# The University Senate of Michigan Technological University

### Proposal 16-13

(Voting Units: Academic)

## "Proposal for a New Certificate in Business Analytics"

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#### 1. Introduction

Business analytics describes the use of mathematical and statistical modeling to optimize business performance. Concomitant increases in computing power and the amount of data collected have led to the development and widespread adoption of analytics by numerous industries.

The proposed certificate in Business Analytics, sponsored by the Department of Mathematical Sciences and the School of Business and Economics (SBE) (and administered by the Department of Mathematical Sciences, will combine coursework in statistics, data mining, predictive analysis, and selected business disciplines, including marketing, operations and systems management, and management information systems. Graduates will present a combination of skills and conceptual understanding that will be highly valued by today's employers.

#### 2. Rationale

Mathematical Sciences is also proposing a concentration in Business Analytics within the Mathematics major. This certificate will offer a credential to students from other programs, particularly SBE, indicating proficiency in a number of related skills.

The proposed certificate is in an emerging interdisciplinary area, and for this reason should make it possible to recruit and retain more students.

#### 3. Details of catalog copy

1. Title: Certificate in Business Analytics

2. Catalog description: This certificate, offered by the Department of Mathematical Sciences and the School of Business and Economics, provides a foundation in the emerging field of Analytics, the use of statistics and mathematical modeling to optimize business performance. The requirements include coursework in mathematics, statistics, computing, and business applications.

3. List of courses

- MA2330 (Introduction to Linear Algebra) 3 credits
- MA2720 (Statistical Methods) (or MA2710 or MA3710) 3 credits
- MIS2100 (Introduction to Business Programming) (or CSA1121 or MA1600) 3 credits
- MIS3100 (Business Database Management) 3 credits
- MA3740 (Statistical Programming and Analysis) 3 credits
- MA4790 (Predictive Modeling) 3 credits
- CS4xxx (Data Mining) 3 credits
- Choose one of:
  - MKT3000 (Principles of Marketing) 3 credits
  - OSM3000 (Operations and Supply Chain Management) 3 credits
  - MIS3400 (Business Intelligence) 3 credits
- Total: 24 credits
- 4. Prerequisites

- MA2330 (MA1160 or MA1161)
- MA2720 (MA1020 or MA1030); MA2710 (MA1160 or MA1161); MA3710 (MA2160)
- MIS2100 (none): CS1121 (MA1031 or MA1032): MA1600 (MA1160 or MA1161)
- MIS3100 (MIS2000)
- MA3740 (MA2710 or MA2720 or MA3710)
- MA4790 (MA3740 or MA4710 or MA4720 or MA4780)
- CS4090 (((MIS3100 or CS4421) and MA2330 and (MA2710 or MA3710) and ((MA3740 and (CS1121 or CS1131)) or CS2321)) or permission of instructor)
- MKT3000 (none)
- OSM3000 (MA2710 or MA2720 or MA3710 or EET2010 or BUS2100)
- MIS3400 (MIS2000)

#### 4. New course descriptions

**MA4790 Predictive Modeling** Application, construction, and evaluation of statistical models used for prediction and classification. Topics include data visualization and exploratory methods, the normal theory regression model, logistic and Poisson regression, linear and quadratic discriminant analysis, and classification with logit models. Pre-Requisite(s): One of: MA3740, MA4710, MA4720, or MA4780. Credits: 3.0

**CS4xxx Data Mining** Data mining focuses on extracting knowledge from large data sources. This course introduces data mining concepts, methodology (including measurement, visualization, and evaluation), algorithms (including classification/regression, clustering, and association), and applications (such as web mining, recommendation systems, and bioinformatics). Pre-Requisite(s): ((MIS3100 or CS4421) and MA2330 and (MA2710 or MA3710) and ((MA3740 and (CS1121 or CS1131)) or CS2321)) or permission of instructor. Credits: 3.0

#### 5. Estimated costs

Because this certificate is based almost entirely on existing courses in Mathematical Sciences and SBE, no significant additional costs are anticipated. One new course is being developed in Mathematical Sciences, the cost of which can be absorbed in the departmental budget (Mathematical Sciences offers more than 175 sections per year, so the marginal cost is not significant). Also, one new course is being created in Computer Science, but that course probably would have been created independently of this proposal (it is in the research area of a new CS faculty member).

#### 6. Planned implementation date

Fall 2013

Introduced to Senate: 23 January 2013 Friendly Amendment (in blue): 29 January 2013 Approved by Senate: 6 February 2013 Approved by Administration: 11 February 2013