KENT STATE UNIVERSITY
CERTIFICATION OF CURRICULUM PROPOSAL

Preparation Date **5-Oct-15** Curriculum Bulletin _____

Effective Date **Fall 2016** Approved by EPC _____

Department	**ECON**
College	**BU - Business Administration**
Degree	**Minor (non degree)**
Program Name	**Data Analytics Minor** Program Banner Code DAAN
Concentration(s)	Concentration(s) Banner Code(s)
Proposal	**Establish program**

Description of proposal:

This proposal creates a new minor in Data Analytics. This program trains students to work with and think critically about data, skills which are increasingly valued in the workforce. Graduates of the economics department already find jobs based on their job skills and conversations with alumni suggest that additional courses would be useful and of interest to students.

Does proposed revision change program's total credit hours? ☐ Yes ☒ No

Current total credit hours: Proposed total credit hours 18

Describe impact on other programs, policies or procedures (e.g., duplication issues; enrollment and staffing considerations; need; audience; prerequisites; teacher education licensure):

The program is constructed based on existing coursework as well as additional courses offered by the economics department. Because of the existing courses, and the expertise of existing faculty, the program will require no new tenure-track faculty members.

Units consulted (other departments, programs or campuses affected by this proposal):

Accounting, Finance, Marketing, Management and Information Systems, Computer Science, Digital Science, Mathematics

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REQUIRED ENDORSEMENTS

_____ 10/06/15
Department Chair / School Director

_____ ___/___/___
Campus Dean (for Regional Campuses proposals)

_____ 10/6/2015
College Dean (or designee)

_____ ___/___/___
Dean of Graduate Studies (for graduate proposals)

_____ ___/___/___
Senior Vice President for Academic Affairs or Provost (or designee)

Interdepartmental Correspondence
College of Business Administration
Department of Economics

TO: Elizabeth Sinclair, Assistant Dean

FROM: Donald R. Williams, Chair, Economics DRW

DATE: October 7, 2015

SUBJECT: Proposal to establish minor in Data Analytics

Attached please find a proposal to establish a minor in Data Analytics, to be housed in the economics department. The minor requires that we establish two new courses, which have been submitted through the curricular workflow process. The proposals to establish the minor and the new courses have been approved unanimously by the Department of Economics Faculty Advisory Committee.

Please do not hesitate to contact me if there are any questions.

Proposal Summary

Establishment of a Minor in Data Analytics

Description of Action

The Department of Economics in the College of Business Administration at Kent State University proposes to create a new minor in Data Analytics. The focus of the program will be to train students to use data to inform decision-making and create solutions. Students will learn to acquire and collect raw data in various formats, convert raw data to usable formats and then understand how to appropriately analyze the data to draw accurate and useful conclusions.

Data analysis or analytics is one of the fastest growing areas of need among employers. Data is increasingly being gathered in large quantities in both the private sector as well as in government and the not-for-profit sectors. Employers need workers who understand how to collect and organize the large amount of information available. Most importantly, employers need workers who understand not only what can be done to analyze and interpret the data, but what should be done to draw appropriate conclusions.

Estimates from a variety of sources show a clear demand for workers with the ability to access, manipulate and interpret data. It is estimated that by 2018 there will be a need for 140,000-190,000 workers with deep analytical talent but more importantly, a need for an additional 1.5 million managers and analysts who have the ability to understand, work with and interpret data.[1] This need is driven by the increased use of data across many sectors and industries, including health care, manufacturing, finance and insurance, retail and government (McKinsey Global Institute, 2011).

The program draws on several existing courses in statistics, computer programming and applied data analysis. It also includes new courses focusing on more advanced topics in data analysis and the data acquisition path, from collection of raw information through data preparation for final analysis. The program requires 18-20 credit hours, a minimum of 15 credit hours of required coursework and a minimum of 3 credit hours of elective coursework (see Table 1).

Students are expected to begin with MIS 24056: Fundamentals of Business Statistics (or equivalent course) where they learn basic probability theory and hypothesis testing. Students will then take ECON 32050: Applied Econometrics I, ECON 32051: Applied Econometrics II, ECON 42050: Data Acquisition, Preparation and Visualization and a programming course. Students will be allowed to choose the programming course from a list of approved 3-4 credit hour courses. A fundamental understanding of computer programming and logic is essential for

[1] McKinsey Global Institute, 2011 (June). "Big data: The next frontier for innovation, competition and productivity." http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation

understanding how to prepare and analyze data; further courses will expand upon this basic competency.

ECON 32050: Applied Econometrics I is an existing required course in the economics major (previously titled Applied Econometrics). Students learn to analyze cross-sectional data with a focus on economic applications. Students use SAS and are introduced to standard Ordinary Least Squares regressions but with a focus on understanding the underlying assumptions of the model, when the model is appropriate, and what conclusions and predictions can (or cannot) be drawn from the data using the method. Students are also introduced to instrumental variable (IV) and probit estimation. Students are expected to complete a series of problem sets and an applied data project on an economics topic.

