

FLORIDA ATLANTIC UNIVERSITY™

UGPC APPROVAL _____
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Graduate Programs—PROGRAM CHANGE REQUEST

DEPARTMENT: ITOM	COLLEGE: BUSINESS
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PROGRAM NAME: Graduate Certificate in Big Data Analytics	EFFECTIVE DATE (PROVIDE TERM/YEAR) SPRING 2016
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PLEASE EXPLAIN THE REQUESTED CHANGE(S) AND OFFER RATIONALE BELOW AND/OR ATTACHED:
Proposal: A Certificate Program in Big Data Analytics with Computer Science and Business Tracks jointly offered by the Department of Computer and Electrical Engineering and Computer Science (CEECs) and Department of Information Technology and Operations Management (ITOM) - to establish a 12 credit Graduate Certificate in Business Analytics. The certificate will allow graduate students to expand their knowledge and skills about the concepts, technologies, and tools of business intelligence (BI), data analytics (DA) and business analytics (BA) and be recognized for their achievement. The certificate program has two tracks: Computer Science (CS) and Business (BU).

I. Tracks

A. **Big Data Analytics Certificate in Computer Science** will be issued to a student admitted [III.A] to the CS Track Certificate Program if s/he successfully completes three (3) 3-credit courses from the CS Data Analytics courses and one (1) 3-credit course from the ITOM Business Analytics courses.

B. **Big Data Analytics Certificate in Business** will be issued to a student admitted [III.B] to the BU Track Certificate Program if s/he successfully completes three (3) 3-credit courses from the ITOM Business Analytics courses and one (1) 3-credit course from the CS Data Analytics courses.

II. Curriculum
 The CS Data Analytics courses and the ITOM Business Analytics courses are listed in the attachment.

III. Admission and Completion

A. CS Track: The certificate program will be open to students who have a BS degree in Computer Science or a related field of Science and Engineering, a GPA of at least 3.0 and must satisfy the prerequisites required for each course in the program. All four courses in the program must be completed with a GPA of 3.0 or better.

B. BU Track: The certificate program will be open to students who have a Bachelor degree in business or related field and a GPA of at least 3.0 and satisfy the prerequisites required for each course in the program. All four courses in the program must be completed with a GPA of 3.0 or better.

Faculty contact, email and complete phone number: Dr. Derrick Huang, (561) 297-2776, dhuang@fau.edu	Consult and list departments that might be affected by the change and attach comments. <i>CEECs</i> <i>Math</i>
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Approved by: Department Chair: _____ College Curriculum Chair: _____ College Dean: _____ UGPC Chair: _____ Graduate College Dean: _____ UFS President: _____ Provost: _____	Date: _____ _____ _____ _____ _____
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Email this form and syllabus to UGPC@fau.edu **one week before** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website prior to the meeting.

Proposal: A Certificate Program in Big Data Analytics with Computer Science and Business Tracks jointly offered by the Department of Computer and Electrical Engineering and Computer Science¹ and Department of Information Technology and Operations Management²

Introduction and Rationale: The digital age is here to stay. As a result, organizations now own and have access to unfathomable amounts of data. The potential of this data is largely untapped; new technologies and efforts are needed to move on to the next phase of the digital revolution- the *data* revolution. Hardware and software technologies have been advancing since the inception of electronic computing to bring us to where we are today. Enormous amounts of data are captured and stored at lighting speed, whether it be through software products such as social media and smart phone apps, various hardware sensors tied to countless entities, health data from doctors' offices and physiological measurements, or government data from census and other reporting programs.

