

Proposal to develop an Online Graduate Certificate in Data Analytics

Introduction

In response to the growing demand for educational resources and skill development in the mining, management and interpretation of “Big Data,” a 15-credit hour online graduate certificate program will be provided to enable students to increase their knowledge and to prepare them for expanding opportunities in this high demand area.

The area of Data Analytics is broad, and the skill needs of professionals in this area span both technical data science capabilities and applied data analytics capabilities. As such, the certificate brings together courses that are foundational to knowledge and skill development in both data sciences and applied data analytics, in order to provide alternatives to develop a personalized plan to meet the needs of individual students in the program.

Based on market research and focus groups with corporate employees that express the need for access to this program, the program will be offered in an online format. A more extensive Needs Assessment and Program Demand evaluation can be found in Appendix A.

Curriculum Overview

Students in the program will be required to complete 12 hours of coursework chosen in consultation with a program advisor, plus the 3-credit hour capstone course. The courses available will be provided by a cross-disciplinary group of faculty in multiple departments. A list of current courses offered online and pending online development is provided in the attached program overview, but additional courses will be added as they become available. The courses chosen will depend on the student’s personal preparation and their professional needs. A minimum of two-thirds of the required credit hours, or ten credit hours, for the graduate certificate must be completed at Kansas State University.

The certificate will culminate with a 3-credit Capstone Design course, GENBA 894: Data Analytics Capstone, which will be taught by faculty from the participating departments. Students will have one of two options for the capstone course. In Option 1, the student will work with a team of fellow students on a project selected by the faculty. In Option 2, the student will work on a project to solve a data analytics or data science problem in their workplace. Either option must be approved and supervised by the faculty assigned to the course. The results will be used to assess learning related to the two educational objectives for all participants in the program:

1. Students will learn to analyze large data sets to provide insight for practical problems
2. Students will be able to relate patterns shown in the data to real-world situations and communicate the implications of these patterns to others not involved in the analysis

Program Administration

The Data Analytics certificate will be a cooperative interdisciplinary program of the colleges of business administration, arts and sciences, and engineering. Initially, the college of business administration will serve as the academic home for the program, coordinating administration of the program and providing administrative support. The associate dean for academic programs will provide leadership and coordinate the course schedule, and an administrative specialist will address inquiries from potential and existing students, admissions and graduation paperwork. These services will be financially supported by a program fee.

Academically, the program will be governed by a steering committee with representatives from the participating departments, currently computing and information sciences, industrial and manufacturing systems engineering, management, marketing, mathematics, statistics, and Global Campus. It will be the responsibility of this committee to provide input to curriculum and course scheduling, marketing and recruiting, admissions processes, and other activities related to the program. Significant program decisions will be initiated by this group (in consultation with appropriate administrators in their respective colleges) and will be reviewed and approved by the faculty who teach in the program.

Two faculty, initially Bongsug Chae for applied analytics and Shing Chang for data science, will serve as advisors for the program. The advisors will provide curriculum leadership, respond to student inquiries, evaluate student admissions, advise students and develop plans of study, as well as other academic related tasks necessary to implement the program. These services will be financially supported by a program fee.

Marketing for the program will be coordinated by Global Campus marketing and communications services unit in collaboration with the program steering committee and with the K-State division of communications and marketing services. A comprehensive marketing and outreach plan will be developed that will promote the program through print, electronic and other media and through direct contact with identified interest groups. In addition to promoting the program, the Global Campus student and faculty services unit, in consultation with other campus student services, will respond to and/or refer inquiries about the program and provide an array of support services to students in the program.

Financially, all courses in the program will have a similar tuition structure, adjusted for coordination with other courses in the individual disciplines. The initial tuition will be \$2,600 per course. See Appendix E for a more complete description of the financial model.

Admission Requirements

Students must have a 3.0 GPA and have successfully completed an undergraduate degree. All students entering the program must have at least one course in fundamental statistics (such as STAT 350: Business and Economics Statistics or STAT 325: Introduction to Statistics) and at least one course in Calculus (Business or Fundamental Calculus). Students should have an advanced level of comfort working with computer applications. Students in the data science track should have an understanding of computing programming fundamentals (such as CIS 200: Programming Fundamentals) and of data and programming structures (such as CIS 300: Data and Program Structures). Some courses available in the program may require significant additional preparation in computer systems, mathematics or statistics. See the separate grid in Appendix B that shows the minimum prerequisites required for each course.

Upon application to the program a program advisor will evaluate the potential student's foundational knowledge to participate in the program, outline a program of study and recommend the student for admission to the graduate school. Program advisors will also direct prospective students to courses and other resources that will enable students to acquire additional background in prerequisite areas for the program or individual courses that will make them stronger candidates for admission to the program. Upon acceptance by the graduate school, successful completion of this plan and approval by two members of the steering committee, students will be admitted and assigned to a program advisor, who will continue to consult with them as they progress throughout the program.

Curriculum Details

The certificate will offer courses in both data science and data analytics to enable students to learn how to mine and effectively communicate the meanings of large data sets. Courses in data science will provide an understanding of how to appropriately choose data manipulations and algorithms for effective data analysis. Courses in data analytics will enable students to relate patterns and communicate the implications of the data for real-world situations.

Students will be required to complete 12 credit hours from the list of approved courses below. (It is anticipated that additional courses will be approved and added in the future.) Each student will be required to take at least one course from each column in the Electives list to assure that they are gaining background in both data science and data analytics. Additional credits may be earned from the selection of elective courses. After the successful completion of 12 credit hours, students will be required to complete a 3 credit hour capstone course.

In accord with university policy, students may transfer up to five graduate credit hours that meet the requirements of the program. Transfer credits must be approved by the student's advisor.

Electives (3 hours each):

Data Science	Applied Analytics
MATH 725 The Mathematics of Data and Networks I Online development pending	*IMSE 785 Big Data Analytics
MATH 726 The Mathematics of Data and Networks II Online development pending	* MANGT 665 Business Analytics and Data Mining
* STAT 705 Regression and Analysis of Variance	* MANGT 670 Social Media Analytics and Web Mining
* STAT 730 Multivariate Statistical Methods	* MKTG 880 Advanced Business Intelligence for Strategic Decision Making
* CIS 730 Principles of Artificial Intelligence	*MKTG 881 Applied Business Data Analytics
*CIS 732 Machine Learning and Pattern Recognition	
*CIS 734 Introduction to Genomics and Bioinformatics	
*CIS 833 Information Retrieval and Text Mining Online fall 2017	

*Courses available online. See the separate grid in Appendix B for more detail regarding the minimum prerequisites required for each course.

Capstone Course (3 hours)

All students must complete the capstone course, GENBA 894: Data Analytics Capstone for 3 credits. This course is a hands-on, project-based course completed in cross-disciplinary groups. The capstone course will require students to work together on projects that will demonstrate their ability to collaboratively analyze large datasets, provide insight for practical problems and effectively communicate the resulting insights. This will assure interactive learning and will reflect real-world experience where graduates of the program will be expected to work on both

data science and data analytics tasks. At the conclusion of the project, the student will present results to the faculty and fellow students and receive feedback on their efforts.

Students will select one of two options for the capstone course with the approval and supervision of the faculty assigned to the course. In Option 1, the student will work with a team of fellow students to complete an applied analytics project under the direction of a team of faculty, representing both the data science and applied analytics specialties. In Option 2, the student will work on a project to solve a data analytics or data science problem in their workplace.

The capstone course will be offered each summer. The course will have a lead instructor whose disciplinary focus is on data analytics, most likely from the management, marketing, computer information systems or industrial and manufacturing systems engineering departments. The lead instructor role will rotate among the instructors participating in the program who are qualified to serve in this capacity. The lead instructor will be responsible for providing the course syllabus, securing the data and details for a case under Option 1, (preferably a live case provided by a business partner), working with student groups and ultimately providing for assessment of student work and grades. Under Option 2, the lead instructor and supporting faculty will work with students as they work on a problem in their workplace in collaboration with the employer and fellow employees. The lead instructor will be assisted by consulting faculty from statistics, mathematics and other participating departments as needed to provide presentations and instructional support in their areas of expertise.

Faculty will receive compensation from the college share of the revenue generated by the program revenue and based on college and department salary payment policies, on course enrollments and on the percentage of the course instruction the faculty member provides. A \$500 additional capstone fee for the course will be assessed to assure that there will be sufficient funds to compensate the faculty involved.

The capstone course will be managed by the College of Business Administration as part of its responsibility related to the academic administration of the program. This includes assigning lead and support instructors in consultation with their departments, assuring the course is offered to meet student needs, assuring that appropriate course assessment data is collected, and providing reports for review by the Data Analytics Steering Committee, made up of representatives of the participating departments.

Compensation amounts will be transferred directly to the college/department of the participating faculty member for salary payment. For a more detailed outline of the financial model for the program, see Appendix E.

