

Adopted: June 2, 2015

**ACADEMIC SENATE
of
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, CA**

AS-805-15

**RESOLUTION ON PROPOSAL TO ESTABLISH A MASTER OF SCIENCE
IN BUSINESS ANALYTICS**

- 1 WHEREAS, There is a demonstrated state and national level need for business professionals
2 with the requisite skills to make decisions informed by the increasing wealth of
3 data available through varied sources, and
4
- 5 WHEREAS, The existing graduate programs at the Orfalea College of Business or Cal Poly at
6 large do not have an analytics-specific core of business courses and the
7 distinguished status of a stand-alone MS in Business Analytics, and
8
- 9 WHEREAS, The proposed self-support program is a comprehensive, one year, interdisciplinary
10 business degree program that encompasses economics, finance, accounting,
11 marketing, and information systems, and
12
- 13 WHEREAS, The Academic Senate Curriculum Committee has evaluated and recommended the
14 program for approval, and
15
- 16 WHEREAS A summary of the program is attached to this resolution with the full proposal
17 available in the Academic Senate office, therefore be it
18
- 19 RESOLVED: That the proposal for the Master of Science in Business Analytics be approved by
20 the Academic Senate of Cal Poly.

Proposed by: The Orfalea College of Business
Date: May 12, 2015

Summary of the proposed MS in Business Analytics degree for review by the Academic Senate

New Program

Title: Master of Science in Business Analytics

Type: Self-Support, Fully face to face

Proposed Launch date: Fall 2106

Program Overview and Rationale

In the increasingly competitive marketplace, organizations need business professionals with the requisite skills to make decisions informed by the increasing wealth of data available through varied sources. The importance of data analysis on organizational success has created what Rob Bearden (CEO of Hortonworks) believes is the biggest demand and supply imbalance ever of people with data analytics skills in the workforce. According to the Bureau of Labor Statistics, the data analysts job category is expected to grow by 45 percent, from 156,000 in 2008 to 285,000 by 2018, making it one of the fastest-growing career fields. Despite the tremendous interest in the field, projected supply will not meet the market's future demand. McKinsey Global Institute estimates that by 2018 in the US alone, there will be a shortage of 140,000-190,000 people with analytical expertise and a shortage of 1.5 million managers and analysts with the expertise to make decisions based on the analysis of big data. The Orfalea College of Business of Cal Poly is addressing this urgent need through an innovative Master of Science (MS) in Business Analytics program designed to produce graduates who understand business environments and possess the problem formulation, statistical, computing, and decision making skills to solve businesses' most pressing problems, while advancing their professional careers in the exciting and fast growing field of data analytics. The intent is to train "managers" who will be able to make better business decisions with data analytics rather than simply creating "data analysts".

Other universities have also responded to the need for data analysts; several universities have either launched or have plans to launch certificate and masters programs in data analytics. Some of these programs, often in a field labeled as Data Science, have a strong technical, computer programming focus where predictive analytics is performed by connecting complex machine learning algorithms to big data. Although purely technical skills are necessary to answer important questions, and will serve a particular market well, we believe that it is the economic and business intuition combined with data analytics that is highly desirable and vitally important. Many industry leaders state that telling a story with data is critical to the success of the data analyst. Tom Davenport (Distinguished Professor at Babson College) argues that, "It may seem obvious that anyone who is doing data analysis would want to create a narrative of the process and outcome, but to many data analysts it's not obvious at all." Thus, decision making success

is better achieved by understanding the business problem, asking relevant questions, developing the appropriate model and then telling a story to provide context, insight, and interpretation. The MS in Business Analytics at Cal Poly is designed to create analysts with precisely this perspective.

The proposed program is a comprehensive, one year, interdisciplinary business degree program that encompasses economics, finance, accounting, marketing, and information systems. This program is unique in equipping students with the necessary quantitative tools to develop insightful models to analyze many types of data—big and not so big; structured and unstructured, as well as cross sectional, time series, and panel data. Our graduates will be highly sought after in many different types of industries including consulting, retail, financial services, marketing, healthcare, human resource management, and technology. The focus of our program on econometrics and decision theory is particularly noteworthy and offers our graduates a competitive advantage. A comprehensive treatment of econometrics (standard, financial, and Bayesian) offers the essential model-first approach as a complement to the standard data-first approach found in other programs. The focus on decision theory prepares our graduates to apply data analytics to develop sound business decisions under uncertainty. In sum, the MS in Business Analytics will offer a holistic approach to data analytics, combining qualitative reasoning with quantitative tools to identify key business problems, translate them into relevant data questions, and apply data analytics while telling a story and proposing concrete business actions. With exposure to analytics in a business setting, graduates will also be able to serve as a critical link among senior management, data scientists, and clients.