The collective problem of dealing with and extracting information from these large sources of data has been coined Big Data. While this term is an often-overused buzzword, a concrete definition of Big Data is elusive and highly debated. The first sighting of the term was in a 1997 paper written by NASA, quantifying Big Data as data too large to fit into computer memory or a hard drive. The problem with this definition is that as computing resources and data management processes mature, a single measurement of data size cannot effectively differentiate "big" from "small" data. The relative nature of the term warrants a more operational and multi-dimensional approach to quantifying Big Data. Gartner research defines Big Data as "high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making." Volume refers to the sheer amount of data, multi-terabytes to petabytes of which can be stored in data warehouses. Velocity refers to the speed at which new data is created; traditional analytical methods cannot keep up with the data coming in. Variety refers to the complexity of the data, as data can come from many sources and have many different formats. The last part of Gartner's definition is key for Big Data analysis: data is useless until it can concretely contribute to a process or industry.

Data scientists, those skilled in handling and gaining insights from Big Data, are in high demand across various industries, but there are simply not enough trained professionals to satisfy the world's data needs. The Wall Street Journal estimates that 80% of U.S. data science jobs created between 2010 and 2011 have not yet been filled. Several universities in the State of Florida offer Master's degrees and/or certificates in business intelligence, or domain-specific informatics (such as Healthcare Informatics). The University of South Florida offers a graduate program in Analytics and Business Intelligence. A couple of examples of Big Data-related programs outside Florida include Stanford's Mining Massive Data Sets Graduate Certificate and University of Maryland University College's degrees and certificates in data analytics. Several

¹ College of Engineering and Computer Science

² College of Business

Massive Open Online Courses (MOOCs) exist to fill the need for data scientists, such as Udacity's Data Analyst Nanodegree, and Coursera's (taught by Johns Hopkins University) Data Science Specialization.

The Department of Computer and Electrical Engineering and Computer Science of the College of Engineering and Computer Science and the Department of Information Technology and Operations Management of the College of Business are uniquely positioned to offer a distinctive certificate program in Big Data Analytics with two tracks: Computer Science (CS) and Business (BU).

I. Tracks

- A. **Big Data Analytics Certificate in Computer Science** will be issued to a student admitted [III.A] to the CS Track Certificate Program if s/he successfully completes three (3) 3-credit courses from the CS Data Analytics courses listed in [1] and one (1) 3-credit course from the ITOM Business Analytics courses listed in [2].
- B. **Big Data Analytics Certificate in Business** will be issued to a student admitted [III.B] to the BU Track Certificate Program if s/he successfully completes three (3) 3-credit courses from the ITOM Business Analytics courses listed in [2] and one (1) 3-credit course from the CS Data Analytics courses listed in [1]

II. Curriculum

Following courses are offered for the Big Data Analytics Certificate Program.

[1] The CS Data Analytics courses required for the certificate program must be selected from the following list of 3-credit courses.

- CAP6673 Data Mining and Machine Learning
- CAP6777 Web Mining
- CAP6778 Advanced Data Mining and Machine Learning
- CAP5615 Intro to Neural Networks
- CAP6776 Information Retrieval
- CAP6771 Data Mining for Bioinformatics
- CAP6688 Social Networks and Big Data Analytics
- CAP6780 Big Data Analytics with Hadoop

[2] The ITOM Business Analytics courses required for the certificate program must be selected from the following list of 3-credit courses, all of which are offered every semester.

- ISM 6119 - Introduction to Business Intelligence
- ISM 6217 – Database Management Systems
- ISM 6422 - Social Media and Web Analytics
- ISM 6136 – Data Mining and Data Warehousing
- ISM 6405 – Advanced Business Analytics
- QMB 6603 - Data Analysis for Managers

III. Admission and Completion

- A. CS Track: The certificate program will be open to students who have a BS degree in Computer Science or a related field of Science and Engineering, a GPA of at least 3.0 and must satisfy the prerequisites required for each course in the program. All four courses in the program must be completed with a GPA of 3.0 or better. All course materials will be in English and all international students must demonstrate proficiency in English to enter the program.
- B. BU Track: The certificate program will be open to students who have a Bachelor degree in business or related field and a GPA of at least 3.0 and satisfy the prerequisites required for each course in the program. All four courses in the program must be completed with a GPA of 3.0 or better. All course materials will be in English and all international students must demonstrate proficiency in English to enter the program.