Program Learning Goals and Assessment Plan

The program has two broad learning goals with six student learning outcomes:

1. Students will learn to analyze large data sets to provide insight for practical problems
2. Students will be able to relate patterns shown in the data to real-world situations and communicate the implications of these patterns to others not involved in the analysis

Learning goal 1 will be assessed with the following SLOs:

SLO 1. Data Preparation: Use of ETL techniques (Extract, Transform & Loading) for data cleaning and transformation

SLO 2. Model Building: Use of various modeling techniques (e.g., classification) and algorithms to the data, including feature selection and exploratory data analysis

SLO 3. Model Evaluation: Use of proper model validation (e.g., cross validation) and evaluation methods and performance metrics (e.g., prediction accuracy)

Learning goal 2 will be assessed with the following SLOs:

SLO 4. Business Understanding: Client's business (or problem domain) and project requirements

SLO 5. Data Assessment: Data & meta data acquisition, data quality assessment, data exploration, data visualization

SLO 6. Storytelling: Interpretation of model outputs, development of managerial and technical implications, presentation skills (e.g., clarity, organization)

Assessment Strategies

Student learning outcomes will be assessed in the capstone design course, GENBA 894. Students from both data analytics track and from data science track are expected to take the capstone design course in the last semester of their study. A mixture of students from both tracks will be chosen to form project groups.

Direct Measures: Group projects will be evaluated by the faculty through the capstone projects based on students' final report and presentation, as well as team peer and mentor evaluations. Student learning outcomes as well as professional conduct will be assessed in the final report and presentation. The rubric utilized for evaluation of these learning objectives is based on a Likert Scale of 1 to 5 with 1 being the worst performance and 5 the best performance.

Indirect Measures: None.

Number of students included in the assessment: Assessment of this program is through a capstone design course GENBA 894. All students must take this course to complete this program. All students will be included in the assessment.

Timetable: GENBA 894 is planned annually. Therefore, all SLOs will be assessed annually.

Graduate School
Proposed Degree Program or Certificate: Data Analytics
College: Arts and Sciences, Business Administration, Engineering and Global Campus
Assessment of Student Learning Plan

College, Department, and Date

College: Arts and Sciences, Business Administration, Engineering and Global Campus
Department: Management, Marketing, Mathematics, Statistics, Computer Science, Industrial and Manufacturing Systems Engineering
Date: 11/3/2015

Contact Person(s) for the Assessment Plan

David Stewart, Associate Dean, Global Campus
Shing Chang, Associate Professor, Industrial Engineering

Name of Proposed Degree Program or Certificate

Graduate Certificate in Data Analytics

Assessment of Student Learning Three-Year Plan

Student Learning Outcome(s)

List (or attach a list) all the student learning outcomes for the program.

The program has two broad learning goals with six student learning outcomes upon the finish of this certificate:

Students will learn to analyze large data sets to provide insight for practical problems
Students will be able to relate patterns shown in the data to real-world situations and communicate the implications of these patterns to others not involved in the analysis

Learning goal 1 will be assessed with the following SLOs:

SLO 1. Data Preparation: The ability to use of ETL techniques (Extract, Transform & Loading) for data cleaning and transformation

SLO 2. Model Building: The ability to use various modeling techniques (e.g., classification) and algorithms to the data, including feature selection and exploratory data analysis

SLO 3. Model Evaluation: The ability to use proper model validation (e.g., cross validation) and evaluation methods and performance metrics (e.g., prediction accuracy)

Learning goal 2 will be assessed with the following SLOs:

SLO 4. Business Understanding: The ability to convert client's business (or problem domain) into project requirements

SLO 5. Data Assessment: The ability to acquire data & meta data, to assess data quality assessment, and provide analysis in terms of data exploration and data visualization

SLO 6. Storytelling: The ability to interpret model outputs, develop managerial and technical implications and express oneself clearly, accurately, and professionally in both oral and written form

Indicate at least three outcomes on the above list that will be assessed by the first mid-cycle review.

All student learning outcomes will be assessed in the capstone design course, GENBA 894. Students from both data analytics track and from data science track are expected to take the capstone design course in the last semester of their study. A mixture of students from both tracks are chosen to form project groups.

Specify the rationale for selecting these learning outcomes: Since GENBA is offered every summer and all students need to take this course to earn the proposed certificate, all SLOs can be assessed in either the final reports or oral presentations.

Relationship to K-State Graduate Student Outcomes: An alignment matrix that maps the proposed SLOs and the graduate program student learning outcomes in terms of knowledge, skills, and attitudes and professional conduct is included in Appendix A.

Assessment Strategies

How will each of the learning outcomes be assessed?

Direct Measures *(If rubrics will be used to assess any aspect of the student learning outcomes, the rubrics should be included in Appendix B.)*

Group projects will be evaluated by a team of faculty through the capstone projects based on students' final report and presentation, as well as team peer and mentor evaluations. Student learning outcomes as well as professional conduct will be assessed in the final report and presentation. The rubric utilized for evaluation of these learning objectives is based on a four-point scale in which 1 is deficient, 2 is acceptable, 3 is proficient, and 4 is exemplary for all SLOs. Details of rubrics for each SLO can be found in Appendix B.

The expected student performance is that 80% of students should score 2 or better and 50% of students should score 3 or better for each SLO.

Indirect Measures *(Any surveys planned used should be in Appendix B.)*

The Program Steering Committee will adapt the Global Campus Graduate Survey that is distributed to graduates of all K-State distance programs. Questions that receive 85% response of "Strongly Agree" and "Agree" will indicate that the program has been successful in accomplishing its goals in those areas. Questions that receive 50% response of "Neutral" will indicate the program is acceptable. Questions that receive 25% response of "Disagree" or "Strongly Disagree" will indicate that the program has not been successful and requires improvements in those areas.

Number of students included in the assessment *(Provide a rationale if you plan to sample only of subset of the students)*

Every student who plans to earn the proposed certificate will be assessed since the capstone design course GENBA 894 is a required course.

Timetable *(When will these outcomes be assessed? How will the data be collected? When will the data be collected? Who will collect the data?)*

The student learning outcomes will be collected when students take the capstone design course GENBA 894. A team of instructors of GENBA 894 will provide direct assessment for each student learn outcome.

Students upon finishing the proposed certificate program will be given a chance to respond to a survey that provides the program assessment. The steering committee will review the survey results, annually most likely in the fall semester.

Results and Review of Student Learning Outcomes and Assessment Strategies

Describe the process the faculty will follow to review the results of assessment data.

Assessment results will be reviewed by the program steering committee annually to provide academic input for the program. The program steering committee is formed by faculty from the participating programs and representatives from Global Campus. The steering committee will meet annually to evaluate the student learning outcomes, program assessment, and assessment strategies. Since the capstone design course is planned to be offered in the summer and all assessment is performed in this course, the preferred steering committee meeting time is in the fall semester. Instructors of the capstone design course GENBA 894 will provide a summary SLO report at the conclusion of each offering for the steering committee to review and make recommendations. The academic home of the proposed certificate will administer and summarize the survey.

Describe any other program improvement procedures that will be followed (e.g. formative assessments of delivery method, corporate or employer surveys).

The Program Steering Committee will review surveys and assessments during its annual meeting and make adjustments in the program accordingly.

Appendix A: Alignment Matrix

Student Learning Outcomes	GENBA 894	Number of Students	Time Table
Knowledge			
SLO 2 Model Building	X	All	Every year
SLO 3 Model Evaluation	X	All	Every year
SLO 4 Business Understanding	X	All	Every year
SLO 5 Data Assessment	X	All	Every year
Skills			
SLO 1 Data Preparation	X	All	Every year
SLO 6 Storytelling	X	All	Every year
Professional Conduct Behave in a professional and ethical manner	X	All	Every year

X means direct measures in assessment.

