned homework that incorporates statistical analysis that can be carried out in Excel. The finance area implemented a policy in 2016-17 academic year in the Masters of Finance (MFin) program of providing incentives to students to complete statistical analysis in SAS rather than Excel. The faculty are well-positioned to supervise student projects in the proposed capstone courses.

The Department of Statistics has tremendous expertise in teaching statistics and in teaching statistical computing. Their role in the program is less focused on applications of statistical analysis to business and more teaching the fundamental skills need to analyze data with statistical computing packages. The MFin program has already hired faculty in the Statistics department to teach statistical computing (SAS) that is geared to business professionals, so they are also well-positioned to deliver the relevant course material and train students so that they have the statistical computing and analytical skills needed for the capstone courses.

#### 1.3 Timetable

The School of Business and the Department of Statistics are prepared to launch the program in the fall of 2019. We have conservatively projected enrollments at 15 students in the first year and gradually increasing to a projected maximum of 50 students by the fifth year. As a comparison, Arizona State University currently offers a 9-month masters of business analytics degree with 153 students enrolled.

The program requires three new courses, while the remainder of the program uses courses that are already in place. Two of the new courses are capstone courses that will be offered in Winter 2020 and Spring 2020 and the third is a statistics course. These courses have already been submitted by the School of Business and the Department of Statistics for approval by the relevant parties in the shared governance process.

#### 1.4 Relation to Existing Programs and Campus Academic Plan

The program fits the overall strategic plans of UCR, the School of Business and CNAS to increase the university and the schools' presence and reputation. The program helps on a number of fronts: it is more rigorous and technical than some other professional degree programs; it will attract students with backgrounds that are more quantitative and therefore require above average intelligence; the job prospects for students in the program are better than in many other programs, so placement records should help our reputation; and the program can charge a reasonably high tuition to reflect the value-added advantages of this type of education.

The specialized skills taught in the MSiBA program should prepare students well for professional employment. Besides the high demand for business analytics professionals, which should lead to good placements, this program is likely to be recognized by the United State government as a STEM program. Foreign students who graduate from designated STEM programs are allowed to work for extended periods with OPT visas (currently 29 months vs. one year for a regular OPT visa).

The new degree program will rely extensively on existing courses in AGSM and Statistics. This means there will be no immediate need for more faculty and existing faculty can teach the material in existing courses to more students. Students will graduate having taken a common set of classes for most of the program but will be given a chance to apply their skills to a particular area in business, such as marketing, operations, or finance.

Faculty hired in response to growth of the program will help build critical mass in the school, and help to advance the school's research mission. Students admitted to the MSiBA program will be strong quantitatively and will contribute positively to the classroom experience. MSiBA may also draw from the more quantitatively-oriented students in UCR undergraduate programs. If they are successful in completing this program and working in business analytics careers, the program may eventually help draw better students to our existing undergraduate programs in statistics and quantitative business disciplines.

Another advantage of the program is that it should gain in popularity compared to the traditional MBA. Business schools around the country are experiencing declining enrollments in full-time MBA programs. AGSM is no exception to this problem, and thus the number of students in a section is smaller than capacity and there are few electives that are offered more than once a year. By offering marketing, finance and operations courses to students in a growing field, UCR expands its opportunities to use more of its graduate business training capacity.

The program is distinctly different from the existing UCR program in Data Science, which is an online program jointly offered by Statistics and BCOE. By having the Statistics Department involved in both programs, the faculty can monitor the two programs to make sure that one is not cannibalizing the other. The Data Science degree is

designed to focus on the computing and database management. It does not involve strategies to maximize revenue, minimize cost or otherwise improve specific business applications.

#### 1.5 Interrelationships with the Programs of Other Institutions, Market and Competition

A few other UC schools and Cal State universities offer BA programs but most do not. UC Davis and UC San Diego have one year masters degrees. Cal State East Bay has a nine-month program. UCLA will begin its program in Fall 2018. UC Berkeley and UC Irvine have online certificate programs. Cal State LA also has a certificate program but it is so new that no details are listed on its website.

TFE Times ranks business masters of business analytics programs and the only ranked program in California is USC (ranked #1). Outside of California there are several hundred schools that offer BA programs, although the TFE Times list only ranks the top 30 or so. Most programs are for a year of full-time study or less. Our proposal is for a nine-month program that allows students to graduate in spring, which puts them in a good position for the job market. Several programs that go longer than nine months do not have more units than what is proposed for UCR, but instead reduce the course load in some quarters and add one or two courses in the summer. For example, the number of courses in UCSD's business analytics program is the same as the one proposed here except that UCSD has two 1-unit professional development courses. Several nine-month programs are ranked high on the TFE Times list – for example, Arizona State (#5), Southern Methodist University (#18) - and many others are for 10 or 11 months (e.g., #4 Rochester and #6 UT Austin).

In addition, there are many other schools that offer data analytics or computer science programs, but these do not focus on business and are not in direct competition.

#### 1.6 Administration

The interdepartmental program will be administered by two departments, Statistics and Business. Because the program is joint between two departments, the program requires its own set of by-laws. These are included in Exhibit IX. The two departments will have equal control over the program and will split the revenues and costs in proportion to their teaching contributions and recruiting successes. The financial elements of the program are to be determined by the deans of CNAS and Business, with input from the co-directors of the program.

Business and Statistics will establish a joint admissions committee. Admissions will be determined using a process that is similar to that which is currently used for the MBA program. The admissions committee members will collaborate to work on admissions criteria.

The program will be marketed on the Statistics and AGSM websites, through local information sessions, and through promotion to faculty and administration of likely feeder schools. Information about the program will be distributed at MBA forums whenever School of Business decides to participate in such forums for the purpose of MBA recruiting.

Formal student advising will be administered through faculty-led advising/information sessions. Because students are expected to have either an undergraduate statistics or business degree, some separate advising will occur based on previous training. In these situations, students with business degrees will receive advising from the Statistics Department and students with statistics degrees will be advised by AGSM staff.

#### 1.7 Plan for Evaluation

AGSM and Statistics will continuously evaluate the program based on the quality of applicants and matriculated students, curriculum effectiveness relative to learning objectives, placement success, and continuing involvement of program alumni.

Campus policy is to evaluate new programs after three years and routinely thereafter, following established Graduate Program review procedures.

#### § 2.0 PROGRAM

#### 2.1 Undergraduate Preparation for Admission

The chief consideration for acceptance into the MSiBA program is the quantitative background of the applicant and his/her training in a related area. Similar to a master's degree in accounting, applicants are expected to have already received substantial training in the discipline before beginning graduate studies. Specifically, they will have obtained undergraduate degrees in statistics, operations, marketing, or finance. Furthermore, applicants must show a high capacity for learning quantitative skills, which will be evaluated with GRE or GMAT scores and/or transcripts showing high grades in quantitative courses. Students who have weaker statistical training but otherwise show promise are required to take STAT 171 or similar courses before entering the program.

Because of the need to communicate the results of the analysis, such as that completed in the two-quarter capstone class, strong English skills are also required. The admissions committee will make selective use of interviews for foreign students, in addition to standardized tests of English proficiency. Preference will be given to applicants who have worked in industry for two or more years.

To be qualified for admission, an applicant to this program must have completed a Bachelor's degree or its approved equivalent from an accredited institution and attained an undergraduate record that satisfies the standards established by the Graduate Division and University Graduate Council. Applications are accepted for fall term. All applicants are expected to submit scores from the Graduate Management Admissions Test (GMAT) or Graduate Record Exam, General Test (GRE). Applicants whose first language is not English are required to submit acceptable scores from the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) unless they have a degree from an institution where English is the exclusive language of instruction.

Additionally each applicant must submit at least one letter of recommendation. The admissions committee will determine in time whether additional letters are appropriate. All other application requirements are specified in the graduate application or in the General UCR catalog.

#### 2.2 Foreign Language

The program has no foreign language requirement.

#### 2.3 Program of Study

#### 2.3.A Fields of emphasis

The MSiBA core specific field of emphasis is Business Analytics. Within this field, students can do a concentration in either operations, finance or marketing.

#### 2.3. B Plan(s)

**Plan I (Thesis)** will not be an option for the Master of Science Business Analytics program. Given this is a three quarter (9 months) program, a Plan I (Thesis) option will not be feasible for students.

**Plan II (Comprehensive Examination)** will be the format for the MSiBA degree. In addition to the course requirements associated with Plan II set forth by the Graduate Division (i.e, at least 18 units must be in graduate level courses taken at a UC campus), every candidate must take a comprehensive examination. The comprehensive exam will be determined by the faculty involved in teaching the MSiBA students.

#### 2.3. C Unit requirements

The Master of Science in Business Analytics will be offered as a three-quarter program (48 units) for graduates of a baccalaureate degree in a field that provides sufficient quantitative background to enable successful completion of the program.

#### 2.3. D Required and recommended courses

All students in the program are required to take three courses (12 units) that focus on analytical tools for business. In addition, students must take a two-quarter capstone sequence (8 units) in which they complete a project that uses the tools acquired in the area of business analytics. These five courses are required for all students in the program. Another set of four required courses (16 units) is designed to enhance their previous training as undergraduates and these vary with a student's undergraduate major. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in both statistics and business. Students who have double majored are treated as if they majored in statistics as undergraduates. The remaining 12 units (3 courses) are elective courses that allow students to concentrate in a particular area of business. The three elective tracks are marketing, operations and finance. Descriptions of the courses are included in Exhibit I.