Derrick Huang <dr.dhuang@gmail.com>

RE: Request for approval for Graduate Certificate in Business Analytics and a new graduate course

1 message

Tamara Dinev <tdinev@fau.edu>
To: Nurgun Erdol <erdol@fau.edu>
Cc: Caryn Conley <cconley8@fau.edu>, Chiang-Sheng Huang <dhuang@fau.edu>

Thu, Sep 17, 2015 at 12:02 PM

Thank you so much! Have a great day

Best Regards:

Tamara

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Tamara Dinev, Ph.D.

Department Chair and Professor

Department of Information Technology and Operations Management

College of Business

Florida Atlantic University

Boca Raton, Florida 33431

OFFICE: Fleming Hall, 219

TEL: (561) 297-3181

FAX: (561) 297-3043

e-mail: tdinev@fau.edu

From: Nurgun Erdol
Sent: Thursday, September 17, 2015 11:39 AM
To: Tamara Dinev
Cc: Caryn Conley
Subject: RE: Request for approval for Graduate Certificate in Business Analytics and a new graduate course

Dear Tamara,

I approve the new courses listed below:

1. New course: ISM 6422 – graduate version of a corresponding existing undergraduate course ISM 4420
2. New course: ISM 6119 – graduate version of a corresponding existing undergraduate course ISM 3316
3. New course: ISM 6058 – graduate version of a corresponding existing undergraduate course Ism 4053.

Best wishes,

Nurgun

Nurgun Erdol, Ph. D.

Professor and Chair

From: Tamara Dinev

Sent: Thursday, September 17, 2015 11:27 AM

To: Nurgun Erdol <erdol@fau.edu>; Mihaela Cardei <mcardei@fau.edu>

Cc: Caryn Conley <cconley8@fau.edu>

Subject: RE: Request for approval for Graduate Certificate in Business Analytics and a new graduate course

Dear Nurgun:

Can you email me your approval for the new courses, per our phone conversation? I will be very thankful

Best Regards:

Tamara

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Tamara Dinev, Ph.D.

Department Chair and Professor

Department of Information Technology and Operations Management

College of Business

Florida Atlantic University

Boca Raton, Florida 33431

OFFICE: Fleming Hall, 219

TEL: (561) 297-3181

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e-mail: tdinev@fau.edu

From: Tamara Dinev

Sent: Monday, September 14, 2015 9:53 AM

To: Nurgun Erdol; Mihaela Cardei

Cc: Caryn Conley

Subject: Request for approval for Graduate Certificate in Business Analytics and a new graduate course

Importance: High

Dear Dr. Erdol:

I am asking for your approval of our proposed graduate certificate for Business Analytics and 3 new graduate courses, two of which are associated with the certificate.

The certificate serves the purposes of the College of Business (COB) and the MBA students and the students from the new COB market rate programs.

I attach for you the certificate description and the new proposed graduate courses.

1. Graduate Certificate in Business Analytics at the College of Business
2. New course: ISM 6422 – graduate version of a corresponding existing undergraduate course ISM 4420
3. New course: ISM 6119 – graduate version of a corresponding existing undergraduate course ISM 3316
4. New course: ISM 6058 – graduate version of a corresponding existing undergraduate course ISM 4053. This course is not associated with the certificate but is needed given the increased demand of businesses in using and creating apps for mobile platforms

I do not see any potential conflict between our colleges' proposals associated with Data Analytics. We have an existing undergraduate certificate and minor in Business Analytics since 2004 and we see an increased

need among the graduate COB students for a similar program. As is the case with past programs such as Software development, Web development, Information Security etc. that are all taught at COB, the two colleges serve different categories of students and teach Information Technology from different perspectives and for different purposes. ITOM teaches IT from Business and Organizational Management and Decision making perspective, not the deep technical aspects of Information Technology.