Appendix B: Rubrics, Surveys, Other documentation

	1. Deficient	2. Acceptable	3. Proficient	4. Exemplary
SLO 1. Data Preparation: The ability to use of ETL techniques (Extract, Transform & Loading) for data cleaning and transformation				
Level of data preparation skills in written report.	__ Reflects unacceptably low level ability for data preparation.	__ Reflects acceptable level of ability for data preparation.	__ Reflects above average level of ability for data preparation.	__ Reflects outstanding level of ability for data preparation.
SLO 2 Model Building: The ability to use various modeling techniques (e.g., classification) and algorithms to the data, including feature selection and exploratory data analysis				
Level of model building ability reflected in written report.	__ Reflects unacceptable low level of ability for model building.	__ Reflects acceptable level of ability for model building.	__ Reflects above average level of ability for model building.	__ Reflects outstanding level of ability for model building.
SLO 3. Model Evaluation: The ability to use proper model validation (e.g., cross validation) and evaluation methods and performance metrics (e.g., prediction accuracy)				
Level of model evaluation ability reflected in written report.	__ Reflects unacceptably low level of ability for model evaluation.	__ Reflects acceptable level of ability for model evaluation.	__ Reflects above average level of ability for model evaluation.	__ Reflects outstanding level of ability for model evaluation.
SLO 4. Business Understanding: The ability to convert client's business (or problem domain) into project requirements				
Level of problem formulation ability reflected in written report.	__ Reflects unacceptably low level of ability for problem formulation.	__ Reflects acceptable level of ability for problem formulation.	__ Reflects above average level of ability for problem formulation.	__ Reflects outstanding level of ability for problem formulation.
SLO 5. Data Assessment: The ability to acquire data & meta data, to assess data quality assessment, and provide analysis in terms of data exploration and data visualization				
Level of Data Assessment ability reflected in the report.	__ Reflects unacceptable ability to express oneself clearly, accurately and professionally in writing	__ Reflects acceptable ability to express oneself clearly, accurately and professionally in writing.	__ Reflects above average ability to express oneself clearly, accurately and professionally in writing	__ Reflects outstanding ability to express oneself clearly, accurately and professionally in writing
SLO 6. Storytelling: The ability to interpret model outputs, develop managerial and technical implications and express oneself clearly, accurately, and professionally in both oral and written form				
Level of result interpretation skills reflected in the report.	__ Reflects unacceptable ability to interpret project results correctly.	__ Reflects acceptable ability to interpret project results correctly.	__ Reflects above average ability to interpret project results correctly.	__ Reflects outstanding ability to interpret project results correctly.

Level of communications skills reflected in the report.	<input type="checkbox"/> Reflects unacceptable ability to express oneself clearly, accurately and professionally in writing.	<input type="checkbox"/> Reflects acceptable ability to express oneself clearly, accurately and professionally in writing.	<input type="checkbox"/> Reflects above average ability to express oneself clearly, accurately and professionally in writing.	<input type="checkbox"/> Reflects outstanding ability to express oneself clearly, accurately and professionally in writing.
	1. Deficient	2. Acceptable	3. Proficient	4. Exemplary
Level of communications skills reflected in oral defense.	<input type="checkbox"/> Reflects unacceptable ability to orally express oneself clearly, accurately and professionally.	<input type="checkbox"/> Reflects acceptable ability to orally express oneself clearly, accurately and professionally.	<input type="checkbox"/> Reflects above average ability to orally express oneself clearly, accurately and professionally.	<input type="checkbox"/> Reflects outstanding ability to orally express oneself clearly, accurately and professionally.
Attitudes and Professional Conduct: The ability to engage in professional conduct, integrity, and ethical behavior.				
Level of attitude and professionalism reflected in the examination.	<input type="checkbox"/> Does not honor the needs and best interests of the profession or demonstrate a pattern of professional behavior such as, absence, tardiness, failure to complete tasks, or academic dishonesty.	<input type="checkbox"/> Reflects acceptable ability to honor the needs and best interests of the profession or demonstrate a pattern of professional behavior such as promptness, task completion, maintaining confidentiality, and academic honesty.	<input type="checkbox"/> Consistently and appropriately honors the needs and best interests of the profession demonstrating a pattern of professional behavior such as promptness, task completion, maintaining confidentiality, and	<input type="checkbox"/> Consistently and appropriately honors the needs and best interests of the profession demonstrating a pattern of professional behavior while actively seeks or leads opportunities to select or create

Program Development Team and Course Instructors

Appendix C provides information about the faculty involved in the program and the courses they will be instructing.

Endorsements

Participating departments have provided written endorsements for the program. The details of these endorsements are provided in Appendix D and in Appendix F, the Memorandum of Agreement.

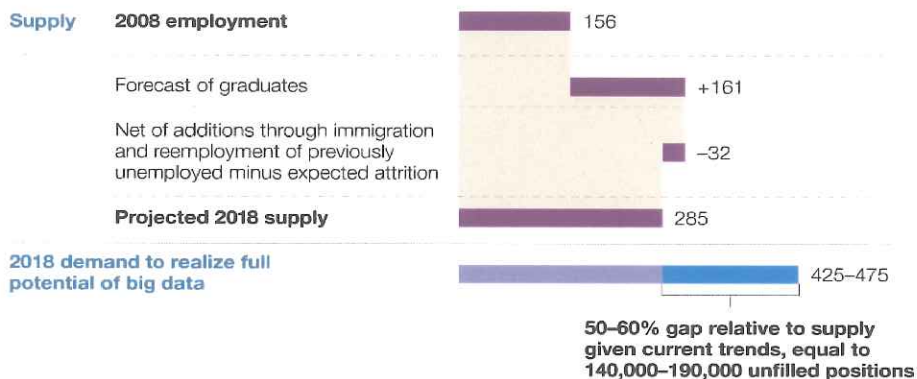
Appendix A - Needs Assessment and Program Demand

Data analytics/data science is a rapidly emerging requirement in today's world with broad application across many industries including business, education, finance, healthcare, and technology. In the past 5 years there has been a measured growth in the amount of available data unlike any other in human history.

There is an identified shortage for professionals with these skills in multiple market surveys based on current openings, and this shortage is expected to grow significantly. McKinsey and Company posted a study in June 2011 which indicates a job shortage of 140,000-190,000 "deep expertise" data analytics experts by 2018 (see graphic below). In addition, this study indicates that beyond just the needs for deep analytical talent there is a need for managers and analysts who are "data savvy", who can understand and relate to the data produced by the deep analysts and make sound business decisions based off this data. McKinsey and Company's study projects an additional shortfall of 1,500,000 FTEs with these skills by 2018.

Demand in the United States for people with deep expertise in data analysis could be greater than its projected supply in 2018.

Deep analytical talent, thousands of FTEs¹



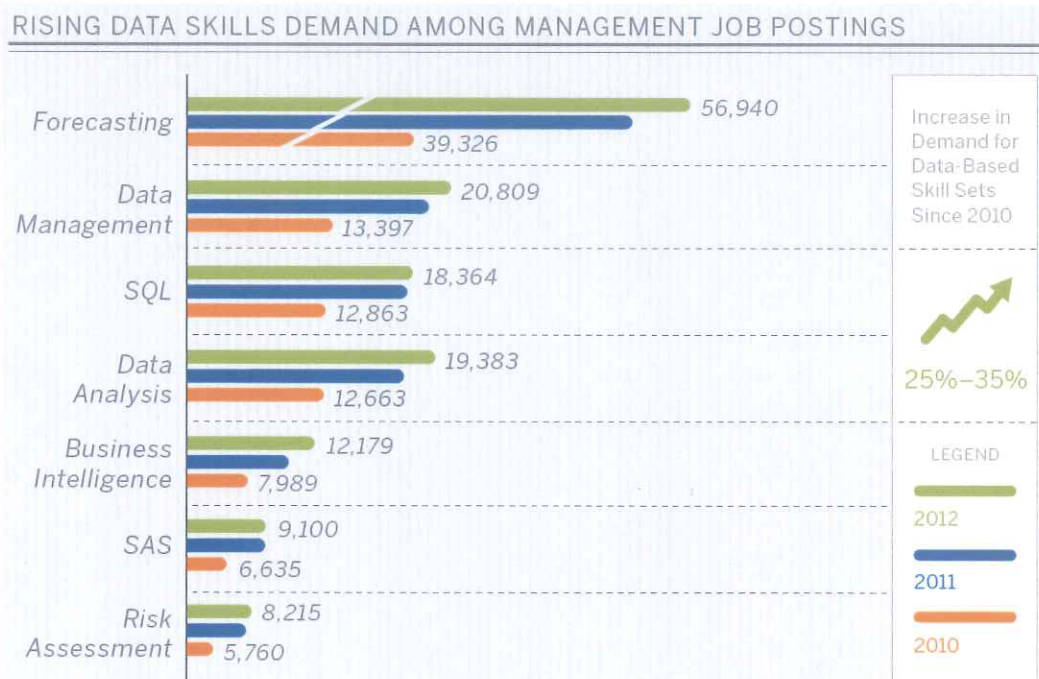
¹ Deep analytical talent are people who have advanced training with statistics or machine learning.
FTE = full-time equivalent.

Source: Dun & Bradstreet; company interviews; US Bureau of Labor Statistics; US Census Bureau; McKinsey Global Institute analysis

This tremendous growth in available data and shortage of professionals to work with it is heavily affecting multiple sectors of industry. We conducted focus groups earlier this year with representatives from local businesses, and they confirmed there is a definite need within their organizations for expertise in this area. All indicated the growth in data is a consideration in their future business needs. Most indicated they were either just getting started or growing in their need for data experts. While having experts who can mine, analyze and apply the data is critical, it is also important to industry that data scientists and analysts be able to relate data in understandable terms to management, customers and other stakeholders. In addition to data skills, other skills such as understanding the larger picture, critical thinking, strategic decision making and business intelligence were mentioned consistently. In all cases, the desire for qualified internal and external individuals was evident.

