

**ESTABLISHMENT OF A MASTER OF SCIENCE  
PROGRAM IN DATA SCIENCE AND BUSINESS ANALYTICS WITH A STATISTIC  
CONCENTRATION**

**Recommendation**

It is recommended that the Board of Governors establish the Master of Science in Data Science and Business Analytics in the College of Liberal Arts and Sciences, effective Fall 2020. If approved, the Master of Science in Data Science and Business Analytics with a Statistics concentration from the Department of Mathematics will be offered along with the concentration options offered by the College of Engineering and the Mike Ilitch School of Business.

**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 has been 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. This proposal recommends to add the Statistics concentration to the three existing concentrations, as demand for talent with solid statistical foundations in industry is increasing. The new concentration will be offered by the Department of Mathematics in the College of Liberal Arts and Sciences. With regard to the program’s cross-cutting core learning outcomes, successful students will be able to:

- Demonstrate and understand 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 Statistics concentration will additionally be able to:

- Demonstrate the ability to create, modify and implement statistical models, based on a deeper understanding of ideas behind statistics, machine learning and their algorithms.

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 from an accredited college or university with sufficient background in mathematics, statistics and computer programming. 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 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. 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. The six credits for practicum may be replaced by two applied statistics courses for

the Statistics concentration if students elect to do so. These applied statistics courses typically include class projects. 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 four faculty co-directors, one director representing each academic department and its respective concentration area. The four 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 three 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. A new course code STA 7500 will be used for the practicum in the Statistics concentration, and the course will be run with the existing practicum in the other three concentrations: DSA 7500, DSB 7500 and DSE 7500. 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 is supported unanimously by all current track directors for the MS DSBA Program. The proposal was approved by the faculty and chair of the Department of Mathematics, the Dean in the College of Liberal Arts and Sciences, the New Programs Committee of the Graduate School, the Graduate Council, the Dean of the Graduate School, and the Provost.