If anything, these new courses from both our colleges will serve better our joint MSITM program which offers an amalgam of management and technical perspective of the Big Data topics to our graduate students

Let me know if you have any questions. Looking forward to hearing from you.

Best Regards:

Tamara

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Tamara Dinev, Ph.D.

Department Chair and Professor

Department of Information Technology and Operations Management

College of Business

Florida Atlantic University

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From: Mihaela Cardei
Sent: Thursday, September 10, 2015 9:25 AM
To: Tamara Dinev
Cc: Nurgun Erdol; Mihaela Cardei
Subject: Request from the CEECS Department

Dear Dr. Dinev

I am the chair of the Graduate Programs Committee in the Department of Computer & Electrical Engineering and

Computer Science (CEECS) at FAU, and we are proposing a Certificate Program in Big Data Analytics.

Please find attached to this email the Certificate description and 4 new course proposals (CAP 6771, CAP 6780, CAP6688, and CAP6776) which are listed in the Certificate.

We would need your approval that ITOM Department supports the Certificate in Big Data Analytics and the 4 new courses.

Could you please review the material and email me your approval decision?

Thank you,

Mihaela Cardei, PhD

Professor

Computer & Electrical Engineering and Computer Science Department

College of Engineering and Computer Science

Florida Atlantic University

<http://www.cse.fau.edu/~mihaela>



Derrick Huang <dr.dhuang@gmail.com>

RE: Request for approval - Big Data Analytics Certificate & new courses

1 message

Mihaela Cardei <mcardei@fau.edu>

Wed, Sep 16, 2015 at 7:37 PM

To: Rainer Steinwandt <srainer@math.fau.edu>

Cc: Nurgun Erdol <erdol@fau.edu>, Tamara Dinev <tdinev@fau.edu>, Chiang-Sheng Huang <dhuang@fau.edu>

Dear Rainer ,

Thank you very much for your fast reply and support!

Best regards,
Mihaela

From: Rainer Steinwandt [srainer@math.fau.edu]

Sent: Wednesday, September 16, 2015 8:24 PM

To: Mihaela Cardei

Subject: Re: Request for approval - Big Data Analytics Certificate & new courses

Dear Mihaela,

Thank you for your email. The proposed certificate program and the associated courses of the CEECS Department and ITOM look very fine to me. For the Department of Mathematical Sciences, I support this certificate program and the associated courses and hope that this program will be a great success.

Kind regards,
Rainer

— Original Message —

From: "Mihaela Cardei" <mcardei@fau.edu>

To: "Rainer Steinwandt" <srainer@math.fau.edu>

Cc: "Nurgun Erdol" <erdol@fau.edu>, "Tamara Dinev" <tdinev@fau.edu>, "Chiang-Sheng Huang" <dhuang@fau.edu>, "Mihaela Cardei" <mcardei@fau.edu>

Sent: Wednesday, September 16, 2015 7:26:41 PM

Subject: Request for approval - Big Data Analytics Certificate & new courses

Dear Dr. Steinwandt,

The Department of Computer & Electrical Engineering and Computer Science (CEECS) and the Department of Information Technology and Operations Management (ITOM) at FAU are proposing a joint Certificate Program in Big Data Analytics, with two tracks: Computer Science and Business.

In addition, CEECS Department is proposing 4 new course proposals (CAP 6771, CAP 6780, CAP6688, and CAP6776) and ITOM is proposing 3 new course proposals (ISM6422, ISM6119, ISM6058).

Please find attached to this email the Certificate and new course proposal documents.

We would need your approval that the Department of Mathematical Sciences supports the joint Certificate in Big Data Analytics and the new course proposals.

Could you please review the material and email me your approval decision?

Thank you,

Mihaela Cardei, PhD

Professor

Computer & Electrical Engineering and Computer Science Department

College of Engineering and Computer Science

Florida Atlantic University

<http://www.cse.fau.edu/~mihaela>