#### Required courses for all MSiBA students

- MGT 286A-B Capstone in Business Analytics (2 guarter course) NEW
- MGT 256 Business Analytics for Management
- STAT 208 Statistical Data Mining
- STAT 232 Statistics for Business Analytics NEW

#### Required courses for students with an undergraduate business degree

•	STAT 205	Discrete Data Analysis
•	STAT 206	Statistical Computing
•	MGT 233	Marketing Research

MGT 267 Applied Business Forecasting

#### Required courses for students with an undergraduate statistics degree

MGT 202 Financial Management

MGT 204 Cost and Management Accounting

MGT 207 Operations Management for Competitive Advantage

MGT 209 Marketing Management

#### Electives – Choose a group of three from below

•	MGT 221	Decision Making Under Uncertainty
•	MGT 258	Logistics and Supply Chain Management
•	MGT 239	Simulation for Business

Or

MGT 228 or MGT 257
 Consumer Behavior or Marketing Strategy

MGT 253 Internet MarketingMGT 251 Market Assessment

Or

MGT 252 or MGT 295F
 Investments and Portfolio Management or Empirical Methods in Finance

MGT 232 Derivatives

MGT 244 or MGT 227
 Corporate Risk Management or Fixed Income

All but three courses, MGT 286A-B and STAT 232, are existing courses and have been offered in at least one of the last two academic years. Exhibit I contains a copy of the catalog entries for the existing courses. Given current MBA enrollments, there is sufficient capacity in the existing classes to accommodate the needs of the MSiBA students. Over time, if the programs expand, it may be necessary to offer multiple sections of the courses. Upon approval of the program, the new courses will be offered at least annually and will require staffing. The cluster hire search in business analytics should be sufficient to meet the additional staffing needs in AGSM. The Statistics Department is confident that it currently has the personnel needed to offer new courses required for the program.

#### 2.4 Sample Program (full time)

Below are two sample programs. The first is for a student whose undergraduate training is in statistics and who has chosen to focus on operations. The second is for one whose undergraduate training is in business and has decided to continue with marketing.

#### Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

MGT 256 Business Analytics for Management

MGT 207 Operations Management for Competitive Advantage

MGT 202 Financial Management

STAT 232 Statistics for Business Analytics

#### Quarter 2

MGT 286A Capstone in Business Analytics I

MGT 221 Decision Making Under Uncertainty

MGT 204 Cost and Management Accounting

MGT 209 Marketing Management

#### Quarter 3

MGT 286B Capstone in Business Analytics II

- MGT 239 Simulation for Business
- MGT 258 Logistics and Supply Chain Management
- STAT 208 Statistical Data Mining Methods

#### Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

- STAT 206 Statistical Computing
- STAT 205 Discrete Data Analysis
- MGT 256 Business Analytics for Management
- STAT 232 Statistics for Business Analytics

#### Quarter 2

- MGT 257 Marketing Strategy
- MGT 286A Capstone in Business Analytics I
- MGT 253 Internet Marketing
- MGT 233 Marketing Research

#### Quarter 3

- MGT 286B Capstone in Business Analytics II
- MGT 251 Market Assessment
- MGT 267 Applied Business Forecasting
- STAT 208 Statistical Data Mining Methods

#### 2.5 Certifications

The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree.

#### 2.6 Normative time from matriculation to degree (full-time)

Plan II students should be able to complete the coursework for this program three quarters (9 months from beginning). Required courses and sufficient elective courses will be offered every year. The minimum academic residence in the UC is three quarters, all of which must be spent at the Riverside campus.

Only courses in which grades of B- or above or "S" are received may be counted toward satisfying graduate degree requirements. To continue in good standing and obtain an advanced degree, students must maintain a minimum GPA of 3.00. In addition, students must demonstrate acceptable progress toward their degree objectives. This entails the acceptable completion of all course work and other degree requirements in a timely fashion. Students are considered to be making unacceptable progress and become subject to dismissal

#### when

- 1. They have 12 or more units of "I" grades (incomplete course work) outstanding
- 2. The quarterly GPA falls below 3.00 for two consecutive quarters
- 3. They fail to fulfill program requirements in a timely and satisfactory manner, or
- 4. They have not completed their degree within 2 years for full-time students or within 5 years for part-time students.

#### § 3.0 PROJECTED NEED

#### 3.1 Student Demand for the Program

The demand is large and increasing, as attested below:

- The Wall Street Journal says: "B-school students can't get enough of big data. Neither can recruiters. Interest in specialized, one-year master's programs in business analytics, the discipline of using data to explore and solve business problems, has increased lately, prompting at least five business schools to roll out stand-alone programs in the past two years. The growing interest in analytics comes amid a broader shift in students' ambitions. No longer content with jobs at big financial and consulting firms, the most plum jobs for B-school grads are now in technology or in roles that combine business skills with data acumen, say school administrators."<sup>2</sup>
- Robert Half, an internationally recognized recruiting firm, surveyed CFOs and found that 61
  percent considered business analytics mandatory for some or all of their accounting and finance
  employees.<sup>3</sup>
- Poets & Quants, the MBA-focused website, reports that "business schools have rolled out...[business analytics]...programs, in response to fast-rising demand for workers trained to wrangle and analyze the big data streams that are getting bigger by the second."<sup>4</sup>

Business schools are creating programs in business analytics at a rapid pace, but, as noted earlier, there are few UC schools with such graduate programs and California is the home state of only one of the ranked programs. Poets & Quants lists all of the top 100 business schools with a business analytics programs and the only ones in California are USC and UC San Diego. Since the Rady School program's first class entered in fall 2016, it is not yet established. This strong and increasing nationwide demand for graduates of master's level business analytics programs, combined with an underserved market here in Southern California, offers an opportunity to gain market share and establish a reputation as a leading school in the discipline. Expanding the potential market to the pool of students beyond California to the national arena, and beyond US borders to the international arena, will ensure that we are able to recruit students who are well qualified to stand the rigors of the proposed program. Exhibit II provides information on existing business analytics programs offered in California.

In addition, some programs that are labeled as business analytics programs focus more on data science than on business, which overstates the degree of competition in this space. For example, the program at USC is

<sup>&</sup>lt;sup>2</sup> Big Data Gets Master Treatment at B-Schools: The Wall Street Journal, November 5, 2014. <a href="http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y">http://www.wsj.com/articles/big-data-gets-master-treatment-at-b-schools-1415226291?autologin=y</a>

<sup>&</sup>lt;sup>3</sup> How Business Analytics and Other Key Skills Can Boost Your Career, Robert Half Finance and Accounting Blog, November 23, 2015.

<sup>&</sup>lt;sup>4</sup> Business Analytics Master's At 100 Top B-Schools, Poets & Quants, January 18, 2016.

offered by the Data Science and Operations (DSO) Department at USC. DSO has 27 tenure-track faculty as well as a dozen clinical professors. Among the tenure-track, 10 are listed as belonging to the area of Statistics, while the rest are either in Operations or Information Systems. The flavor of the program reflects the fact that it is only offered by DSO, not the whole school, and that DSO is in part a statistics department. In particular, their one-year program requires six courses that emphasize statistics and three electives chosen from a list that includes seven statistics or database courses, while only two required course are clearly focused on business. The only business elective is Marketing Analytics and there are no courses that allow a student to apply business analytics specifically to finance or operations. That is, the focus is on data science rather than applications to business.

We anticipate that the tuition, fees, and other costs of the program will be comparable to other highly regarded business analytics masters programs. UC San Diego charges \$1,058 per credit unit for their 50 credit degree program, for a total tuition of \$52,900. Our program has two fewer units, but is otherwise similar. We believe it would be prudent to charge slightly less, about \$1000 per credit unit, or \$48,000. USC's program started in 2014 with a tuition set at \$47,000 and is currently at \$51,300. Our intent is to develop the MSiBA as a full-time program and we expect that initial enrollments will be of full-time students, but since many of our MBA classes are at night, the program may attract many part-timers as well. Exhibit III includes financial projections associated with the new program.

Evidence from other programs indicates that students with master's degrees are able to command materially higher compensation than undergraduates. Several sources on the internet suggest starting salaries near \$90,000. Generally, the cost of the degree to the student is normally justified based on anticipated impact on compensation. Applicants seem to agree - more than 300 people applied for 87 spots in Arizona State's 2014 class. Given that there is a ready market for such students, scholarship aid in these programs is quite limited, normally around 10 to 15% of total tuition and fees. Scholarship aid is normally awarded competitively. Students who are not employer-sponsored or state-sponsored and who need funding can generally borrow much of the cost of the degree. Students who take the program on a part-time basis normally do not receive scholarship aid, and usually are working full time and can cover the cost of the program themselves.

#### 3.2 Opportunities for Placement of Graduates

According to McKinsey, there will be a shortage of talent necessary for organizations to take advantage of big data. By 2018, the firm predicts, the US alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the data.<sup>6</sup>

#### 3.3 Importance of the Discipline

Business analytics is highly important to several disciplines, especially operations, marketing and finance. With the recent developments in technology and communications and data-rich environments, business analytics is indispensable for managers in all three areas, as well as for CEOs and CFOs.

#### 3.4 Ways in Which the Program Will Meet the Needs of Society

Graduates of the program will obtain jobs with above average pay that are even higher than the salaries

<sup>&</sup>lt;sup>5</sup> Big Data Gets Master Treatment at B-Schools, Wall Street Journal, November 5, 2014.

<sup>&</sup>lt;sup>6</sup> See www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation.

obtained with other graduate business degrees. The Master of Science in Business Analytics program will help students in the Inland Empire advance their careers by helping to obtain these desirable positions. The program address an unmet need for graduate business education in Southern California in general. The program will contribute to UCR's reputation for leadership in U.S. higher education, to recruiting outstanding faculty, and to the diversification of our sources of revenue, which will help the School of Business Administration and the Department of Statistics maintain financial stability.

Students in the UCR Master of Science in Business Analytics program will acquire the knowledge and tools necessary to effectively manage their organizations. Their understanding of business analytics will help their organizations operate more efficiently. They will understand that effective use of business analytics give businesses a competitive advantage in the marketplace.

