FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—New CERTIFICATE PROGRAM

UGPC APPROVAL _____

UFS APPROVAL _____

CATALOG _____

DEPARTMENT: COMPUTER/ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	COLLEGE: ENGINEERING AND COMPUTER SCIENCE

PROGRAM NAME:

Graduate Certificate in Big Data Analytics

EFFECTIVE DATE
(PROVIDE TERM/YEAR)

SPRING 2016

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 Big Data Analytics. The joint certificate program in Big Data Analytics has two tracks: Computer Science (CS) and Business (BU).

I. Tracks

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

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

II. Curriculum

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

II. 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: **Frederick Bloetscher, Ph.D., P.E.** **239-250-2423**	Consult and list departments that might be affected by the change and attach comments. **ITOM (College of Business)** **Mathematical Sciences (College of Science)**

Approved by:

	Date:
Department Chair: *Mingy Endy*	10/6/2015
College Curriculum Chair:	10/6/15
College Dean:	10/6/15
UGPC Chair:	
Graduate College Dean:	
UFS President:	
Provost:	

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 Science[1] and Department of Information Technology and Operations Management[2]

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

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[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.

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.

RE: Request from the CEECS Department

Tamara Dinev

To:	Mihaela Cardei
Cc:	Nurgun Erdol; Chiang-Sheng Huang; Caryn Conley

Dear Dr. Cardei:

Regarding the 4 new course proposals below, I approve of their creation.

Regarding the Certificate in Big Data Analytics, per our conversation today with Dr. Erdol, rather than having two separate certificates in Data/Business Analytics, we agreed to create one certificate – in Big Data Analytics – with two tracks: Computer Science track and Business track. Students in each track with take 3 courses offered by the corresponding college, and one from the other college. Thus, a student in Computer Science track will take 3 CAP courses and 1 ISM course, and a student in College of Business will take 3 ISM courses and one CAP course.

Please contact Dr. Huang to coordinate how to amend our proposals toward this final version and fast track through the colleges so we can present our proposal at the upcoming University Council session.

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: Mihaela Cardei
Sent: Thursday, September 10, 2015 9:25 AM
To: Tamara Dinev <tdinev@fau.edu>
Cc: Nurgun Erdol <erdol@fau.edu>; Mihaela Cardei <mcardei@fau.edu>
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 you 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

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

Rainer Steinwandt [srainer@math.fau.edu]

To: Mihaela Cardei

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