We have effectively aligned curriculum development to industry needs in this rapidly evolving field of data analytics through close industry interactions in numerous venues. Our Dean's Advisory Council provided useful feedback and support in the earlier stages of the program development. As we progressed, we worked closely with the Coraggio Group (www.coraggiogroup.com) to assist us with market research and the early positioning of the MS in Business Analytics program. In doing so, we compared our course and program proposals to similar programs across the country. The Coraggio Group conducted an internet literature review on the trends in data analytics education and market needs, and, more importantly, interviewed university program directors and corporate leaders in the area of business analytics. In the executive summary of their report on their findings, the Coraggio Group stated that Cal Poly's early research suggested " ... unmet demand existed between the current university program offerings and the demands of industry to produce graduates" and that " ... Cal Poly has a long-term opportunity to distinguish itself amongst university programs in focusing on Business Analytics."

To assist in assuring the long-term quality and impact of the MS in Business Analytics, we formed a Business Analytics Advisory Board (BAAB). Board members include some of the nation's top executives who are leveraging data and advanced analytics to change the game in

their respective industries. We already have an impressive representation of firms, including Brocade, Cisco, First Republic Bank, Google, Informatica, Nest, NetApp, Oracle, Safeway, Symantec, VSP Global, and Walmart. The mutually beneficial partnership not only gives board members immediate access to a new pool of business analytics graduates, but also allows them to provide input regarding the skill sets they need from new college graduates in this field. We envision three to four board meetings per year, split between San Luis Obispo and other cities in California. The first meeting, held at the Oracle campus on April 3, 2015, was stimulating and productive. For the most part, the board members endorsed our suggested curriculum but also made some useful recommendations. The second meeting is tentatively scheduled at the Google campus later in the year. It is expected that board members will provide an analytical project and the data for student teams to work on with their company.

Overall, the proposed program has received tremendous support from industry leaders. The following quotes from Jeff Henley, Harry Tannenbaum, and Joshua Knox sum up the endorsement:

"Here at Oracle, we know there is tremendous demand for new business school graduates with the ability to glean competitive insights from the massive amounts of data being generated today. In fact, one of the key findings from new research Oracle just sponsored with the Wall Street Journal is that businesses should partner with universities that offer business analytics degrees, in order to gain lower-cost access to finance talent with analytical experience. Oracle already looks to Cal Poly as a major source of new hires for its Sales Academy, based on the quality and preparation of the students coming out of the business school. An MS program in Business Analytics will only add to the appeal of Cal Poly as a go-to source of finance and business administration talent for innovative companies in the Bay Area and beyond."

Jeff Henley, Executive Vice Chairman, **Oracle**

"As a leader of a fast growing business analytics organization -- I was incredibly excited to get a sneak peak at Cal Poly's MS in Business Analytics program. I think the approach, which blends technical training with a holistic understanding of what it takes to drive a business is right on the mark. I will hire someone out of this program in an instant and would feel confident that they would have significant impact on our business"

Harry Tannenbaum, Head of Business Analytics, **Nest Labs**

"Both Google as a company, and Google Analytics as a product, have an ever-present need for tomorrow's leaders able to bridge the business and technical worlds with the necessary analytical skills to materially impact our bottom line. Cal Poly's new MS program is uniquely positioned to provide a local talent base with the skills to hit the ground running."

Joshua Knox, Engineering Program Manager, **Google**

Program Curriculum

Core Courses	<i>Courses are included below:</i>	
Course Number	Course Title	Units
GSB 510	Data Visualization and Communication in Business	4
GSE 518	Essential Statistics for Econometrics	4
GSE 520	Advanced Econometrics I (<i>prereq: GSE 518</i>)	4
GSE 524	Computational Methods in Economics	4
GSB 520	Data Management for Business Analytics	4
GSB 530	Data Analytics and Mining for Business (<i>prereq: GSB 520</i>)	4
GSB 503	Collaborative Industry Projects (<i>Approval from Associate Dean</i>)	8
	Core Subtotal	32
Approved Electives	<i>Select 13 units from the following:</i>	
Course Number	Course Title	Units
GSE 522	Advanced Econometrics II (<i>prereq: GSE 520</i>)	4
GSB 516	Strategic Marketing Analytics (<i>prereq: GSE 518</i>)	4
GSB 573	Marketing Research (<i>prereq: GSE 518</i>)	4
GSE 544	Evidence-Based Decision Analysis (<i>prereq: GSE 520</i>)	4
GSB 550	Bayesian Econometrics (<i>prereq: GSE 520</i>)	4
GSB 501	Individual Research (<i>Approval from Associate Dean</i>)	1-4
GSB 570	Selected Advanced Topics (<i>Approval from Associate Dean</i>)	1-4
	Electives Subtotal	13
	TOTAL UNITS	45

Culminating Experience

Students are required to take eight units of GSB 503: Collaborative Industry Projects. The purpose of this core course is to engage in an interdisciplinary project activity, leading to two or more completed projects. For each project, the Business Analytics Advisory Board and other industry partners will provide real world problems and data to be reviewed and analyzed by our students. All projects are expected to be team based, where students, working in small groups, apply tools and techniques as they are covered in the curriculum. Through this arrangement, students will also get valuable experience working effectively in a team and for a client.