#### 3.5 Relationship of the Program to Research and/or Professional Interests of the Faculty

The Master of Science in Business Analytics program fits well with the research strengths of the School of Business and Statistics faculty. Moreover, revenues from the MSiBA program will help to support databases that are important to the research activities of the faculty, will provide competent research assistants, and will help to provide funding for the Ph.D. programs. In addition, by having more students enrolled in graduate level management and statistics courses, faculty are more likely to teach two sections of the same topic. Given the current workload of four sections per year, this makes it more likely that faculty can complete their teaching obligations with two types of courses (two preps), allowing more time for research. This is particularly helpful for younger faculty.

#### § 4.0 FACULTY

The faculty members in the School of Business and the Department of Statistics are quantitatively and qualitatively strong. In particular, the OCSM faculty, several of the quantitative marketing researchers, and the finance faculty are well-suited to delivering successful quantitative business courses. The faculty in Statistics are currently delivering not only statistics courses to their students, but the computer and software classes that are required for business analytics. The strength of the faculty for this program is evident from the number of courses that already exist and the fact that only three new courses would be required at UCR. Exhibit X includes the brief biographies of faculty who will teach in the program.

#### § 5.0 COURSES

In the first quarter of the Master of Science in Business Analytics program, students will be expected to take core courses in the areas that they did not study as undergraduates. In the second quarter, building onto the fundamentals, students are exposed to more advanced coursework and will focus their studies in one of three business disciplines: Operations, Marketing or Finance. They will also begin the design and data collection work related to their two-quarter capstone class. In the third quarter, students are expected to build on what they learned and complete their individual capstone projects. They will also expand into more detailed work in some topics and finish up required courses outside their main area. Descriptions of the courses are included in Exhibit I.

#### § 6.0 RESOURCE REQUIREMENTS

The program is designed to take advantage of existing capacity in the School of Business and CNAS. Both the Statistics and the Business departments have recently expanded their faculty, so no additional resource requirements involve faculty lines. Support staff for recruiting and administering the program are already in place and are expected to have more time given the declining enrollments in MBA programs. The MSiBA program requires two new capstone courses and faculty time required to teach these capstone courses. The two courses can be split between Statistics and Business faculty. In addition, there is one other new course that will be offered by the Statistics faculty. The students in this program are expected to fill out the sections of existing courses, so new sections of the existing courses are not expected until the program is well established, if at all. Therefore only minimal additional classroom space is required. Students are expected to have their own computers. Most software is already provided to students through a UCR site license, but if new software is needed to analyze data the students are expected to purchase it on their own, in the same way that they are expected to purchase their own books. The students can use data that the School of Business already purchases or they can obtain their own data using their own funds. There is no additional equipment needed for the MSiBA program nor are there any new library acquisitions required for it. The program is likely to add greater pressure on parking, but currently many of the Management courses are taught at night when parking is more plentiful. The School of Business is embarking on a mission to offer more Saturday classes, which will also help alleviate parking pressures.

Most of the courses will be taught by School of Business faculty, with the rest being taught by faculty in the Department of Statistics. The split between the two depends on the backgrounds of the students in the program. If there are more students who studied undergraduate business, Statistics Department will have a greater portion of the MSiBA students in their classes. The more statistics undergrads who apply, the more the work for School of Business faculty. The new capstone course will require FTE faculty, which would be from the School of Business and Statistics (one for each quarter course).

The program is self-sufficient, given the existing courses, and does not require state resources. Indeed, as a stand-alone professional program, it is expected to generate positive financial resources after considering all costs, as shown in Exhibit III.

#### § 7.0 GRADUATE STUDENT SUPPORT

The Master of Science in Business Analytic program will offer graduate student support by reserving 10% of the gross fee revenue for student financial aid. As the program grows, the School of Business Development officers will strive to attain donor commitments for scholarships for the Master of Science in Business Analytics graduate students.

In addition to financial aid in the form of tuition reductions, graduate students in the program may serve as readers for undergraduate courses or as research assistants for professors who work on applied statistical research.

#### § 8.0 GOVERNANCE

The program will be directed by an interdepartmental group of faculty that will include all of the faculty in AGSM and all of the faculty housed in Statistics. AGSM will have oversight through its Executive Committee. At the same time, CNAS will have oversight through its Executive Committee. Further oversight will be in place with the creation of a new Advisory Board for the program that includes all ladder-rank faculty from the Department of

Statistics and from the OCSM, Marketing and Finance areas of the School of Business. Executives of Southern California firms and UCR alumni with appropriate expertise will be asked to serve on the board as well.

#### § 9.0 CHANGES IN SENATE REGULATIONS

The Master of Science in Business Analytics program will not require any changes in Senate Regulations at the Divisional level or in the Academic Assembly.

## EXHIBIT I COURSE DESCRIPTIONS

#### **Statistics Courses:**

#### STAT 205 Discrete Data Analysis (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160A, STAT 160B, STAT 160C or equivalents; or consent of instructor. Contingency tables, log-linear models, information theory models, maximum likelihood estimation, goodness of fit, measures of association, computational procedures.

#### STAT 206 Statistical Computing (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 160C or consent of the instructor. Topics include statistical programming, simulation studies, smoothing and density estimation, generating random variables, optimization, Monte Carlo methods, Bootstrap, permutation methods, cross-validation.

#### STAT 208 Statistical Data Mining Methods (4)

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): STAT 201A, STAT 201B, STAT 202A or equivalents; or consent of the instructor. Covers principal data-mining methodologies and applications. Includes Bayes and LDA classifiers, logistic regression and neural network classifiers, support vector classifiers, classification trees, predictive modeling, ridge and lasso regressions, k-mean and Dendogram clustering methods, business analytics and mining association rules. Features SAS and R programming language.

#### STAT 232 Statistics for Business Analytics (4) NEW

Lecture, 3 hours; discussion, 1 hour. Prerequisite(s): MATH 023, 100B or equivalent, or consent of the instructor. Covers analysis of variance, multiple comparisons, simple and multiple linear regression, nonparametric statistics, and categorical data with applications in business.

#### MGT 233 Marketing Research (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 209; or consent of instructor. Examines how marketing-related data is gathered from individuals and organizations. Explores the importance of integrating problem formulation, research design, questionnaire construction, and sampling so as to yield the most valuable information. Also studies the proper use of statistical methods and the use of computers for data analysis.

#### MGT 267 Applied Business Forecasting (4)

Seminar, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 201 or equivalent. Provides experience in developing forecasting models and applying them to problems in marketing, production, inventory management, business economics, and other fields. Discusses issues in data acquisition, data analysis, modeling of relations between variables, trend analysis, and seasonal forecasting. Uses case studies and applications from a variety of management areas.

#### **Core Management Courses:**

#### MGT 202 Financial Management (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): graduate standing or consent of instructor; MGT 201 (may be taken previously or concurrently), MGT 211 (may be taken previously or concurrently) or equivalents. Provides a foundation in theories of finance. Topics include time

value of money, security valuation, financial institutions, theories of risk measurements, managing a firm's investment decisions, capital structure, and sources of financing for a firm.

#### MGT 204 Cost and Management Accounting (4)

Lecture, 3 hours; outside projects, 3 hours. Prerequisite(s): MGT 211 or equivalent. A study of accounting information for managerial planning and control. Topics include managerial applications for product costing, budgeting, and performance evaluation; accounting techniques for modern manufacturing systems; activity-based accounting and cost management; international cost accounting systems; and the behavioral implications of accounting information.

#### MGT 207 Operations Management for Competitive Advantage (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours per week. Prerequisite(s): MGT 201, spreadsheet skills. Focuses on managing the activities involved directly in the creation of products and services, such as design, production, and distribution. Provides managers with the skills and tools to analyze, optimize, and improve production processes for competitive advantage. Explores issues through lectures, cases, and videos pertaining to various industries.

#### MGT 209 Marketing Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 403 or equivalent. Analyzes the marketing process, the environment within which it operates, institutions involved, and the functions performed. Examines the relationships and trends in a market-based economic system. Develops concepts and terms applied to marketing decisions from the perspective of a manager.

#### **Business Analytics Courses:**

#### MGT 256 Business Analytics for Management (4)

Lecture, 3 hours; written work, 1 hour; extra reading, 1 hour; practicum, 1 hour. Prerequisite(s): MGT 201 or consent of instructor. Provides the fundamental concepts and tools needed to understand the emerging role of business analytics in organizations and apply basic business analytics tools in a spreadsheet Management / 332 environment. Makes extensive use of data, statistical and quantitative analysis, exploratory and predictive models, and fact-based management to drive decisions and actions.

#### MGT 286A Capstone in Business Analytics I (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will propose a topic of inquiry that will use a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical techniques used to answer questions related to business operations and profitability.

#### MGT 286B Capstone in Business Analytics II (4) NEW

Lecture, 3 hours; project, 1 hour. Pre-requisites: STAT 208, MGT 256; MGT 286A or consent of the instructor. This course uses the skills and knowledge developed in the study of business analytics to complete an individual study of a business project related to the areas of operations, marketing or finance. Students will work on a project that was initiated in MGT 286A that uses a quantitative approach to analyzing an issue in business. Topics covered include examples of applications in business analytics, data sources and common statistical

techniques used to answer questions related to business operations and profitability.

#### **Operations Electives Courses:**

#### MGT 221 Decision Making Under Uncertainty (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Introduces basic tools for using data to make informed managerial decisions under uncertainty. Addresses modeling, performance evaluation, and optimization of systems with uncertain parameters. Topics include Markov chains, Markov decision processes, and probabilistic linear and dynamic programming. Applications are drawn from operations, finance, marketing, and other management fields.

#### MGT 239 Simulation for Business (4)

Lecture, 3 hours; outside projects and extra reading, 3 hours. Prerequisite(s): MGT 201, MGT 205. Introduces computer simulation as a tool for analyzing complex decision problems. Analyzes and discusses the theory and practice of modeling through simulation. Topics include modeling uncertainty and collecting input data, basic simulation principles, Monte Carlo simulation techniques, model verification and validation, and analysis of simulation output. Examines applications in manufacturing, finance, health services, and public policy.