Job opening growth nationally is reflecting the trends stated by our focus groups. A study by the Educational Advisory Board shows a rising number of job openings are listing skills for data among management positions (see graphic below). It is becoming critical for professionals to be able to understand and work with the data sets within their organizations. Our focus groups confirmed that many organizations are seeking to use predictive analytics to their advantage on data sets which, while not always rising to the level of "Big Data", are simply too

large and overwhelming for the skill sets currently available. As more and more data becomes available to leverage, this problem will continue to grow for industry.



From Education Advisory Board: “How Will Big Data Reshape the Workforce”, 2013

Lastly, there is a potential window of opportunity within the market for a program offered by K-State. Relatively few data analytics programs available are online. As of an Educational Advisory Board study published last fall, only 7 of 20 programs profiled nationwide offered online programs. 3 of these were exclusively online. However, the urgency to take advantage of this opportunity now rather than later is very real. Since the EAB study, Berkeley has added an online program and it is highly likely more are in development. Another point to consider is that of the available programs, most are focused in the coastal areas with very few geographically close to K-State. This will allow us to market this program to businesses locally and regionally with little nearby competition.

Appendix B – Course Details and Prerequisites

Course Number	Course Title	Course Description (from catalog)	Course Prerequisites (from K-State catalog)	Course Prerequisites in general terms (for student advising)
IMSE 785	Big Data Analytics	Topics include big data management, data architecture of hosting big data, big data retrieval languages, parallel computing methods, big data analytical methods, and data visualization.	CIS 209: C Programming for Engineers (Has MATH 220 Calculus as a prerequisite) AND STAT 510: Introductory Probability and Statistics I: (Has MATH 221 as prerequisite) OR STAT 350: Business and Economic Statistics I (Has MATH 100 as a prerequisite)	Knowledge of object-oriented computer programming (e.g., C, Python)
MANGT 665	Business Analytics and Data Mining	In-depth study of a broad range of topics and techniques in business intelligence (BI), data mining, and database marketing (DM). Emphasis on fundamentals of relational database management, data warehousing as a business practice, customer relationship management (CRM), customer segmentation, various data mining techniques, data visualization, business performance management, use of scorecard/dashboard, and advanced BI and data mining software tools.	MANGT 366: Information Technology for Business (Has GENBA 166 or CIS 101, 102, and 103 as prerequisites) or equivalent.	General Admission Requirements (see page 2)

Course Number	Course Title	Course Description (from catalog)	Course Prerequisites (from K-State catalog)	Course Prerequisites in general terms (for student advising)
MANGT 670	Social Media Analytics and Web Mining	This course is an in-depth study of a broad range of topics and techniques in the areas of social media analytics, web mining and social network analysis. Emphasis is on fundamentals of data acquisition from the web and social media platforms, transformation of these unstructured data into structured format, advanced data processing techniques for analysis, business intelligence through web crawling, analysis of web and social media data using classification, clustering, and association techniques, sentiment analysis (or opinion mining) for business decisions, visualization of unstructured data, and social network analysis.	MANGT 366: Information Technology for Business (Has GENBA 166 or CIS 101, 102, and 103 as prerequisites) or equivalent introductory computing course.	General Admission Requirements
MATH 725	The Mathematics of Data and Networks I	Develops the mathematical tools necessary for studying and handling large data-sets and networks. Includes matrix, graph, and probability theory, dimensionality reduction, clustering, maximum likelihood, Bayesian networks, sparsification, modularity, information theory, hidden Markov chains, branching processes, electrical networks, internet mathematics, random walks, random graphs, random matrices, and search algorithms.	Recommended Prerequisites MATH 551: Applied Matrix Theory (Has MATH 205 or MATH 220 as prerequisites) AND MATH 222: Analytic Geometry and Calculus III (Has MATH 221 as prerequisite).	Knowledge of matrix theory and advanced calculus and geometry

Course Number	Course Title	Course Description (from catalog)	Course Prerequisites (from K-State catalog)	Course Prerequisites in general terms (for student advising)
MATH 726	The Mathematics of Data and Networks II	Continuation of MATH 725. Develops the mathematical tools necessary for studying and handling large data-sets and networks. Includes matrix, graph, and probability theory, dimensionality reduction, clustering, maximum likelihood, Bayesian networks, sparsification, modularity, information theory, hidden Markov chains, branching processes, electrical networks, internet mathematics, random walks, random graphs, random matrices, and search algorithms.	Recommended Prerequisites MATH 551: Applied Matrix Theory (Has MATH 205 or MATH 220 as prerequisites) AND MATH 222: Analytic Geometry and Calculus III (Has MATH 221 as prerequisite).	Knowledge of matrix theory and advanced calculus and geometry
MKTG 880	Advanced Business Intelligence for Strategic Decision Making	Business Intelligence is a systematic approach to harnessing customer data and competitive information to drive strategic business decision making. This course deals with how to collect and analyze business data to enhance quality of decision making in modern enterprises. Unlike courses based on data mining (inductive approach), this course will be largely based on regression techniques (deductive approach). The course will be based on lectures, case analysis, and hands on exercises to make students comfortable with powerful computing tools used for data analysis. The cases and exercises will be bundled with data which will be used to apply concepts learned in class to real business situations.	STAT 350 (Business and Economic Statistics I)	General Admission Requirements

Course Number	Course Title	Course Description (from catalog)	Course Prerequisites (from K-State catalog)	Course Prerequisites in general terms (for student advising)
MKTG 881	Applied Business Data Analytics	This course provides an understanding of the econometric and statistical methods of data analyses that can be applied to business problems. Students will develop skill using the practical software tools often used for data analysis in businesses. After completing this course, students will be able to understand and interpret the results of most of the econometric and statistical analyses used in data analyses. Furthermore, students should be able to successfully apply the appropriate methods in their own data analyses. Topics will include customer choice analysis, Segmentation and Targeting, Customer lifetime value, forecasting using Google Trends, Google ad words auction, etc.		General Admission Requirements
STAT 705	Regression and Analysis of Variance	Simple and multiple linear regression, analysis of covariance, correlation analysis, one-, two- and three-way analysis of variance; multiple comparisons; applications including use of computers; blocking and random effects.	One previous statistics course.	General Admission Requirements
STAT 730	Multivariate Statistical Methods	Multivariate analysis of variance and covariance; classification and discrimination; principal components and introductory factor analysis; canonical correlation; digital computing procedures applied to data from natural and social sciences.	STAT 705: Regression and Analysis of Variance (Has one previous statistics course as a prerequisite) OR STAT 713: Applied Linear Statistics Models (Has previous knowledge of matrix or linear algebra and one prior course in statistics as prerequisites)	

Course Number	Course Title	Course Description (from catalog)	Course Prerequisites (from K-State catalog)	Course Prerequisites in general terms (for student advising)
CIS 730	Principles of Artificial Intelligence	Introduction to the fundamental concepts and techniques of AI: problem solving, search and planning, knowledge representation and qualitative reasoning, expert systems, natural language processing and cognitive modeling, computer vision, and machine learning.	CIS 501: Software Architecture and Design (Has CIS 300 Data and Programming Structures and CIS 200 Programming Fundamentals as prerequisites)	Knowledge of regression and analysis of variance Or Knowledge of linear statistics models
CIS 732	Machine Learning and Pattern Recognition	Theory and methodology of inductive learning, including decision trees, artificial neural networks, probabilistic and instance-based learning, and inductive logic programming; unsupervised and reinforcement learning, bagging and boosting; genetic algorithms and genetic programming; and applications to data mining.	CIS 501: Software Design And Architecture (Has CIS 300 as a prerequisite) OR CIS 575: Introduction to Algorithm Analysis (Has CIS 300, CIS 301, and MATH 510 as prerequisites)	Knowledge of software architecture and design
CIS 734	Introduction to Genomics and Bioinformatics	A problem solving approach to understanding genomics and bioinformatics. Practical use of databases and web-based tools used to study biological problems. Introduction to the algorithms behind these tools.	(BIOL 450: Modern Genetics (Has BIOL 198, CHM 230, and MATH 100 as prerequisites) OR CIS 300: Data and Program Structures (Has CIS 200 as prerequisite) AND Instructor Permission	Knowledge of software architecture and design Or Knowledge of computer algorithm analysis
CIS 833	Information Retrieval and Text Mining	Theory and practice of search engines for retrieving textual information; basic and advanced topics, with emphasis on newer technologies that go beyond simple keyword search; the use of MapReduce framework to process large collections of documents.	CIS 732: Machine Learning and Pattern Recognition (Has CIS 501 or CIS 575 as prerequisites) AND Instructor Permission	Knowledge of machine learning and pattern recognition AND instructor permission

Appendix C – Program Development Team and Course Instructors

Program Development Team:

College of Arts and Sciences	Andy Bennett, Department of Math Pietro Poggi-Corradini, Department of Math Gary Gadbury, Department of Statistics
College of Business Administration	Kevin Gwinner, Interim Dean Stacy Kovar, Associate Dean Bill Turnley, Department of Management Chwen Sheu, Department of Management Bongsug Chae, Department of Management Esther Swilley, Department of Marketing Jaebeom Suh, Department of Marketing
College of Engineering	Scott DeLoach, Department of Computing and Information Sciences Gurdip Singh, Department of Computing and information Sciences William Hsu, Department of Computing and Information Sciences Bradley Kramer, Department of Industrial and Manufacturing Systems Engineering Shing Chang, Department of Industrial and Manufacturing Systems Engineering

Course Instruction:

CIS 730: Principles of Artificial Intelligence	Bill Hsu, Assoc. Prof. of Computing and Information Sciences, Graduate Faculty
CIS 732: Machine Learning and Pattern Recognition	Bill Hsu, Assoc. Prof. of Computing and Information Sciences, Graduate Faculty
CIS 734: Introduction to Genomics and Bioinformatics	Doina Caragea, Assoc. Prof. of Computing and Information Sciences, Graduate Faculty
CIS 833: Information Retrieval and Text Mining	Doina Caragea, Assoc. Prof. of Computing and Information Sciences, Graduate Faculty
IMSE 785: Big Data Analytics	Shing Chang, Assoc. Prof. of Industrial and Manufacturing Systems Engineering, Graduate Faculty
MANGT 665: Business Analytics and Data Mining	Bongsug Chae, Professor of Management, Graduate Faculty
MANGT 670: Social Media Analytics and Web Mining	Bongsug Chae, Professor of Management, Graduate Faculty
MKTG 880: Advanced Business Intelligence for Strategic Decision Making	Jaebeom Suh, Assoc. Prof. of Marketing, Graduate Faculty
MKTG 881: Applied Business Data Analytics	TBD
MATH 725: The Mathematics of Data Networks I	(Pending development)
MATH 726: The Mathematics of Data Networks II	(Pending development)

STAT 705: Regression and Analysis of Variance

STAT 730: Multivariate Statistical Methods

Karen Keating, Instructor in Department of
Statistics, Graduate Faculty

Perla Reyes, Assist. Professor of Statistics,
Graduate Faculty

Appendix D - Endorsements

Department of Marketing:

The Department of Marketing strongly supports the proposed online certificate program in data science and analytics. We have had representation throughout the development of this certificate proposal and find value to potential students and our faculty in offering the program. We are especially proud and excited about the interdisciplinary approach to this certificate. By taking skills from different functional areas on campus, a certificate program has been created that will add value far beyond what could have been accomplished through a single department.

Our department appreciates the need/demand among working professionals for such a certificate, especially one delivered using distance education. We have the faculty expertise to offer the proposed marketing course (currently in development) in this area and are committed to offering the course on a regular basis to allow for students to successfully complete the certificate on a reasonable time frame.

Esther Swilley, Interim Head
Associate Professor
Department of Marketing
College of Business Administration

Department of Management:

The Department of Management supports the proposed online certificate program in data science and analytics. We believe the inter-disciplinary nature of the program is important. This approach will allow for the utilization of the unique strengths of several departments and allow us to better meet the needs of the students and the desires of employers.

Our department has been actively involved in the planning process and we are comfortable with our role in this program. Our faculty have the expertise to offer the two management courses that will be included in the certificate (MANGT 665 - Business Analytics and Data Mining and MANGT 670 - Social Media Analytics and Web Mining).

William Turnley
Interim Department Head and Professor
Department of Management
College of Business Administration

Department of Computing and Information Sciences:

The Department of Computing and Information Sciences support the proposed certificate program and data science and analytics. Our department has been involved in the planning process and understands our role. Our faculty has the expertise and desire to provide four courses in the program on a regular basis: CIS 730, 732, 734, and 833.

Scott A. DeLoach
Professor and Interim Department Head
Department of Computing & Information Sciences

Department of Statistics:

We expect to be able to accommodate increased enrollment in our current online Stat 705 and 730, based on projected numbers of new students in the first couple of years. We anticipate that these students may be in a separate section that will run concurrently under the same instructor as the other section.

We are not opposed to participation in the steering committee.

Weixing Song, Interim Head
Associate Professor, Department of Statistics
Kansas State University

Department of Industrial and Manufacturing Systems Engineering:

The faculty of the Department of Industrial and Manufacturing Systems Engineering supports the delivery of the proposed certificate program in data science and analytics. Through the efforts of Dr. Shing Chang, our faculty have been actively engaged in the planning and development of this interdisciplinary certificate. We are committed to regularly offering IMSE 785 to support both our own distance graduate programs as well as this graduate certificate.

Bradley A. Kramer
Professor and Department Head
Ike and Letty Evans Engineering Chair

Department of Mathematics:

The department of mathematics endorses the proposal. We plan to offer Math 725 and 726 as long as there is sufficient student interest.

Andrew G. Bennett
Professor and Department Head
Department of Mathematics

Appendix E – Financial Model

Global Campus - Data Analytics (\$2,600 per 3 hour course)

	Year 1 - FY2016 (5 courses)					Year 2 - FY2017 (5 courses)					Year 3 - FY2018 (5 courses)				
	Dept.	Central	Global	Coord	Total	Dept.	Central	Global	Coord	Total	Dept.	Central	Global	Coord	Total
Revenue:															
Fall Semester															
Credit Hours					6					6					9
Students/Class					10					15					20
Tuition/Fee Revenue	23,660	11,424	8,922	7,994	52,000	35,491	17,136	13,383	11,991	78,000	70,981	34,272	26,766	23,981	156,001
Spring Semester															
Credit Hours					6					6					9
Students/Class					10					15					20
Tuition/Fee Revenue	23,660	11,424	8,922	7,994	52,000	35,491	17,136	13,383	11,991	78,000	70,981	34,272	26,766	23,981	156,001
Summer															
Credit Hours					3					6					6
Students/Class					10					15					20
Tuition/Fee Revenue	11,830	5,712	4,461	3,997	26,000	35,491	17,136	13,383	11,991	78,000	47,321	22,848	17,844	15,988	104,000
Total Annual Revenue	59,151	28,560	22,305	19,985	130,001	106,472	51,408	40,149	35,972	234,001	189,283	91,392	71,376	63,950	416,002
On Campus Tuition - Split 50/50 Central & Dept.	380.80														
Global Campus	148.70														
Program Fee - Department	203.94														
Program Fee - Coordination	133.23														
Credit Hour Cost	866.67														
Capstone course will have an additional \$500 fee which will be provided to the Department(s) providing instruction for that course.															

Appendix F – Memorandum of Agreement

Between the College of Arts and Sciences, the Department of Mathematics, the Department of Statistics, the College of Business Administration, the Department of Management, the Department of Marketing, the College of Engineering, the Department of Computing and Information Sciences, the Department of Industrial and Manufacturing Systems Engineering and K-State Global Campus

for the online delivery and support of the

Data Analytics Graduate Certificate

August 12, 2015

This memorandum of agreement is established between the College of Arts and Sciences, the Department of Mathematics, the Department of Statistics, the College of Business Administration, the Department of Management, the Department of Marketing, the College of Engineering, the Department of Computing and Information Sciences, the Department of Industrial and Manufacturing Systems Engineering, and the K-State Global Campus for the purpose of providing support and sustainability for the online delivery of the interdisciplinary Data Analytics Graduate Certificate (the program).

The Department of Mathematics agrees to provide online courses, MATH 725: The Mathematics of Data and Networks I and MATH 726: The Mathematics of Data and Networks II, identified as electives for the program. The department will also provide consultation to students in the program regarding other relevant course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The Department of Statistics agrees to provide online courses, STAT 705: Regression and Analysis of Variance, and STAT 730: Multivariate Statistical Methods, identified as electives in the program. The department will also provide consultation to students in the program regarding other relevant course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The College of Arts and Sciences agrees to provide general in kind support for the Department of Mathematics and the Department of Statistics and their students in the program, including facilitation of revenue transfers to the departments, assisting with academic advising and general administrative support.

The Department of Management agrees to provide online courses, MANGT 665: Business Analytics and Data Mining, MANGT 670: Social Media Analytics and Web Mining, identified as electives in the program. The department will also provide consultation to students in the program regarding other relevant course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The Department of Marketing agrees to provide online courses, MKTG 880: Advanced Business Intelligence for Strategic Decision Making, MKTG 881: Applied Business Data Analytics, identified as electives in the program. The department will also provide consultation to students in the program regarding other relevant

course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The College of Business Administration agrees to serve as the academic home for the program, designating the associate dean for academic programs as the program director. The College agrees to provide administrative support for the program, subject to financial limitations imposed by the extent of the coordination fee provided to the College. The college agrees to provide general in kind support for the Department of Management and the Department of Marketing and their students in the program, assisting with academic advising and general administrative support.

