Submitted by: Keith E. Whitfield, Provost

ESTABLISHMENT OF A MASTER OF SCIENCE
PROGRAM IN DATA SCIENCE AND BUSINESS ANALYTICS

Recommendation

It is recommended that the Board of Governors establish a new Master of Science in Data Science and Business Analytics, offered jointly by the College of Engineering and the Mike Ilitch School of Business, effective Fall 2017.

Background

Analytics is a relatively new, fast-growing science, technology, engineering and mathematics (STEM) field that spans areas of computing, statistics, operations research, and business. The field is defined as "the scientific process of transforming data into insight for making better decisions." There has arisen incredible demand for individuals that can synthesize meaningful narratives from data to transform all operational aspects of an organization. McKinsey Global Institute (2011) called analytics the next frontier in innovation, competition, and productivity and predicted that by 2018 the United States will face a shortage of 140,000-190,000 people with deep analytical skills, and that one third will be unfilled due to lack of trained applicants. On January 5, 2016, Michigan's Talent Connect website (http://www.mitalent.org) listed more than 950 jobs within 100 miles of Wayne State University and posted within the past 30 days with the keyword "analytics." This trend was further verified at the Wayne State University Big Data & Business Analytics Symposium in both 2014 and 2015, where faculty and industry experts from companies including DTE, Ford, General Motors, HP, IBM, Chrysler, Urban Science, and others had in-depth discussions regarding the skills required in industry for graduates of such a Master's program; all industry representatives expressed strong interest in the program and its graduates.

Program Description

The Master of Science in Data Science and Business Analytics (MSDSBA) program is designed to give graduates a core of computing, business, statistics, and operations research skills to identify, analyze, and solve analytics problems; to integrate those skills in an interdisciplinary way that other, single-discipline-oriented analytics degree might not; and to provide in-depth training in an analytics area of specialization. The program will be offered jointly by the Department of Management and Information Systems in the Mike Ilitch School of Business and the Department of Computer Science and the Department of Industrial and Systems Engineering in the College of Engineering. With regard to the program's cross-cutting core learning outcomes, successful students will be able to:

- Demonstrate an understanding fundamental principles across a range of core areas in data science and analytics, including computing, statistics, operations research, and business;
- Identify and frame problems in business and other domains, as well as data science and analytics problems related to those domains;
- Understand and use methods for acquiring, managing, and utilizing large and fast-moving streams of data;
- Select, build, solve, and analyze analytics models using appropriate methodology;

- Apply and integrate the knowledge and skills they have gained, to successfully develop and execute analytics projects;
- Engage in multidisciplinary activities and work in diverse and/or multidisciplinary teams related to data science and analytics projects;
- Communicate complex ideas from data science and analytics to individuals in a variety of fields;
- Demonstrate expertise and proficiency in a practicum project on a data science and analytics topic.

Students who elect the Data Science for Business concentration will additionally be able to:
- Demonstrate the ability to understand, frame, and solve problems in marketing, operations, finance, management of information technology, and accounting in order to develop and execute analytics projects within businesses.

Students who elect the Data Science and Engineering concentration will additionally be able to:
- Demonstrate the ability to acquire, preprocess, store, manage, analyze, and visualize data arriving at high volume, velocity, and variety.

Students who elect the Data Science and Analytics concentration will additionally be able to:
- Demonstrate the ability to select, build, solve, and analyze models using methodology such as parametric and non-parametric statistics, regression, forecasting, data mining, machine learning, optimization, stochastics, and simulation.

Admission Requirements

Applicants must meet requirements for admission to the Graduate School. Students must have earned a Bachelor's Degree or the equivalent in Engineering or Business from an accredited college or university. Application and admission to this program will be coordinated separately in each of the concentration areas in coordination with the participating units.

Curriculum Requirements

The MSDSBA program requires students to complete a minimum of thirty credits using master's degree Plan C: a minimum of twenty-four credits in course work plus a six credit practicum final project with industry. Students will be required to take three core courses (covering the three concentrations) along with three advanced courses which will be required within a concentration. In addition, students will be able to take at least two elective courses. All students will also be required to take a practicum course carrying six credits that will pull together a variety of subject material covered in the core/elective courses in the context of real-world applications. Combined, the core and advanced courses give students integrated breadth of analytics, and provide depth of knowledge in an area of analytics tailored to their specific interests and career goals.

Graduation Requirements

All coursework must be completed in accordance with the academic regulations of the Graduate School policies and the regulations governing graduate scholarship and degrees. Students may enroll on a full-time or part-time basis but must complete requirements within six years of admission.

Program Administration

This degree program will be administered by three faculty co-directors, one director representing each academic department and its respective concentration area. The three co-directors will have responsibility for curriculum development and program assessment and evaluation in consultation with the relevant faculty governance bodies. The co-directors will report to their respective chairs and deans.

Budget and Resource Requirements

Across the two participating colleges, existing full-time faculty have the interest and availability to teach in the program. Full-time faculty will lead course development and curriculum delivery within their normal teaching load. Ten of the course offerings will replace existing course offerings being run as electives or special topics, with six new courses planned. Overall the existing classroom facilities at the Main Campus are sufficient for the classes. Most courses will require a variety of specialized modeling and analysis efforts, hence, material fees will be assessed to pay for costs associated with expenses such as annual software licenses and costs associated with maintaining cloud computing and learning environments that are typically assessed based on use.

Accreditation

There is no disciplinary accrediting body for data science and business analytics.

Approvals

The proposal was approved by the faculty and chair of the Management and Information Systems Department, the dean of the Mike Ilitch School of Business, faculty and chairs of Industrial & Systems Engineering and Computer Science Departments, the Academic Operations Committee of the College of Engineering, dean of the College of Engineering, the New Programs Committee of the Graduate School, the Graduate Council, the dean of the Graduate School, and the provost.