#### MGT 258 Logistics and Supply Chain Management (4)

Lecture, 3 hours; individual study, 3 hours. Prerequisite(s): MGT 207 or consent of instructor. Studies the integration of value-creating elements in supply, procurement, manufacturing, distribution, and logistics processes, using information technologies as a main enabler. Topics include distribution networks, demand management, sourcing, transportation, pricing, supply chain coordination, information technology, and e-business.

#### **Marketing Electives Courses:**

#### MGT 228 Consumer Behavior (4)

Lecture, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. Analyzes why people buy and examines purchase decision processes and outcomes. Studies current models of consumer behavior. Topics include brand equity, customer delight, global marketing, behavior modification, and strategic market analysis.

#### MGT 251 Market Assessment (4)

Lecture, 3 hours; outside project, 3 hours. Prerequisite(s): MGT 209. Examines advanced topics in marketing, with emphasis on quantitative tools to aid marketing decision making. Topics include demand and market-share forecasting, conjoint analysis, market segmentation and cluster analysis, brand positioning and competitive market structures, and assessing market response to price, advertising, promotion, distribution, and sales force.

#### MGT 253 Internet Marketing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 209 or consent of instructor. Examines the role of the Internet in an organization's overall marketing framework. Discusses marketing applications of personalization, traffic generation, online search, community, online experience, and other current Internetenabled marketing techniques. Emphasizes Internet retailing.

#### MGT 257 Marketing Strategy (4)

Seminar, 3 hours; consultation, 1 hour. Prerequisite(s): MGT 209 or consent of instructor. A framework is developed for strategic marketing planning. Topics emphasized include market audits and futures research, product-market identification, product portfolio balancing, target market strategy, and integrated marketing program planning. Relies heavily on an extensive computer-based market simulation.

#### Finance Electives Courses:

#### MGT 227 Fixed Income (4)

Lecture, 3 hours; extra reading, 1.5 hours; outside projects, 1.5 hours. Prerequisite(s): MGT 201. Covers analytical techniques related to fixed-income securities. Includes basic analytical tools in fixed-income markets. Topics include relative pricing of fixed-income securities, yield-curve estimation, securities with embedded options, and trading strategies. Utilizes interest rates swaps, mortgage-backed securities, and credit derivatives.

#### MGT 232 Derivatives and Asset Pricing (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Explores the pricing of derivatives-based securities. Covers various topics in derivatives markets. Introduces pricing techniques for forwards, futures, options, swaps, and other derivatives. Utilizes empirical data and financial modeling.

#### MGT 244 Corporate Risk Management (4)

Lecture, 3 hours; written case analyses and reports, 3 hours. Prerequisite(s): MGT 202. Provides an overview of derivative financial instruments. Focuses on the use of derivatives to manage risk in a corporate setting. Utilizes the case-method to develop strategies and policies for managing the risk exposure of an enterprise, as well as to assess the relations between risk management and value creation.

#### MGT 252 Investments and Portfolio Management (4)

Seminar, 3 hours; outside research, 3 hours. Prerequisite(s): MGT 202. Discusses standard asset pricing models, portfolio theory, and empirical uses of securities data. Addresses pricing in the capital markets and empirical issues in testing asset pricing models. Other topics include risk-adjusted portfolio performance, term structure, bond pricing, and bond portfolio management.

#### MGT 295F Empirical Methods in Finance (4)

Seminar, 3 hours; individual study, 3 hours. Prerequisite(s): ECON 205A or equivalent or consent of instructor; doctoral standing in Management or consent of instructor. Covers econometric approaches to analyzing common problems encountered when conducting empirical research. Focuses on hypothesis testing, specification tests, general methods of moments estimation, the capital asset pricing model, multifactor asset pricing models, event studies, operating performance studies, simultaneous equations models, and endogeneity issues. Demonstrates programming in SAS and/or Gauss.

## EXHIBIT II SCHOOLS THAT OFFER BUSINESS ANALYTICS PROGRAMS IN CALIFORNIA

2017 TFE T	imes
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University	Ranking	Location	Program	Length	Tuition
UCLA	Begins Fall 2018	Los Angeles	M.S. in Business Analytics	13 months	\$62,579
USC	1	Los Angeles	M. S. in Business Analytics	18 months	\$58,674
UC San Diego	unranked	San Diego	M. S. in Business Analytics	12 months	\$52,900
UC Davis	unranked	Davis	M. S. in Business Analytics	12 months	\$50,729
Cal State East Bay	unranked	Hayward	M. S. in Business Analytics	9 months	\$26,595
Cal State LA	certificate	Los Angeles	<b>Business Analytics Certificate</b>	9 units	\$6,300
<b>UC Berkeley Extension</b>	certificate	online	Predictive Analytics Certificate	10 units	\$4,000
<b>UC Irvine Extension</b>	certificate	online	<b>Business Analytics Certificate</b>	11 units	\$3,985
Santa Clara University	unranked	Santa Clara	M.S. Business Analytics	15 months	\$55,076

### EXHIBIT III FINANCIAL PROJECTION

	2019-20	2020-2021	2021-2022	Steady State
Revenues:				
Number of students	15	20	30	50
Total tuition fees (\$48,000 per student)	720,000	960,000	1,440,000	2,400,000
Scholarships	72,000	96,000	144,000	240,000
Total new revenues	648,000	864,000	1,296,000	2,160,000
Expenses:				
Faculty:				
Additional faculty per capstone section	150,000	150,000	150,000	150,000
Number of capstone sections per year	2	2	2	4
Additional faculty for other courses	50,000	50,000	50,000	100,000
Cost of additional faculty	350,000	350,000	350,000	700,000
Additional staff	100,000	100,000	100,000	200,000
Additional expenses related to classroom				
use (rent, maintenance, etc.)	30,000	30,000	30,000	60,000
Marketing and recruiting	100,000	100,000	100,000	100,000
Total new costs	580,000	580,000	580,000	1,060,000
Net new cash flow: <sup>7</sup>	68,000	284,000	716,000	1,100,000

<sup>&</sup>lt;sup>7</sup> Assumes new sections of existing courses will not be needed because business analytics students will fill remaining seats in these courses. These include the following STAT and MGT courses (with recent excess classroom capacity noted): STAT 205 (12 of 36 seats in Winter 2017); STAT 206 (11of 30 seats in Fall 2017); STAT 208 (12 of 30 seats in Spring 2017); MGT 202 Financial Management (offered in two quarters each year; 14 of 65 seats and 24 of 70 seats for sections 1 and 2, respectively, in Spring 2017 and 14 of 36 seats in Fall 2017); MGT 203 Economics for Management (1 of 74 seats and all 36 seats for sections 1 and 2, respectively, in Winter 2017); MGT 204 Cost and Management Accounting (29 of 65 seats in Fall 2017); MGT 207 Operations Management for Competitive Advantage (5 of 65 seats and 23 of 70 seats for sections 1 and 2, respectively, in Spring 2017); MGT 209 Marketing Management (6 of 77 seats and 4 of 35 seats for sections 1 and 2, respectively, in Winter 2017); MGT 221 Decision Making Under Uncertainty (all 30 seats filled in Fall 2017 but can be expanded to a larger room); MGT 227 Fixed Income (40 of 75 seats in Spring 2017); MGT 228 Consumer Behavior (8 of 60 seats in Fall 2017); MGT 232 Derivatives and Asset Pricing (7 of 36 seats in Winter 2017); MGT 233 Marketing Research (2 of 36 seats in Winter 2017); MGT 239 Simulation for Business (17 of 36 seats in Spring 2017); MGT 244 Corporate Risk Management (29 of 70 seats in Winter 2017); MGT 251 Market Assessment (6 of 36 seats remain); MGT 252 Investments and Portfolio Management (53 of 70 seats in Spring 2017); MGT 253 Internet Marketing (12 of 36 seats in Spring 2017); MGT 256 Business Analytics for Management (27 of 36 seats in Spring 2017); MGT 257 Marketing Strategy (4); MGT 258 Logistics and Supply Chain Management (10 of 36 seats in Winter 2017); MGT 267 Applied Business Forecasting (24 of 36 in Winter 2017); and MGT 295F Empirical Methods in Finance (1 of 16 seats in Winter 2017)

## EXHIBIT IV COURSE SCHEDULE AND COURSES

#### Sample Program I (student has a B.S. in Statistics)

#### Quarter 1

•	MGT 256	Business Analytics for Management
•	MGT 207	Operations Management for Competitive Advantage
•	MGT 202	Financial Management
•	STAT 232	Statistics for Business Analytics

#### Quarter 2

•	MGT 286A	Capstone in Business Analytics I
•	MGT 221	Decision Making Under Uncertainty
•	MGT 209	Marketing Management
•	MGT 204	Cost and Management Accounting

#### Quarter 3

•	MGT 286B	Capstone in Business Analytics II
•	MGT 239	Simulation for Business
•	MGT 258	Logistics and Supply Chain Management
•	STAT 208	Statistical Data Mining Methods

#### Sample Program II (Student has a B.S. or B.A. in Business)

#### Quarter 1

• STAT 206 Statistical Computing

• STAT 205 Discrete Data Analysis

• MGT 256 Business Analytics for Management

• STAT 232 Statistics for Business Analytics

#### Quarter 2

• MGT 257 Marketing Strategy

MGT 286A Capstone in Business Analytics I

MGT 253 Internet Marketing

MGT 233 Marketing Research

#### Quarter 3

MGT 286B Capstone in Business Analytics II

• MGT 251 Market Assessment

• STAT 208 Statistical Data Mining Methods

MGT 267 Applied Business Forecasting

#### **EXHIBIT V**

#### ACADEMIC DEGREE PROGRAM PROPOSALS: INFORMATION REQUIRED BY CPEC

#### 1. Name of Program:

Master in Business Analytics

#### 2. Campus:

University of California Riverside

#### 3. Degree/Certificate:

Master's Degree

4. CIP Classification: (to be completed by the Office of the President)

#### 5. Date to be started:

September 1, 2018

6. If modification of existing program, identify that program & explain changes.

Not Applicable.