The Department of Computing and Information Sciences agrees to provide online courses, CIS 730: Principles of Artificial Intelligence, CIS 732: Machine Learning Recognition, CIS 734: Introduction to Genomics and Bioinformatics, and CIS 833: Information Retrieval and Text Mining, identified as electives in the program. The department will also provide consultation to students in the program regarding other relevant course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The Department of Industrial and Manufacturing Systems Engineering agrees to provide the online course, IMSE 785: Big Data Analytics, identified as an elective in the program. The department will also provide consultation to students in the program regarding other relevant course electives in the department that may enhance the student's learning experience. The department will provide faculty support for students in the GENBA 894: Data Analytics Capstone course, consistent with the separate plan set forth in the attachment of this agreement. The department through its designated representative agrees to serve as an active participant on the program steering committee.

The College of Engineering agrees to provide general in kind support for the Department of Computing and Information Sciences and the Department of Industrial and Manufacturing Engineering Systems and their students in the program, including facilitation of revenue transfers to the departments, assisting with academic advising and general administrative support.

K-State Global Campus agrees to provide marketing, coordination, student and faculty services and other support services for the online delivery of the program. Global Campus agrees to provide financial management for the program by monitoring enrollments, facilitating the transfer of revenues to the departments, colleges and the university, and providing financial reports to the program steering committee. Global Campus agrees to provide financial support from its internal grant funding program for continued growth and enhancement of the program. Global Campus through its designated representative also agrees to serve as an active participant on the program steering committee.

It is agreed that the program will be supported and sustained by tuition revenues received from course enrollments. Courses for the program will be offered through Global Campus and assessed a common tuition fee, initially \$2,600 per course. Revenues will be distributed by Global Campus to support the academic administrative services required by the program and department costs for course instruction. Accordingly, Global campus will distribute tuition revenues as follows for each credit hour generated by students enrolled in the Certificate program:

On-campus graduate tuition amount	Split 50% to the College/Department and 50% to Central Administration
-----------------------------------	---

Additional tuition	Global Campus will be supported by the distance education tuition assessed for each credit hour.
	The College of Business will be compensated for its administrative support of the program through a fee of 133.33 per credit hour from the tuition revenues in excess of the on-campus tuition amount
	Remaining tuition revenues in excess of the on campus amount will be distributed to the college/department teaching the student credit hours involved.

An additional capstone fee of \$500 will be charged for the capstone course (GENBA 894) to be directed toward faculty compensation needs for the course as specified in the attached agreement. This agreement and the program will be reviewed annually by the steering committee that will recommend any needed adjustments to the participating colleges and departments.

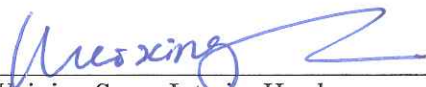
This agreement expires one year from the date of the last signature. Participating colleges and departments will review and re-sign the agreement at the annual meeting of the steering committee.



Andrew G. Bennett, Head
Department of Mathematics

10/12/15

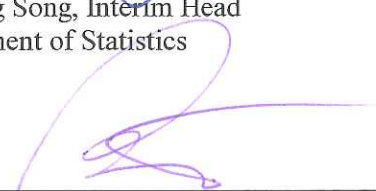
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Weixing Song, Interim Head
Department of Statistics

10/12/15

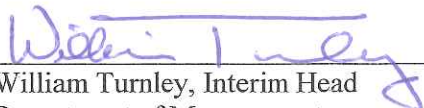
Date



Peter Dorhout, Dean
College of Arts and Sciences

10/12/2015

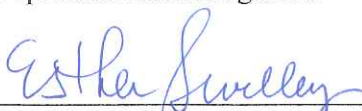
Date



William Turnley, Interim Head
Department of Management

10/12/15

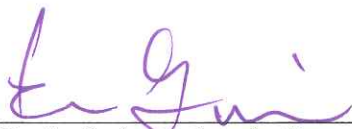
Date



Esther Swilley, Interim Head
Department of Marketing

10-13-15

Date



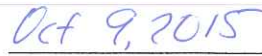
Kevin Gwinner, Interim Dean
College of Business Administration

10-9-15

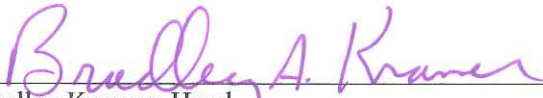
Date



Scott DeLoach, Interim Head
Department of Computing and Information Sciences



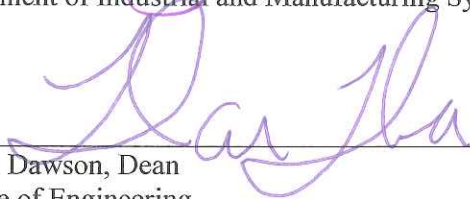
Date



Bradley Kramer, Head
Department of Industrial and Manufacturing Systems Engineering



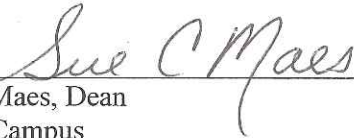
Date



Darren Dawson, Dean
College of Engineering



Date



Sue C. Maes, Dean
Global Campus



Date

Graduate School
Proposed Degree Program or Certificate: Data Analytics
College: Arts and Sciences, Business Administration, Engineering and Global
Campus
Assessment of Student Learning Plan

College, Department, and Date

College: Arts and Sciences, Business Administration, Engineering and Global Campus
Department: Management, Marketing, Mathematics, Statistics, Computer Science,
Industrial and Manufacturing Systems Engineering
Date: 11/3/2015

Contact Person(s) for the Assessment Plan

David Stewart, Associate Dean, Global Campus
Shing Chang, Associate Professor, Industrial Engineering

Name of Proposed Degree Program or Certificate

Graduate Certificate in Data Analytics

Assessment of Student Learning Three-Year Plan

Student Learning Outcome(s)

List (or attach a list) all the student learning outcomes for the program.

The program has two broad learning goals with six student learning outcomes upon the finish of this certificate:

Students will learn to analyze large data sets to provide insight for practical problems
Students will be able to relate patterns shown in the data to real-world situations and communicate the implications of these patterns to others not involved in the analysis

Learning goal 1 will be assessed with the following SLOs:

SLO 1. Data Preparation: The ability to use of ETL techniques (Extract, Transform & Loading) for data cleaning and transformation

SLO 2. Model Building: The ability to use various modeling techniques (e.g., classification) and algorithms to the data, including feature selection and exploratory data analysis

SLO 3. Model Evaluation: The ability to use proper model validation (e.g., cross validation) and evaluation methods and performance metrics (e.g., prediction accuracy)

Learning goal 2 will be assessed with the following SLOs:

SLO 4. Business Understanding: The ability to convert client's business (or problem domain) into project requirements

SLO 5. Data Assessment: The ability to acquire data & meta data, to assess data quality assessment, and provide analysis in terms of data exploration and data visualization

SLO 6. Storytelling: The ability to interpret model outputs, develop managerial and technical implications and express oneself clearly, accurately, and professionally in both oral and written form

Indicate at least three outcomes on the above list that will be assessed by the first mid-cycle review.

All student learning outcomes will be assessed in the capstone design course, GENBA 894. Students from both data analytics track and from data science track are expected to take the capstone design course in the last semester of their study. A mixture of students from both tracks are chosen to form project groups.

Specify the rationale for selecting these learning outcomes: Since GENBA is offered every summer and all students need to take this course to earn the proposed certificate, all SLOs can be assessed in either the final reports or oral presentations.

Relationship to K-State Graduate Student Outcomes: An alignment matrix that maps the proposed SLOs and the graduate program student learning outcomes in terms of knowledge, skills, and attitudes and professional conduct is included in Appendix A.

Assessment Strategies

How will each of the learning outcomes be assessed?

Direct Measures *(If rubrics will be used to assess any aspect of the student learning outcomes, the rubrics should be included in Appendix B.)*

Group projects will be evaluated by a team of faculty through the capstone projects based on students' final report and presentation, as well as team peer and mentor evaluations. Student learning outcomes as well as professional conduct will be assessed in the final report and presentation. The rubric utilized for evaluation of these learning objectives is based on a four-point scale in which 1 is deficient, 2 is acceptable, 3 is proficient, and 4 is exemplary for all SLOs. Details of rubrics for each SLO can be found in Appendix B. The expected student performance is that 80% of students should score 2 or better and 50% of students should score 3 or better for each SLO.

Indirect Measures *(Any surveys planned used should be in Appendix B.)*

The Program Steering Committee will adapt the Global Campus Graduate Survey (see Appendix B below) that is distributed to graduates of all K-State distance programs, concentrating on Questions 7-24. Questions that receive 85% response of "Strongly Agree" and "Agree" will indicate that the program has been successful in accomplishing its goals in those areas. Questions that receive 50% response of "Neutral" will indicate the program is acceptable. Questions that receive 25% response of "Disagree" or "Strongly Disagree" will indicate that the program has not been successful and requires improvements in those areas.