ECON 32051: Applied Econometrics II will introduce students to techniques for analyzing longitudinal and panel data, and will further explore estimation of and categorical outcomes using probit and logistic regression. Students will then learn methods for analyzing time series data and techniques for forecasting using economic and business data. Students will continue to work with data in SAS for panel data, and will be introduced to alternative software packages (such as Eviews) for time series data and will be expected to complete an applied project with an economics focus.

ECON 42050: Data Acquisition, Preparation and Visualization will focus on techniques for producing data for final analysis. Students will learn about existing data sources in economics and business and learn techniques for querying data from websites. Students will also learn to think about how data should be organized and defined to move from raw information into usable formats for data analysis. Students will also learn standard machine learning tools such as regression trees and LASSO estimation. Students will either use SAS, R, or an equivalent software package.

Finally, students will select a 3 credit hour elective course to complete the minor. Students can choose to either take a second programming course to refine programming skills or they can take an applied elective that will have a heavy emphasis on utilizing data to answer questions. Options include three economics courses with a heavy emphasis on data and data analysis that are taught each year: ECON 42072: Economics of Labor Markets, ECON 42068: Industrial Organization and ECON 42191: Senior Seminar. The former focuses on questions of work, schooling and pay while the latter focuses on market structures and business strategy. Students in these courses will be exposed to research in the disciplines, both of which are heavily focused on data analysis, and students will be expected to complete data projects.

Students will be required to complete ECON 22060: Principles of Microeconomics and MATH 11012 Intuitive Calculus (or MATH 12002: Analytical Geometry and Calculus) with a C- to declare the minor. Students must obtain a 2.0 grade in ECON 32050: Applied Econometrics I to

continue in the minor and must have a 2.5 grade point average in minor courses to graduate with the minor.

Table 1

MINOR PROGRAM REQUIREMENTS[1,2] (minimum 15 credits)					
Attribute	**Course**		**Title**	**Credits**	**Min Grade**
	MIS	24056	Fundamentals of Business Statistics (or equivalent)	3	C-
ELR	ECON	32050	Applied Econometrics I	3	C
	ECON	32051	Applied Econometrics II	3	
	ECON	42050	Data Acquisition and Preparation	3	
		Programming Requirement: Choose one from the following:			
	CS	13011/12	Computer Science IA and IB (see note 2)	4	
	DSCI	15310	Computational Thinking and Programming	3	
	MIS	34070	Programming Theory and Applications (see note 2)	3	
ADDITIONAL PROGRAM REQUIREMENTS (minimum 3 credits)					
		Elective requirement: Choose one of the following:			
		A second programming course			
	CS	23001	Data Structures and Abstraction (CS II) (see note 2)	4	
	MIS	44033	Advanced Computer Programming for Business (see note 2)	3	
		Or an Applied Economics Elective (or equivalent) (see note 3)			
	ECON	42068	Industrial Organization (see note 2)	3	
	ECON	42072	Economics of Labor Markets (see note 2)	3	
WIC	ECON	42191	Senior Seminar (see note 2)	3	
			MINIMUM TOTAL	**18**	

Program Notes:

1. To earn a College of Business Administration minor, students must complete at least 50 percent of the total required credit hours for the minor at Kent State University, at least 6 credit hours in the minor must be at the upper division (30-40000) level, and at least 6 credit hours in the minor must be different from courses in the student's major and minor(s). Students may not pursue a minor and a major in the same discipline.
2. Students are expected to satisfy course pre-requisites. Completion of ECON 22060 is required for ECON 32050 and MATH 11012 (or MATH 12002) will satisfy the math requirements for required courses. Pre-requisites will vary for major specific coursework.
3. Students may be allowed to choose an appropriate applied data course from their major discipline, subject to approval by their academic advisor.

Impact on Other Programs, Course Offerings, Students, Faculty, Staff

The program is not anticipated to have a negative effect on other programs or course offerings. The new courses in the program do not compete with any existing courses, the minor can be acquired by students from a variety of programs across the university without too much additional coursework. Existing faculty will be sufficient to teach the courses without harming other course offerings. While we do not anticipate problems, the inclusion of existing courses could affect enrollments in those courses depending on capacity constraints.

The two new courses will not need additional tenure-track faculty, but course schedules will be adjusted to cover the new courses. This will have no effect on the required courses in the BA in Economics or BBA in Economics programs but might change the scheduling of elective courses.

Fiscal, Enrollment, Facilities, and Staffing Considerations

Student demand is expected to be strong. Economics students would only need to take a few additional courses to complete the minor (but would satisfy the requirement of a minimum of 6 credit hours of unique coursework). The program will be particularly attractive to economics majors who are interested in expanding their quantitative skills. Graduates of the economics program have said that the current economics coursework helped them develop analytic and quantitative skills for their jobs but that they would have liked to take even more quantitative data courses. Furthermore, College of Business students in all programs will already have completed the required statistics course and learning more about data analysis will be attractive to students in all majors.