### 7. Purpose (academic or professional training) and distinctive features (how does this program differ from others, if any, in California?

#### **Program Differentiation**

There is a large and increasing demand and professional need for specialized masters programs in Business Analytics. Our program is designed to extend the training of students who have already shown an aptitude for quantitative analysis and expands their skill set to sophisticated analytics in operations, marketing and finance. This makes the program focused on the business applications of statistics and quantitative analysis rather than the tools for handling large amounts of data, which is in contrast to the program at UC Davis or the online Data Science degree offered by UCR. An increasing number of schools are offering masters level programs in business analytics, but the only ranked program in our area is that offered by the University of Southern California. Their program is much too small to serve the demands of Southern California and it is tilted towards data science rather than business. UCR will be unique in the UC system in offering a nine month Master of Business Analytics master's degree and will be one of only three UC universities to offer the degree. The program is also unique in that it is joint between Statistics and Business, which ensures rigorous quantitative training while ascertaining that the program coursework differ from the curriculum in a data science program.

#### 8. Type(s) of students to be served:

The Master in Business Analytics will be offered as a 9-month program (48 units) for graduates of a baccalaureate degree in either statistics or a quantitative business discipline. The program will extend the training of students along two tracks so that both sets of students will have similar skill sets by the end of the program.

#### 9. If program is not in current campus academic plan give reasons for proposing program now:

Computing power and sophistication of software products has evolved to such a degree that there is now an entire new field combining business acumen with statistical analysis. Traditionally, students have focused on business with limited ability to analyze data or have focused on data analytics without much knowledge of its application to business. The demand for this degree is fairly new and UCR would be at the forefront of schools offering the degree. In addition, the regional market is underserved and this program will be an immediate source of net revenue.

#### 10. If program requires approval of licensure board, what is the status of such approval? Not Applicable

#### 11. Please list special features of the program:

The program has two tracks serving two types of students, depending on their undergraduate studies. This allows all graduates of the program to reach the same level of expertise in business analytics by graduation.

#### 12. List all courses required:

The following four courses are required courses for all MSiBA students: MGT 286A-B (Capstone in Business Analytics, a 2 quarter sequence), MGT 256 (Business Analytics for Management), STAT 208 (Statistical Data Mining Methods) and STAT 232 (Statistics for Business Analytics). In addition, students with an undergraduate business degree are required to take STAT 205 (Discrete Data Analysis), STAT 206 (Statistical Computing), MGT 233 (Marketing Research) and MGT 267 (Applied Business Forecasting). Required courses for students with an undergraduate statistics degree are MGT 202 (Financial Management), MGT 204 (Cost and Management Accounting), MGT 207 (Operations Management for Competitive Advantage) and MGT 209 (Marketing Management).

In addition, students are required to take three electives that form a concentration. The electives must be a group of three courses in either operations, marketing or finance.

#### 15. List any related program offered by the proposing institution and explain relationship.

We anticipate that the program will help us fill empty seats in the more technical courses offered in the existing MBA program.

#### 16. Summarize employment prospects for graduates of the proposed program.

The program will educate individuals for employment in all types of businesses that collect and organize data for the purpose of maximizing profits. These include large industrial firms, financial services firms and consulting businesses. The experience of our faculty with other programs is that opportunities for professional employment are excellent and that it is possible to develop a virtuous cycle where recent graduates who are placed become ambassadors for the program, helping to place subsequent graduates.

#### 17. Give estimated enrollment for the first 5 years and state basis for estimate.

We project 15 students in the first year, increasing each year to reach 50 students in about five years.

# 18. Give estimates of the additional cost of the program by year in each of the following categories: FTE Faculty, Library Acquisitions, Computing, Other Facilities, Equipment. Provide brief explanation of any of the costs where necessary.

Exhibit III contains our financial projections. Library Acquisitions, Computing, Facilities and Equipment are considered to be "in-direct costs" and are allocated across all graduate programs and the undergraduate program based on the projected student credit hours in each program. The projected budget uses the current 90% undergraduate student credit hours, with the remaining 10% graduate student credit hours allocated over the individual graduate program. An increase in faculty FTE is shown by the increase in costs allocated to the Business School or Statistics Faculty. There will be only incremental facilities cost as we will use available capacity in existing classrooms, including statistical computing rooms. Over time as the program expands we anticipate having more students and likely a few more sections of that require more classroom space. The incremental rent, equipment and other elements of classroom space are included in the budget. We do not have specific equipment needs for the MSiBA program. Direct costs for the program include marketing and recruiting costs, and additional support staff, and financial aid at 10% of gross revenue.

#### 19. How and by what agencies will the program be evaluated.

An initial campus level review will occur after 3 years and normal campus-level reviews will occur periodically thereafter

# EXHIBIT VI BYLAWS FOR THE INTERDEPARTMENTAL MASTERS DEGREE PROGRAM IN BUSINESS ANALYTICS

#### University of California, Riverside

Masters of Science Degree in Business Analytics (MSiBA) Program Faculty Approval Date: _	
Graduate Council Approval Date:	

#### **Article I. Objective**

The mission of the Master's of Science in Business Analytics (MSiBA) program is to deliver graduate level courses that will lead to the awarding of a M.S degree that combines business education with training in statistical analysis. This degree program shall be operated in conformance with the rules and procedures of the Graduate Division of the Riverside Campus of University of California. The expectation is that graduates from this program will assume positions in leading companies that have resources to carry out detailed analyses of marketing, operations, and financial data. To achieve this objective, a combination of rigorous coursework in both statistics and the technical areas of business (operations, marketing and finance) will produce students who are capable of analyzing datasets in ways that will enhance company profits.

As an interdepartmental program, the MSiBA program will involve faculty from Statistics and from Business. If in the future, the School of Business were to separate into more than one department the program will involve Statistics and whichever departments house faculty in operations, marketing and finance.

#### **Article II. Degree Offered by the Program**

The program offers the Master of Science (M.S.) degree (comprehensive examination Plan I).

#### **Article III. Membership**

#### A. Qualifications for Program Faculty Membership

The program faculty shall consist of persons at the University of California, Riverside, who are ladder-rank faculty in the School of Business and all ladder-rank faculty in the Statistics Department. Other faculty members may teach courses that are required for obtaining the degree, but the administration of the program will be conducted by the above-mentioned faculty.

All program faculty members will have the same full rights and privileges regarding the governance of the program, with the exception of the two Graduate Program Co-Directors. One Co-Director will belong to the School of Business and one from the Department of Statistics. The Co-Director from the School of Business shall be appointed by the school's Executive Committee (EC).

#### **Article IV. Organization and Administration**

The administration of the program and its activities will be supervised by the Co-Directors.

#### A. Program Co-Directors

The Co-Directors are two faculty members; one from the School of Business and one from Statistics. The director from the School of Business must belong to one of the following areas: Finance, SCOM, or Marketing. The Co-Directors are responsible for the overall organization and leadership of the program. The Co-Directors shall serve as the chief officers and spokespersons for the program and shall call and preside over meetings of the program faculty. The Co-Director from the School of Business represents the program at the Business School Dean's meetings while the Co-Director from Statistics represents the program at the CNAS Dean's meetings.

The appointment of the Co-Directors shall be in accordance with the regulations of the UCR Graduate Council. The Co-Directors will be appointed by the Chancellor for a term of three years, upon the recommendation of the Dean of the Graduate Division and the Deans of CNAS and the School of Business. Each respective school's EC shall solicit the names of nominees for a new Co-Director. The Graduate Dean, in consultation with the respective Deans, will forward his/her recommendation to the Chancellor, who makes the appointment.

#### **Article V. Committees**

#### A. Admissions and Recruitment Committee

The members of the Admissions Committee will be selected by the Co-Directors on an annual basis. All members of the Admissions and Recruitment Committee must be program faculty who are AGSM or Statistics Department faculty members. The Admissions and Recruitment Committee shall consist of

- The Graduate Program Co-Directors, who supervise the committee
- Four program faculty that represent as many different major field areas in the program as possible. The functions of this committee shall include admission of students to the program and recommendations for their financial support. Admissions decisions are made by the Committee with input from the program faculty. The Committee will also be responsible for recruitment strategies, organization of prospective student visits to campus, and appropriate updating of the program website and print brochures.

#### **Article VI. Meetings**

At least one annual meeting of the program faculty must be held in the Fall at the beginning of the academic year. Other meetings may be called as frequently and for such purposes as deemed desirable by the Graduate Program Co-Directors. Additional meetings can be scheduled upon written petition by five or more program faculty members (sent to the Co-Directors). Meetings will be conducted according to Robert's Rules of Order. Minutes of the meetings shall be kept by the AGSM or CNAS staff and shall be distributed to all program faculty within ten days of the meeting.

#### **Article VII. Quorum**

A quorum consists of 50% of the eligible program faculty. Passage of motions shall require a simple majority of the MSiBA program members who are present at the meeting. Voting may also be done by electronic ballot.

#### **Article VIII. Amendments**

Amendments and revisions to the bylaws may be proposed by either the AGSM faculty or the Statistics Department Faculty by petition of 20% or more of the faculty in either department. Proposed amendments shall be either discussed at a meeting which satisfies quorum requirements or distributed by electronic mail to the program faculty members at least one week before distribution of the relevant ballot. Passage of an amendment to the bylaws will require at least a majority of those voting by electronic mail. All amendments and revisions must be submitted to the UCR Graduate Council for review and approval.