Number of students included in the assessment *(Provide a rationale if you plan to sample only of subset of the students)*

Every student who plans to earn the proposed certificate will be assessed since the capstone design course GENBA 894 is a required course.

Timetable (*When will these outcomes be assessed? How will the data be collected? When will the data be collected? Who will collect the data?*)

The student learning outcomes will be collected when students take the capstone design course GENBA 894. A team of instructors of GENBA 894 will provide direct assessment for each student learn outcome.

Students upon finishing the proposed certificate program will be given a chance to respond to a survey that provides the program assessment. The steering committee will review the survey results, annually most likely in the fall semester.

Results and Review of Student Learning Outcomes and Assessment Strategies

Describe the process the faculty will follow to review the results of assessment data. Assessment results will be reviewed by the program steering committee annually to provide academic input for the program. The program steering committee is formed by faculty from the participating programs and representatives from Global Campus. The steering committee will meet annually to evaluate the student learning outcomes, program assessment, and assessment strategies. Since the capstone design course is planned to be offered in the summer and all assessment is performed in this course, the preferred steering committee meeting time is in the fall semester. Instructors of the capstone design course GENBA 894 will provide a summary SLO report at the conclusion of each offering for the steering committee to review and make recommendations. The academic home of the proposed certificate will administer and summarize the survey.

Describe any other program improvement procedures that will be followed (e.g. formative assessments of delivery method, corporate or employer surveys).

The Program Steering Committee will review surveys and assessments during its annual meeting and make adjustments in the program accordingly.

Appendix A: Alignment Matrix

Student Learning Outcomes	GENBA 894	Number of Students	Time Table
Knowledge			
SLO 2 Model Building	X	All	Every year
SLO 3 Model Evaluation	X	All	Every year
SLO 4 Business Understanding	X	All	Every year
SLO 5 Data Assessment	X	All	Every year
Skills			
SLO 1 Data Preparation	X	All	Every year
SLO 6 Storytelling	X	All	Every year
Professional Conduct Behave in a professional and ethical manner	X	All	Every year

X means direct measures in assessment.

Appendix B: Rubrics, Surveys, Other documentation

	1. Deficient	2. Acceptable	3. Proficient	4. Exemplary
SLO 1. Data Preparation: The ability to use of ETL techniques (Extract, Transform & Loading) for data cleaning and transformation				
Level of data preparation skills in written report.	__ Reflects unacceptably low level ability for data preparation.	__ Reflects acceptable level of ability for data preparation.	__ Reflects above average level of ability for data preparation.	__ Reflects outstanding level of ability for data preparation.
SLO 2 Model Building: The ability to use various modeling techniques (e.g., classification) and algorithms to the data, including feature selection and exploratory data analysis				
Level of model building ability reflected in written report.	__ Reflects unacceptable low level of ability for model building.	__ Reflects acceptable level of ability for model building.	__ Reflects above average level of ability for model building.	__ Reflects outstanding level of ability for model building.
SLO 3. Model Evaluation: The ability to use proper model validation (e.g., cross validation) and evaluation methods and performance metrics (e.g., prediction accuracy)				
Level of model evaluation ability reflected in written report.	__ Reflects unacceptably low level of ability for model evaluation.	__ Reflects acceptable level of ability for model evaluation.	__ Reflects above average level of ability for model evaluation.	__ Reflects outstanding level of ability for model evaluation.
SLO 4. Business Understanding: The ability to convert client's business (or problem domain) into project requirements				
Level of problem formulation ability reflected in written report.	__ Reflects unacceptably low level of ability for problem formulation.	__ Reflects acceptable level of ability for problem formulation.	__ Reflects above average level of ability for problem formulation.	__ Reflects outstanding level of ability for problem formulation.
SLO 5. Data Assessment: The ability to acquire data & meta data, to assess data quality assessment, and provide analysis in terms of data exploration and data visualization				
Level of Data Assessment ability reflected in the report.	__ Reflects unacceptable ability to express oneself clearly, accurately and professionally in writing.	__ Reflects acceptable ability to express oneself clearly, accurately and professionally in writing.	__ Reflects above average ability to express oneself clearly, accurately and professionally in writing.	__ Reflects outstanding ability to express oneself clearly, accurately and professionally in writing.
SLO 6. Storytelling: The ability to interpret model outputs, develop managerial and technical implications and express oneself clearly, accurately, and professionally in both oral and written form				
Level of result interpretation skills reflected in the report.	__ Reflects unacceptable ability to interpret project results correctly.	__ Reflects acceptable ability to interpret project results correctly.	__ Reflects above average ability to interpret project results correctly.	__ Reflects outstanding ability to interpret project results correctly.
Level of communications skills reflected in the report.	__ Reflects unacceptable ability to express oneself clearly, accurately and professionally in writing.	__ Reflects acceptable ability to express oneself clearly, accurately and professionally in writing.	__ Reflects above average ability to express oneself clearly, accurately and professionally in writing.	__ Reflects outstanding ability to express oneself clearly, accurately and professionally in writing.

	1. Deficient	2. Acceptable	3. Proficient	4. Exemplary
Level of communications skills reflected in oral defense.	__ Reflects unacceptable ability to orally express oneself clearly, accurately and professionally.	__ Reflects acceptable ability to orally express oneself clearly, accurately and professionally.	__ Reflects above average ability to orally express oneself clearly, accurately and professionally.	__ Reflects outstanding ability to orally express oneself clearly, accurately and professionally.
Attitudes and Professional Conduct: The ability to engage in professional conduct, integrity, and ethical behavior.				
Level of attitude and professionalism reflected in the examination.	__ Does not honor the needs and best interests of the profession or demonstrate a pattern of professional behavior such as, absence, tardiness, failure to complete tasks, or academic dishonesty.	__ Reflects acceptable ability to honor the needs and best interests of the profession or demonstrate a pattern of professional behavior such as promptness, task completion, maintaining confidentiality, and academic honesty.	__ Consistently and appropriately honors the needs and best interests of the profession demonstrating a pattern of professional behavior such as promptness, task completion, maintaining confidentiality, and academic honesty.	__ Consistently and appropriately honors the needs and best interests of the profession demonstrating a pattern of professional behavior while actively seeks or leads opportunities to select or create appropriate new forums to become involved the profession.

Global Campus Graduate Survey:

Survey Description:

We are committed to giving our distance/online students an opportunity to share their experiences with K-State Global Campus and Kansas State University. We appreciate your response to the survey as your feedback is very important and will be used to improve student services and distance education offerings.

Opening Instructions:

Your answers are voluntary and anonymous. If a question does not apply to you, please check the Did Not Use/NA button.

Default Question Block

Question 1:

Which program did you complete via distance at Kansas State University?

- ☐ Bachelor's
- ☐ Master's
- ☐ Doctorate

Question 2:

Please select the appropriate Ph.D. degree program(s) from the list below. Select all that apply.

- ☐ Personal Financial Planning
- ☐ Other:

Question 3:

Please select the appropriate Master's degree program(s) from the list below. Select all that apply.

- ☐ Academic Advising
- ☐ Adult and Continuing Education
- ☐ Agribusiness
- ☐ Agricultural Education and Communication (AG*IDEA)
- ☐ Business Administration, Professional MBA
- ☐ Chemical Engineering
- ☐ Civil Engineering
- ☐ Community Development
- ☐ Curriculum and Instruction
- ☐ Curriculum and Instruction, ESL emphasis
- ☐ Curriculum and Instruction: Digital Teaching and Learning emphasis
- ☐ Curriculum and Instruction: Educational Computing, Design, and Online Learning emphasis
- ☐ Curriculum and Instruction: Math emphasis
- ☐ Curriculum and Instruction: Reading Specialist emphasis
- ☐ Dietetics

...

- ☐ Educational Leadership
- ☐ Electrical Engineering
- ☐ Engineering Management
- ☐ Family and Community Services
- ☐ Food Science
- ☐ Gerontology
- ☐ Mechanical Engineering
- ☐ Merchandising
- ☐ Nuclear Engineering
- ☐ Operations Research
- ☐ Personal Financial Planning
- ☐ Psychology with an emphasis in Industrial and Organizational Psychology (MIOP)
- ☐ Software Engineering
- ☐ Youth Development
- ☐ Other:

Question 4:

Please select the appropriate Bachelor's degree program(s) from the list below. Select all that apply.

- ☐ Animal Sciences and Industry
- ☐ Dietetics
- ☐ Early Childhood Education
- ☐ Family Studies & Human Services
- ☐ Food Science and Industry
- ☐ General Business
- ☐ Interdisciplinary Social Science
- ☐ Nutrition and Health
- ☐ Technology Management
- ☐ Other:

Question 5:

Did you also complete a Certificate, Endorsement or Minor program via distance at Kansas State University?

- ☐ Yes
- ☐ No

Question 6:

Please select the appropriate certificate, endorsement or minor program(s) from the list below. Select all that apply.