The projects may be initiated in the very first quarter a student is enrolled and carried out for the remaining quarters of the program. A faculty team drawn equally from the technical and management disciplines will provide an important balance. Such a mentoring configuration will provide the students with the ability to develop within an incubator, data analytics type environment for real world data exploration, modeling, data analytics, and solution development. In addition to the technical skills, the students will be mentored on developing strong “people skills” which encompass effective teamwork, leadership, conflict resolution and negotiation, and strategy. Throughout the academic year, there will be regular workshops and seminars led by the faculty team as well as industry partners.

The final project, completed in the last quarter of the program, will provide students with the opportunity to synthesize the ideas and methods they have learned over the duration of the MS Business Analytics program, fulfilling the requirements for a culminating experience as specified in the California Code of Regulations. The expected output from this activity is a professional level written report and presentation reviewed by industry partners, key program faculty, and the student’s academic advisor. Though the projects are team based, students will be expected to make individual presentations highlighting their individual contribution towards the project and submit individual reports. These individual undertakings will form the basis of assessment of the culminating experience.

Student Learning Outcomes

Graduates of the MS in Business Analytics program will be able to:

LO 1: Employ key aspects of data management – retrieval, integration and enrichment

LO 2: Apply high ethical standard towards the collection, storage, analysis, and reporting of data

LO 3: Apply modeling tools to data of various types and sizes

LO 4: Visualize data to infer and communicate insights

LO 5: Use data to analyze, inform and solve fundamental business problems

Student Demand

There is currently a large unmet demand in the marketplace for people with data analytic skills. For example, the Bureau of Labor Statistics reports, "Companies of all sizes are expected to add enough data analysts that, as a group, the job category should grow by 45 percent through 2018, making it among the fastest-growing career choices out there." The shortage of data analysts in the marketplace has created an obvious demand for relevant programs in the area. Several universities have either launched or are in the process of launching certificate as well as master's programs in data analytics. Most of these programs have experienced exceptionally fast-growing enrollments. George Washington University, for instance, began offering their MBA students a certificate related to data analytics. In the first two years, the number of students in the program increased from 10 to 75; eventually resulting in the certificate program evolving into a full master's program in Business Analytics in Fall 2013. Similarly, the MS in Business Analytics program at Arizona State University started within the last two years has a current enrollment of 90 students based on 333 applications in 2014. The Business Analytics program at the University of Connecticut has increased from 20 students in 2011 to a current enrollment of 250. The Predictive Analytics program at DePaul University, which began with 30 students in 2010, had 150 enrolled students in 2014.

In the run up to the proposed MS in Business Analytics program, we plan to launch a 4-month professional certificate program in Business Analytics in Summer 2015. An on-campus information session held in February 2015, drew 56 Cal Poly students from diverse disciplines including economics, business, engineering, computer science, and biology. The program was extremely well received when presented at the Good Morning SLO event, sponsored by the Chamber of Commerce. Despite minimal marketing, we have received 18 applications for the certificate program. With admission open until June 5, 2015, we expect the pool to increase.

Given the national trend and the right positioning, we foresee robust demand and enrollment after the initial launch of the MS in Business Analytics program in Fall 2016. The interest in the program from non-business students is consistent with other existing programs. For example, 38 percent of students in the MS in Marketing Analytics program at University of Maryland in Fall 2013 comprised of undergraduates from fields such as engineering, mathematics, computer science, and physics. With Cal Poly's strong focus on STEM fields, the proposed program is positioned to flourish.

State of California
Memorandum

CAL POLY
SAN LUIS OBISPO

To: Gary Laver
Chair, Academic Senate

Date: June 30, 2015

From: Jeffrey D. Armstrong
President



Copies: K. Enz Finken
M. Pedersen
S. Dawson
S. Jaggia
R. Shani

Subject: Response to Academic Senate Resolution AS-805-15
Resolution on Proposal to Establish a Master of Science in Business Analytics

I am pleased to approve the above-entitled Academic Senate resolution. The proposal will now be sent to the Chancellor's Office for approval.

Please express my appreciation to the Academic Senate members for their attention to this important curricular matter.