# EXHIBIT VII LETTERS OF SUPPORT FOR THE PROPOSED MASTERS IN BUSINESS ANALYTICS PROGRAM (MSiBA)

Exhibit VII includes letters of support from the following individuals:

Professor Sanjiv Das, Co-Director Masters of Business Analytics Program, Santa Clara University

Ms. Payal Shah, UCR Alumna, Ph.D. Statistics

Mr. Jesse Cota, UCR Alumnus, B.A. Business Economics

Mr. Minh Ly, UCR Alumnus, B.S. Statistics

Ms. Tricia Haderlie, School of Business Career Development Center Advisory Board member

Professor Karsten Hansen, Professor of Marketing, UC San Diego

Mr. Jefferson Hammann, Walmart



Ocotober 21, 2017.

To: Professor Jean Helwege

Re: UCR Business Analytics Masters Program (MSiBA)

I am writing in support of your MS in Business Analytics proposal. I believe that with less than an additional year of coursework, your undergraduate students with a grounding in subjects such as math, statistics, quantitative business, engineering, etc., would be able to rotate into analytics and graduate with a Masters degree with sufficient training to be employed as entry-level hires in the vast array of Analytics jobs that remain unfilled today. In short, the basic proposition of the degree is well thought out, based on market demand, and satisfies a need in the job market.

I am the William and Janice Terry Professor of Finance and Data Science at Santa Clara University, and previously held appointments as Associate Professor at Harvard and Berkeley. My fields are quantitative finance and theoretical and applied computer science. I work at the interface of both fields, and supervise undergraduate and graduate students in both areas. My CV is available at <a href="http://srdas.github.io/">http://srdas.github.io/</a>. I am also a member of the advisory board of MIT's Consortium for Risk Analytics, and a Senior Fellow at the FDIC. I am the founder and co-director of the MS in Business Analytics (MSBA) program at SCU and we are based in the heart of Silicon Valley (Santa Clara county is Silicon Valley), so I am keenly aware of the growing demand for analytics skills.

I believe the goals of the program are differentiated well from other offerings. The key idea is that this program is not meant to produce more "data scientists" — a programmer with data and statistics skills. Data scientists play more technical roles at the intersection of computer science and statistics, but do not have business perspective. There is a greater proportional shortage of people who can ideate business propositions from data. Such people need a solid grounding in economics, finance, marketing, supply chains, where knowledge of business paradigms is key. I believe that the MSiBA will fill a huge gap for "business analysts" in the job market, as opposed to the gap for data scientists. My own estimation is that there are many more jobs for data scientists, which are being filled by software engineers with some coursework in handling data using machine learning. But, even though there are fewer jobs for business analysts, the percentage of these roles being filled is much smaller. This is the niche you are trying to fill and

it is a big opportunity. My own program at SCU is aimed at exactly the same market. We graduated our first cohort and placed them all, and this year we have tripled the size of the program for the cohort beginning in Fall 2017.

When we began our MSBA program, the intention was identical to yours, i.e., track our undergrads into it and enable them to continue on for a value-add degree. We were surprised and overwhelmed by the external demand for the degree, which led us to open it up to an external market. I suspect you may end up doing the same. As many of the major tech names begin to build and extend campuses in the LA region, you will find a natural home for some of your graduates, but the demand from startups is also high, especially for people who are not just programmers, but business thinkers as well. I think the courses you have will serve the students well, and the only course I see that would be useful to add on is a course on machine learning, which is an essential part of the training that analytics students must have.

Your proposal envisages a small initial cohort of 15 students. Your program will change rapidly as you learn from doing with feedback from employers, but I would also give thought to how to scale the program as you will likely be pleasantly surprised by the demand for it. There will be a need for faculty to rotate into teaching a skill set that extends beyond what is currently the provenance of business school education. This is a good challenge to have, and your program will add a new energy to both, your undergraduate and graduate programs. I believe it is a well thought out proposal, and I heartily support it.

Sincerely,

Sanjiv R. Das | William and Janice Terry Professor of Finance | Leavey School of Business | Santa Clara University |Tel: (408)-554-2776 | srdas@scu.edu | <a href="http://srdas.github.io/">http://srdas.github.io/</a>

November 1, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

Dear Dean Uhrich,

I am writing to offer my support of the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Math and Statistics, M.S. in Statistics, and a PhD in Applied Statistics. Since graduating with my PhD, I have spent the last eight plus years in a career building statistical models to use as a tool in making important business decisions. I currently work in the Consumer Modeling and Analytics team at Bank of America as Senior Vice President, Quantitative Operations Manager.

I believe this program is helpful in preparing students for similar careers. Many people who have extensive training in statistics have little formal training in business. Time must be invested to learn this on the job, while graduates of this program would start the job with more of the relevant skills and training required on the business front as well.

In particular, the Statistics UG track with the finance concentration would really help someone with a strong statistical background who wants to work in a quantitative realm within the financial industry be better prepared. Hence, I truly believe this program will be a great resource and want for students with similar career interests.

Sincerely,

Payal Shah

Pshah1122@gmail.com

(951) 237-3517

Jesse Cota Senior Financial Analyst Agua Caliente Band of Cahuilla Indians jesse@cota.email (760) 625-4843

November 20, 2017

University of California Riverside Riverside, CA 92521

Honorable Members and Chairs of the different relevant departments:

As a member of the Inland Empire community and an alumnus of UCR, I am honored and enthusiastic in making a case for the one-year Master of Science in Business Analytics (MSiBA) program. I graduated in 2010 with a B.A. degree in Business Economics. My theoretical background was very well cemented, but I found myself lacking the practical skills in business analytics needed to be competitive in the labor market. It was only after a few years in the workforce and after having completed a master's degree from the School of Advanced International Studies at Johns Hopkins University (SAIS) that I began to obtain and improve skills in statistical analysis, econometric methods, data modeling, data management, and business intelligence among others.

Given today's abundance of professionals with bachelor's degrees, being able to differentiate oneself from the many is key. In addition, the current trend of corporations, government agencies, NGOs, and other organizations to make only decisions that are driven by data will continue to increase as server memory and computing power improve. With the proper advice, undergraduate students of accounting, business, economics, finance, statistics and related disciplines may guide their studies toward the goal of being admitted to the MSiBA program and hence make themselves competitive with the right mix in their skillset.

As a professional in the sector of business analytics, I witness on a day-to-day basis the need for better efficiency, analysis, and management of operations data. If more students graduate with the acumen and knowledge on how to treat, extract, transform, load, and analyze data, organizations hiring them will increase their added-value and efficiency. Therefore, I strongly recommend the creation of the one-year MSiBA program to the members and chairs of the different relevant departments within the University of California, Riverside. Should you have any questions, or would like further information, please do not hesitate to contact me at the email or phone number above.

Faithfully yours, Jesse Cota November 3, 2017

Kathryn Uhrich CNAS Dean's Office Geology 2258 Riverside, CA 92507

#### Dear Dean Uhrich,

I am writing to give my support to the proposed Master of Science in Business Analytics Program at UC Riverside. I graduated from UC Riverside with a B.S. in Statistics – Quantitative Management in 2004, and have since then built a career in business operations. I currently work at Gigamon as Senior Manager, Demand Planning.

When I heard about the proposed MSiBA program, in particular, the Statistics UG track with the Operations concentration, I knew this would be a great program for students who are trained in Statistics have a better understanding of business operations. These are both tools that are used daily in my field. I think this will be a great program to prepare people, who are considering similar careers, with the relevant skills.

Best Regards,

Minh Ly

Minh.P.Ly@outlook.com

(909) 382-1618



February 12, 2018

Yunzeng Wang, Ph.D Dean, University of California, Riverside School of Business Riverside, CA 92521

Dear Dean Wang,

I am writing to offer my support for Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM. Businesses are in need of qualified professionals who have demonstrated their knowledge, skills and abilities by achieving a master's degree in this field.

Our organization is a non-profit and as such, it is vital for us to better understand the large amounts of data we have about our customers, programs, and costs in order to improve our operations and services, especially in a time when grant dollars are not readily available. Over the past two years, our organization had the privilege to host a couple of MBA Fellows; both concentrated on analytics and their work made an impact for us. A program dedicated to this would be instrumental in the non-profit and for profit worlds.

Sincerely,

Tricia Haderlie

SVP, Talent & Training

Satura and Anderlie











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RADY SCHOOL OF MANAGEMENT

9500 GILMAN DRIVE #0554 LA JOLLA, CALIFORNIA 92093-0554 WEB: www.rady.ucsd.edu

Karsten T. Hansen Professor of Marketing Rady School of Management E-mail:k4hansen@ucsd.edu Phone: (858) 822 7462

February 14, 2018

Yunzeng Wang Dean, School of Business University of California – Riverside Riverside, CA 92521

Re.: Degree proposal of MSiBA program, UC Riverside

Dear Dean Wang,

I am writing to offer my support for a new program in business analytics at UC Riverside. The proposed MS degree in business analytics (MSiBA) program will provide a valuable service to students in the Inland Empire as well as to the businesses that hire them. For reference, my background is 15 years of research in Quantitative Marketing with a specialty in "big data" analytics. Furthermore, my own school at UC San Diego launched a similar MSBA program in 2016 and I am quite familiar with many of the details in setting up a program like the one UC Riverside is proposing.

The MSiBA program is designed to ensure a high level of scholarship by combining the expertise of both statistics and business professors who will teach in this interdepartmental program. The admissions criteria also help ensure a high level of scholarship, as only those students who have already been trained in one of the two areas of study will enter the program. The two quarters of capstone courses also add to my confidence that graduates of this program will be able to apply their training in a real business environment.

The need for students trained in the area of business analytics is large and growing. This is a great opportunity for students from underrepresented groups to obtain professional training that will enhance both the financial aspects and prestige of their future careers. As a university that values the diversity of its undergraduate population, UCR will benefit greatly from extending this environment to its professional schools.