- ☐ Academic Advising Graduate Certificate
- ☐ Adult Learning
- ☐ Advanced Horticulture Graduate Certificate (AG*IDEA)
- ☐ Applied Statistics Graduate Certificate
- ☐ Biobased Products and Bioenergy Graduate Certificate (AG*IDEA)
- ☐ Business Administration Graduate Certificate
- ☐ Community Engaged Leadership
- ☐ Conflict Resolution
- ☐ English as a Second Language (ESL) Endorsement
- ☐ Financial Therapy
- ☐ Food Safety and Defense
- ☐ Food Science
- ☐ Gerontology
- ☐ Grassland Management
- ☐ Horticultural Therapy
- ☐ Nonviolence Studies
- ☐ Online Course Design
- ☐ Organizational Leadership Graduate Certificate
- ☐ Personal Financial Planning
- ☐ Primary Texts
- ☐ Public Administration
- ☐ Reading Specialist Endorsement
- ☐ Social Justice Education
- ☐ Teaching English as a Second Language for Adult Learners
- ☐ Transportation Engineering Graduate Certificate
- ☐ Youth Development
- ☐ Other:

Question 7:

Please rate your level of agreement with the following statements regarding your program.

**1 - Strongly Agree | 2 - Agree | 3 - Neither Agree nor Disagree
4 - Disagree | 5 - Strongly Disagree | 6 - Did Not Use/N.A.**

	1	2	3	4	5	6
7.1 Program completion requirements were available and clear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.2 Courses were offered on a schedule to allow me to complete my degree in a timely manner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.3 Program objectives and/or learning outcomes were clearly articulated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.4 Student collaboration was important for my success in the program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.5 The program provided me with a rewarding educational experience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.6 The program provided me with a challenging educational experience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.7 The intellectual environment within the program was stimulating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.8 I would recommend this program to others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 8:

Please rate your level of agreement with the following statements about your overall experience with faculty in your major program.

1 - Strongly Agree | 2 - Agree | 3 - Neutral | 4 - Disagree
5 - Strongly Disagree | 6 - Cannot Judge

	1	2	3	4	5	6
8.1 Faculty were accessible for assistance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.2 Faculty were interested in the personal development of students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.3 Faculty were interested in the academic development of students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.4 Faculty were interested in the professional development of students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.5 Faculty introduced students to a broad range of ideas, perspectives, and worldviews.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.6 Faculty listened and responded to students regarding student needs, concerns, and suggestions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 9:

Please rate your level of agreement with the following statements regarding advising during your major program.

1 - Strongly Agree | 2 - Agree | 3 - Neutral | 4 - Disagree
5 - Strongly Disagree | 6 - Cannot Judge

	1	2	3	4	5	6
9.1 I received high-quality advising.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.2 My adviser responded in a timely manner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.3 My adviser was helpful in planning my progression through my program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.4 My adviser met my academic needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 10:

Please rate your level of agreement with the following statements concerning completion of this program.

1 - Strongly Agree | 2 - Agree | 3 - Neither Agree nor Disagree
4 - Disagree | 5 - Strongly Disagree | 6 - Cannot Judge

	1	2	3	4	5	6
10.1 My knowledge and skills in this field have increased.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.2 My appreciation and understanding of the responsibilities of professionals in this field have increased.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.3 Through completion of this program I am now qualified for the professional positions in this field that I desire.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 11:

Please rate your level of agreement with the following statements in regards to your overall academic program experience.

1 - Strongly Agree | 2 - Agree | 3 - Neutral | 4 - Disagree
5 - Strongly Disagree

	1	2	3	4	5
11.1 Overall, the quality of teaching in my program met my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.2 Overall, the quality of the student-to-student relationships in my program met my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.3 Overall, this program met my expectations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 12:

Were academic/department staff easily contacted if you had questions related to your academic program or courses?

- ☐ Yes
- ☐ No
- ☐ Further comments about your response:

Question 13:

Were your questions answered in a timely manner?

- ☐ Yes
- ☐ No (please explain your response in the box below)
- ☐ I have not had any questions
- ☐ Further comments about your response:

Question 14:

K-State Global Campus utilizes several communication avenues to connect with you and keep you informed. Using the scale below, please rate your level of satisfaction with the variety of communication avenues used.

1 - Very Satisfied | 2 -Satisfied |
3 - Neither Satisfied nor Dissatisfied | 4 - Dissatisfied |
5 - Very Dissatisfied | 6 - Did Not Use/N.A.

	1	2	3	4	5	6
14.1 K-State Global Campus Facebook page	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.2 World Wide Wildcats electronic newsletter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.3 K-State Global Campus Twitter feed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.4 K-State Global Campus Linked In	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.5 K-State Global Campus Website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.6 K-State Global Campus Online chat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.7 Social media from your academic department	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.8 Email	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.9 Phone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questions 15:

Were you aware that all these communication avenues existed?

- ☐ Yes
- ☐ No

Question 16:

Why did you use the above communication avenues?

Question 17:

Using the scale below, please rate your level of agreement with the following statements.

1 - Strongly Agree | 2 - Agree | 3 - Neither Agree nor Disagree

4 - Disagree | 5 - Strongly Disagree | 6 - Did Not Use/N.A.

	1	2	3	4	5	6
17.1 The Office of Student Financial Services (loans, scholarships, financial aid) was responsive to my needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.2 Enrollment through KSIS was an easy process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.3 K-State Online was intuitive and easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.4 The Information Technology (IT) Help Desk provided adequate technological support and assistance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.5 The resources provided by K-State counseling services and through the University Life Café website were helpful in maintaining my academic success.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.6 The Office of Student Life connected me with accurate referrals for academic and personal problems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.7 The Office of the Registrar handled my requests efficiently.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.8 The K-State Library resources and tools have efficiently helped me with research and information for classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.9 Career and Employment Services (CES) provided excellent resources for employment opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.10 Student Access Center provided appropriate solutions to meet my needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.11 Non-Traditional and Veterans Student Services staff offered needed support for the unique set of challenges related to my military requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.12 K-State Global Campus' Student and Faculty Services were responsive and provided excellent service.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.13 The Writing Center was able to provide guidance for writing better papers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.14 I was able to use a tutor through the Tutoring Center and get the academic assistance I needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.15 I used Powercat Financial Counseling to better understand how to manage my finances and student loans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 18:

Were you aware of all of these services existed?

☐ Yes

☐ No

Question 19:

Why did you use the above services?

Question 20:

Please give your opinion on exam services offered through the K-State Global Campus.

1 - Strongly Agree | 2 - Agree | 3 - Neither Agree nor Disagree
4 - Disagree | 5 - Strongly Disagree | 6 - Did Not Use/N.A.

	1	2	3	4	5	6
20.1 I received information about exam proctoring in a timely manner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.2 It was easy for me to find an acceptable exam proctor in my area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.3 My proctor received exams and information in a timely manner allowing me to complete exams on schedule.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.4 I found it easy to schedule proctored exams through K-State Global Campus Student and Faculty Services.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.5 I found the testing facilities at the K-State Global Campus to be adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.6 I found the exam staff at K-State Global Campus to be friendly, helpful and accommodating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 21:

Other comments about K-State Global Campus exam administration and testing facilities.

Question 22:

Why did you choose to attend Kansas State University? Please select all that apply.

- ☐ Recommendation by family
- ☐ Recommendation by friends
- ☐ Affordability
- ☐ Quality of educational opportunities
- ☐ Athletics
- ☐ Ranking of programs
- ☐ Reputation
- ☐ Scholarship support
- ☐ Other:

Question 23:

Would you recommend a Kansas State Global Campus course or program to someone else?

- ☐ Yes
- ☐ No
- ☐ Further comments about your response:

...

Question 24:

Would you consider taking another online training course or program at K-State if you had further education needs?

- ☐ Yes
- ☐ No
- ☐ Further comments about your response

Question 23:

How many hours per week were you employed during your academic program?

- ☐ Not employed
- ☐ 10 hours or fewer per week
- ☐ 11-20 hours per week
- ☐ 21-31 hours per week
- ☐ 32-40 hours per week
- ☐ More than 40 hours per week

Question 24:

How did your employer support your participation in this program? (Select all that apply.)

- ☐ My employer did not support my participation
- ☐ Paid time off
- ☐ Unpaid time off
- ☐ Reduced workload
- ☐ Flexible work schedule
- ☐ Educational expense reimbursement (Please describe in the comment box.)
- ☐ Supportive attitude
- ☐ Other:
- ☐ Further comments about your response:

Closing Page

Closing Statement:

This concludes the K-State Global Campus Exit Survey. Your time and participation are very much appreciated. As a new graduate from Kansas State University you will receive a complimentary one-year membership to the K-State Alumni Association. If you have questions about the K-State Alumni Association call 785-532-6260. Please take advantage of your membership and continue to stay connected with K-State!

Please click the next button to submit the survey.