The program is also designed to be of interest to students outside of the College of Business Administration. The program is likely to be of interest to students in Computer Science, Digital Sciences and Mathematics (particularly the Actuarial Mathematics students who now take Applied Econometrics I, formerly titled Applied Econometrics). Given that the program is focused on the use of data to make decisions in many areas, it likely will also be attractive to students from science and social science programs that utilize data.

The program will not require any new tenure-track faculty members. The proposed minor utilizes several existing courses. The two new courses, Applied Econometrics II and Data Collection and Preparation, will be taught by faculty in the economics department or adjuncts from the professional community. Applied Econometrics II is already being proposed by the department as a stand-alone course and thus will already be available for the minor. Furthermore, the department of economics has a number of faculty members qualified to teach the proposed courses. In their research, Department of Economics faculty regularly utilize large datasets and employ a wide range of empirical methodologies chosen to fit the specific data and hypotheses being tested. Thus, department faculty have the training and practical experience in acquiring, preparing and analyzing data needed to teach students.

The program can easily be offered with existing facilities.

Evidence of Need and Sustainability if Establishing

Graduates of the economics department with a BA or BBA typically receive jobs based on their knowledge and ability to analyze data. These abilities are currently developed in ECON 32050: Applied Econometrics, as well as in applied electives. Graduates work in many sectors where data is used, frequently in jobs with the word "analyst" in the title. The minor would provide an opportunity for interested students to expand their quantitative skills and be introduced to

additional software packages used in industry. Having the minor on their transcript and the additional skills on their resume will benefit them when seeking jobs that increasingly rely on workers understanding data.

Need for the program extends beyond economics as data becomes more and more ubiquitous in business and government.[2] Students from many disciplines have the opportunity to meld the topical knowledge gained in their discipline with the skills desired in industry that will be taught in this program. There is a need for this blending of expertise because of the increased use of data across many industries in the private sector, including health care, manufacturing, finance and insurance, and retail as well as in government (McKinsey Global Institute, 2011).

Data from several sources indicates a growing need for workers with the ability to understand and work with data. Nearly 1.5 million managers and analysts who understand data will be needed to work with the projected 200,000 professionals with deep analytical ability (McKinsey Global Institute, 2011). This demand can be seen in projections of large increases in employment for occupations focused specifically on analyzing data (Table 2). Occupations typically associated with analyzing data are expected to grow nationally by 21% from 2012-2022. Growth in Ohio is expected to be similar at 18.3%.

Table 2: Employment Projections

	Employment change 2012-2022			
	National[1]		Ohio[2]	
Budget Analyst	3,800	6.2%	70	4.0%
Credit Analysis	6,400	10.4%	180	5.7%
Financial Analysts	39,400	15.6%	820	9.8%
Management Analysts	133,800	18.6%	3,360	14.6%
Market Research Analysts	131,500	31.6%	5,520	29.3%
Actuaries	6,300	25.9%	260	25.7%
Statisticians	7,300	26.4%	260	29.9%
Survey Researchers	3,200	17.8%	40	16.7%
Total	331,700	21.0%	10,510	18.3%

Notes:
1) Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections
2) Ohio Bureau of Labor Market Information, Office of Workforce Development, Department of Job & Family Services

Provisions for Phase-Out if Inactivating

Not Applicable.

[2] Burtch Works Executive Recruiting, 2014. "The Burtch Works Study: Salaries of Predictive Analytics Professionals." http://burtchworks.admin.haleywebsite.com/files/2014/07/Burtch-Works-Study_PAP-2014_FINAL.pdf

Timetable and Actions Required

September: Submission to Department for Approval

October: Submission to College of Business Administration Undergraduate Curriculum Committee for Approval

November: Submission to EPC

Fall 2016: Activation of program

Data Analytics Minor

College
College of Business Administration

Department
Department of Economics

Program Description
The minor in data analytics will train students to use data to inform decision-making and create solutions. Students will learn to acquire and collect raw data in various formats, convert raw data to usable formats and then understand how to appropriately analyze the data to draw accurate and useful conclusions. Graduates of the program will be able to use their skills across a wide-range of industries as well as in the non-profit and government sectors.

Requirements to declare the data analytics minor

- Completion of following courses (or their equivalent) with a minimum C- grade: ECON 22060 and MATH 11012 (or MATH 12002)

Requirements to graduate with data analytics minor

- Minimum 2.500 minor GPA. In computing the minor GPA, all attempts of 30000 and 40000 level courses are included in the calculation while only the highest grade for all attempts in 10000 and 20000 level courses are counted.
- Minimum C grade in ECON 32050.

Please read the sections in the University Catalog on Kent Core, diversity, writing-intensive and the experiential learning requirements.

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