Overall, I think the directors of the proposed program have put together a very clear, detailed presentation of the program proposal and I think they make a convincing case for starting a MSiBA degree program at UCR. In sum, I believe this program will greatly enhance the reputation of UCR, the economy of the Inland Empire, and opportunities for underrepresented groups.

Best,

Karsten T. Hansen

February 22, 2018

Dr. Yunzeng Wang Dean, UCR School of Business University of California, Riverside Riverside, CA 92507

Dear Dean Wang,

From our first meeting in 2014 through my work on the CDC Advisory Board to the A. Gary Anderson Graduate School of Management, I have enjoyed unrivaled academic partnerships and community support, as well as lasting professional relationships and camaraderie which will transcend our formal assignments to our respective institutions. Through our board work, I have recently learned of Professor Jean Helwege's proposed Business Analytics MS Business degree program at AGSM.

Having worked in corporate supply chain with Walmart for more than 16 years, as well as seven years with various governmental agencies, I would be remiss to not offer support to this proposal. I have taken the opportunity to review the related materials as well as reflect on the applications of such training to professionals in my field. Data analytics applications in complex business problem-solving are at the forefront of my field, and we are always in search of such talent that can leverage continued growth into our business.

Supply chain in general, and the retail sector in particular, are becoming increasingly competitive in an omni-channel world. Such a track of study would certainly have interested me had it been available at the time I pursued masters-level work. I would look forward to seeing this program in implementation and action, particularly with regard to the professionals that will graduate to successful careers in the supply chain space.

My thanks in advance for your consideration.

Sincerely,

Jefferson Hammann

jeffersonhammann@gmail.com

951.675.1979 mobile

# EXHIBIT VIII BIOGRAPHIES OF SELECTED PARTICIPATING FACULTY

Exhibit XI includes biographies of the following professors:

## Statistics:

Xinping Cui, Department Chair and Professor James Flegal, Associate Professor Daniel Jeske, Professor Yehua Li, Professor

#### **Business:**

Subramanian (Bala) Balanchander, Professor Alexander Barinov, Assistant Professor Mohsen El Hafsi, Professor Long Gao, Associate Professor Elodie Goodman, Associate Professor Jean Helwege, Professor Iva Kalcheva, Assistant Professor Charles Zhang, Assistant Professor

## Bala Balachander

Subramanian "Bala" Balachander is Professor and the Albert O. Steffey Chair in Marketing at the School of Business Administration of the University of California, Riverside. Prior to his current position, he was a Professor of Management at Purdue University. Professor Balachander has a Ph. D. in Industrial Administration from Carnegie Mellon University, an MBA from IIM, Calcutta and a B. Tech in Chemical Engineering from IIT, Madras. His research studies competitive marketing strategy, pricing, bundling, sales promotions and market signaling, and uses methods of game theory and structural econometric models. His teaching interests are in pricing, marketing strategy and marketing models. A 2012 study published in the Journal of Product Innovation Management ranked Professor Balachander No. 16 among the world's top innovation management scholars based on articles published in the top marketing journals. Professor Balachander currently teaches MGT 257, Marketing Strategy.

#### Alexander Barinov

Dr. Barinov is an Assistant Professor of Finance at A. Gary Anderson School of Business Administration, University of California Riverside. Prior to joining UCR in 2015, he taught at the University of Georgia. He earned his Ph.D. and his M.S. in Finance from the University of Rochester. He also holds a M.A. degree in Economics from New Economic School (Moscow) and a B.A. in Economics from Lomonosov Moscow State University. Dr. Barinov's work centers

around the idea that firms with high levels of firm-specific uncertainty and option-like equity beat the CAPM when expected aggregate volatility increases, and therefore serve as a hedge against aggregate volatility risk. His work is related to phenomena in the stock market known as the value effect, the small growth anomaly, the new issues puzzle, the idiosyncratic volatility discount and the analyst disagreement effect. Dr. Barinov currently teaches MGT 295G and MGT 252, which focus on investments in the stock market.

# Xinping Cui

Dr. Cui is a Professor of Statistics at the University of California –Riverside, a position she has held since 2014. She joined UCR in 2002, after working as a statistical analyst at Reed Neurological Research Center. Dr. Cui became chair of the Statistics department in 2016. She earned her Ph.D. in biostatistics at UCLA and an M.S. in applied statistics at Bowling Green State University. Dr. Cui's undergraduate degree is in mathematics, which she studied at Nankai University in Tianjin, China. She also has a M.S. degree in math from Nankai University. In addition to receiving grants from the National Institutes of Health to study statistical aspects of health and disease, Dr. Cui has worked with researchers at the UCR Agricultural Experimental Station. She currently teaches STAT 231A, Statistics for Biological Sciences, as well as several undergraduate statistics courses.

## Mohsen El Hafsi

Mohsen Elhafsi received both Ph.D. and M.S. in 1995 in industrial engineering from the University of Florida. He received a "Qualified Engineer" degree from the Ecole Nationale d'Ingenieurs de Tunis, Tunisia, in 1988. Dr. El Hafsi joined the School of Business at UCR as a tenure-track faculty member in 1997. In 2007, he was awarded a \$10,000 COR Research Fellowship (a fellowship program administered by the Academic Senate Committee on Research) for his proposal to work on supply chain issues related to contract manufacturing. His areas of research include operations and supply chain management, manufacturing and service operations, and production and inventory systems.

## James Flegal

Dr. Flegal is an Associate Professor of Statistics at the University of California –Riverside. Professor Flegal received his Ph.D. from the University of Minnesota. Dr. Flegal has worked with researchers at NASA in the organization known as FIELDS, or Fellowships and Internships in Extremely Large Data Sets: A Training and Research Program in Big Data and Visualization. His research focuses on Monte Carlo methods and Markov chains. He currently teaches STAT 206, Statistical Computing.

## Long Gao

Dr. Gao is an Associate Professor of Management in the area of Operations and Supply Chain Management at the University of California –Riverside. He earned his Ph.D. in business administration and operations research from Penn State University, and his M.E. and B.E. in engineering physics from Tsinghua University in Beijing, China. His research interests include supply chain management, stochastic modeling of manufacturing and service systems, Markov decision processes, and simulation. Professor Gao currently teaches MGT 239, Simulation for Business and MGT 207, Operations Management for Competitive Advantage.

#### Elodie Goodman

Dr. Goodman is an Associate Professor in the area of management science in the School of Business. She joined the University of California – Riverside in 2012. Previously, she was assistant professor of industrial engineering at the University of Illinois at Chicago from 2006 to 2012. She holds a Diplôme d'Ingénieur from Ecole Centrale Paris, France (2002) and a Ph.D. in operations research from MIT (2006). Her research interests are on the modeling and solution of optimization problems in a variety of areas, in particular those involving game theory. Her recent work includes supply chain, influenza vaccine supply chain, pricing and inventory management and healthcare payment systems. She currently teaches MGT 201, Quantitative Analysis and MGT 221, Decision-Making Under Uncertainty.

# Jean Helwege

Dr. is a professor in the Finance area of the School of Business at UC Riverside. Before joining the group, she held the J. Henry Fellers Professorship in Business Administration at the University of South Carolina. Her prior experience also includes faculty positions at Penn State, the University of Arizona, and Ohio State University. From 1988 to 1998 she worked in the Federal Reserve System as an economist. She holds a Ph.D. in economics from UCLA and she received a Bachelor of Arts in linguistics from the University of Chicago. Her research interests include corporate bonds, bank regulation, financial distress, initial public offerings and capital structure. She currently teaches MGT 227, Fixed Income.

#### Dan Jeske

Dr. Jeske is a Professor in the Statistics department at the University of California –Riverside, where he has worked since 2003. Prior to joining UCR, Professor Jeske held positions at Rutgers University and Bell Laboratories. He is the editor of *The American Statistician*, and has served on the editorial board of *Applied Stochastic Models in Business and Industry* and *Technometrics*. He earned his Ph.D. and his M.S. degrees in statistics at lowa State University. Dr. Jeske's undergraduate degree is in mathematics and computer science from Austin Peay State University. Dr. Jeske runs the Statistical Collaboratory Consulting Project at UCR, which has

cumulative revenues of over \$1 million. He currently teaches STAT 208, Statistical Data Mining.

## Ivalina Kalcheva

Dr. Kalcheva is an Assistant Professor of Finance in the School of Business at UCR. She joined the Business department in 2014 after having taught at the University of Arizona from 2007-2014. Professor Kalcheva earned her Ph.D. in Business Administration from the University of Utah. She has an M.B.A. from Saginaw Valley State University and she studied for her B.A. in economics in Bulgaria. Dr. Kalcheva's research focuses on the stock market and trading execution. She has taught MGT 252, Investment and Portfolio Management and MGT 202, Financial Management.

#### Yehua Li

Dr. Li is a Professor of Statistics at the University of California –Riverside. Professor Li joined UCR in 2018 after having taught at Iowa State and the University of Georgia. He received his Ph.D. from Texas A&M University in 2006 and his undergraduate degree in applied math from Tsinghua University in Beijing, China. Dr. Li's research interests are in big data, bootstrapping, large sample theory, measurement error and nonparametric approaches. He has statistical methods for electrical engineers and applied experimental design.

# **Charles Zhang**

Dr. Zhang is an Assistant Professor of Management in the marketing area at the University of California –Riverside. Professor Zhang joined UCR in 2014 after having taught at Boston College. He received his Ph.D. in marketing from the University of Michigan and degrees in statistics from University College, London and Fudan University. Dr. Zhang's research interests are judgment and decision making with an emphasis on numerical judgment and inference. Some of his published work is focused on how the granularity of communicated numbers conveys information that goes beyond the magnitude of the numbers. Professor Zhang currently teaches MGT 233, Marketing Research.

Office of the Dean

900 University Avenue, Anderson Hall, Riverside, CA, 92521

Tel: 951.827.4237 Fax: 951.827.3970 e-mail: <a href="mailto:yunzeng.wang@ucr.edu">yunzeng.wang@ucr.edu</a> web-site: <a href="mailto:http://soba.ucr.edu">http://soba.ucr.edu</a>

March 23, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**RE:** Master of Arts in Business Analytics

## Dear Committee Members:

I am writing to endorse the proposed Master of Arts in Business Analytics. This is a well-designed program to meet the strong demand from students who has an analytical background and are interested in professional careers in business administration. The program has the potential to significantly differentiate UCR's Business School and to raise the reputation of the School and the Campus. The program will provide a stream of revenue to help improve faculty and student support.

Like the faculty, I enthusiastically support the program.

Sincerely

Yunzeng Wang

Dean

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# College of Natural and Agricultural Sciences Agricultural Experiment Station and Cooperative Extension Office of the Doop 2258D Goolean Building

Office of the Dean – 2258D Geology Building Riverside, CA 92521-0127

To: CNAS Executive Committee

From: Kathryn Uhrich

Dean, CNAS

Date: April 12, 2017

RE: Proposal for an Interdepartmental Graduate Program Leading to the Master of

Science in Business Analytics

The Department of Statistics along with faculty of the School of Business and the A. Gary Anderson Graduate School of Management have proposed a valuable degree program that allows students to obtain a MS degree in Business Analytics. The degree program will be offered as a three-quarter 48 units program for graduates of a baccalaureate degree that provides sufficient quantitative background to enable successful completion of the program. The set of courses required for the statistics undergraduate students focus on business, while the courses required for the students who hold undergraduate business degrees focuses on statistics. This way, both sets of students will graduate with similar training in statistics and business. The curriculum is expected to meet the requirements for a degree to be designated by the Department of Homeland Security as a STEM degree. All but three courses are existing courses and have been offered in at least one of the last two academic years. This program is expected to serve as a potential model for other programs within the college to efficiently provide academic training and preparation for non-academic careers in technical fields.

I fully support this proposed Master of Science degree program in Business Analytics.



March 28, 2018

To: Dylan Rodriguez, Chair of the Academic Senate

From: Jerayr Haleblian, School of Business Department Chair

Re: MSiBA

Dear Dylan,

I would like to strongly support the joint effort between the business school and the department of statistics to create a Master of Science in Business Analytics (MSiBA) at UC-Riverside. This program will develop the analytical abilities students and allow them to apply these abilities to business data. A recent trend has emerged in which businesses have access to vast amounts of data. Analyzing such data on customers, competitors, and costs can be used to improve strategy, forecasting, and operations. Programs in Business Analytics are emerging around the country, and are fast becoming the most in demand programs within business school program portfolios.

The UC Riverside School of Business has designed a Business Analytics program that is unique in that it trains its students in both business and statistics by drawing on both the school of Business and Department of Statistics. The resulting program has the potential to offer superior training in appropriate statistical analysis than can typically be offered when programs only reside in the business school.

From the perspective of the business school, we would like to emphasize the following:

- The business school has sufficient resources to offer the classes in this program.
   Specifically, the proposed curriculum is based on courses we already offer. The only exceptions are two capstone courses (one in statistics and one in business) and a new statistics course. Accordingly, the business school needs to only staff one new course. Moreover, most of the existing courses that MSiBA students will take already have capacity for additional students. Therefore, the business school currently has the resources required to deliver the program with only minimal additional resource requirements.
- 2. The program is rigorous, and as a result with enhance the reputation of the business school. The UCR School of Business is currently ranked among the top 100 business schools in the US, and this program will only help enhance this reputation.
- 3. There is strong demand for business analytics programs across the country, and we fully expect that our program will be in high demand as worldwide businesses continue to move in the direction of increased large data set analyses.

4. The joint set up with the department of statistics gives us a competitive advantage, as we can offer superior data analytic training, which we believe will help sustain the program in the long term.

\_la\_y-Holoblian

Jerayr Haleblian Department Chair School of Business

## UNIVERSITY OF CALIFORNIA, RIVERSIDE

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DEPARTMENT OF STATISTICS RIVERSIDE, CALIFORNIA 92521-0138

April 15, 2018

The Graduate Council University of California, Riverside Riverside, CA 92521

**Dear Committee Members:** 

I am writing in strong support for the proposed inter-departmental Master program in Business Analytics at UCR. Business Analytics has grown out of the need to integrate business and statistical approaches to processing and interpreting business data. It is experiencing a rapid and unplanned growth. The program addresses critical shortage of college graduates trained in business analytics in the industry and government. The proposed program will provide a synergistic approach to real world business problem solving, one that leverages the content in statistics but using case-based focus and hands-on approach. Creating this program will also help differentiate and raise the reputation of UCR's Statistics Department. This self-support program is also expected to generate substantial revenue to help improve the support in students and faculty in Statistics Department.

Our Statistics Department is enthusiastically and fully committed to the establishment and the success of Business Analytics Program at UCR.

Sincerely,

Dr. Xinping Cui

Dinging Cui

Professor and Chair

Department of Statistics

University of California, Riverside



April 10, 2018

## To Whom It May Concern:

I write in support of the proposed MS in Business Analytics. With more, and more varied types of data available, businesses require professionals skilled and trained within this area. More than ever before businesses need managers and leaders who are able to make decisions informed by data. Graduates from this program will be well-prepared either for a transition to a PhD program in business or to transition to a career in the business world. This latter is especially relevant to our region where skills such as these are in short supply. Graduates from such programs elsewhere in the US are highly sought after. The program at UCR will contribute to the reputation of AGSM as a school of innovation in business learning. The proposed program builds on existing expertise within the school and is both rigorous and well-thought out and will provide students with the combination of analytical and technical skills necessary to succeed in this area.

Sincerely,

Shaun Bowler

Dean of the Graduate Division

Stran Benter



May 15, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Ward Beyermann, Chair, Executive Committee College of Natural and Agricultural Science

Re: Campus Review: Proposed Degree Program, Masters of Science in Business

Analytics (MSiBA)

The CNAS Executive Committee discussed the revised proposal for a Masters of Science in Business Analytics (MSiBA) at its May 8, 2018 meeting. The committee feels the concept has merit and supports the proposal.

Yours sincerely,

Ward Beyermann, Chair

**CNAS Executive Committee** 

Ward Beyerm



June 15, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Richard Seto

Committee on Physical Resources Planning

Re: [Campus Review] Masters of Science in Business Analytics MSiBA

The Committee on Physical Resources Planning reviewed the [Campus Review] Masters of Science in Business Analytics MSiBA via email. The committee was supportive of the proposal.



June 14, 2018

To: Dylan Rodríguez, Chair

**Riverside Division** 

From: Wee Liang Gan, Chair

Committee on Courses

Re: Proposed M.S. in Business Analytics

The Committee on Courses reviewed the proposal for a M.S. in Business Analytics at their June 7, 2018 meeting and via email. The Committee was supportive of the proposal and did not note any concerns with the proposed courses for the curriculum.



## **Graduate Council**

May 24, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Christiane Weirauch, Chair

**Graduate Council** 

Re: Proposal for a Master of Science in Business Analytics

The Council reviewed the proposal for a Master of Science in Business Analytics at their May 17, 2018 meeting. While the Council was supportive of the proposal, the committee had some questions and concerns.

- 1) The Council noticed that most of the letters of support were from students and very few from faculty from other institutions. Outside faculty letters are a requirement and CCGA stresses their importance in their review of the proposal.
- 2) The admissions process and criteria were not clearly outlined. Stating that the admissions process will be "similar to that which is currently used for the MBA program" does not seem to provide sufficient information.
- 3) There was mention of revenue splitting according to teaching load and recruiting success. The concept of splitting by teaching loads seems clear, but the Council wondered how review splitting be recruiting process would work and how the two would be balanced.
- 4) The proposal states that student advising will be conducted through faculty-led advising/information sessions. It was not clear to the Council how faculty advisors will be selected/appointed (balance between SoBA and Statistics?) and if this constitutes a significant new workload or not.
- 5) Finally, if this is a proposal for a self-supporting program, it is not made clear from the proposal. It should be stated very clearly in the proposal, not the cover email from Prof. Helwege. Financial aspects for self-supporting programs that show how and when the

program will become self-supporting should also be part of the proposal – please follow Appendix K, Guidelines for Review of New and Continuing Self-Supporting Graduate Professional Degree Programs.



#### PLANNING & BUDGET

May 24, 2018

To: Dylan Rodriguez, Chair

Riverside Division

From: Christian Shelton, Chair Chair Chair

Committee on Planning and Budget

RE: Proposed Degree Program: Master of Science in Business Analytics (MSiBA)

The Committee on Planning and Budget (CPB) reviewed the proposal for a new Master of Science in Business Analytics and found that it does not follow the proper format or guidelines for self-supporting program proposals, particularly in regard to accounting for indirect costs back to the department, college, and campus. CPB would also recommend some type of market analysis, common on self-supporting program proposals, to help justify the tuition and enrollment numbers.

CPB had questions about admission into the program, particularly for students whose background is outside of undergraduate business or statistics (for instance, economics, mathematics, or engineering). It is unusual to have separate degree requirements by undergraduate major and this curriculum leaves out students who do not fall into one of the enumerated categories. This may unnecessarily restrict the enrollment.

CPB would also recommend the program have a single primary director that alternates, not codirectors.

A faculty vote from each department and College Executive Committees should be included in the proposal.

3) CPB would also recommend the program have a single primary director that alternates, not co-directors.

Response: The proposal now has a single director that alternates between Statistics and Business.

4) A faculty vote from each department and College Executive Committees should be included in the proposal.

<u>Response:</u> The previous version of the proposal and the current version both start with details on the status of the proposal and these details state the dates on which the departments and EC voted to approve the MSiBA degree. The proposal now includes memos from the CNAS and School of Business ECs clearly stating approval of the program.