KENT STATE UNIVERSITY
CERTIFICATION OF CURRICULUM PROPOSAL

Preparation Date **11-Dec-19** Curriculum Bulletin _____

Effective Date **Fall 2020** Approved by EPC _____

Department **CS and MATH**

College **AS - Arts and Sciences**

Degree **MS - Master of Science**

Program Name **Data Science** Program Banner Code DATA

Concentration(s) Concentration(s) Banner Code(s)

Proposal **Establish program**

Description of proposal:

The Departments of Computer Science and Mathematical Sciences are proposing a Masters of Science in Data Science program.

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

Current total credit hours: Proposed total credit hours

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

Supporting programs may see and increase in enrollment in courses.

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

BSCI, GEOG, PSYC, ECON, Public Health, CCI, BUS, AE

REQUIRED ENDORSEMENTS

[signature] 12/11/19

Department Chair / School Director

— ___/___/___

Campus Dean (for Regional Campuses proposals)

Mary Ann Haley 12/13/19

College Dean (or designee)

Cynthia R Stillings 1/13/20

Dean of Graduate Studies (for graduate proposals)

___/___/___

Provost (or designee)

CS/MATH 2

Data Science
Master of Science Degree

FULL PROPOSAL

Submitted to: Chancellor's Council on Graduate Studies
Ohio Department of Higher Education

Submit date: *to come*

Submitted by: College of Arts and Sciences
Kent State University

KENT STATE UNIVERSITY

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Basic Characteristics of the Proposed Program

1. **Brief description of the disciplinary purpose and significance of the proposed degree.**

   An interesting and beautiful aspect of data science is its abstract focus on data—by its very nature the field is multidisciplinary. Data science is an emerging STEM area founded on the principles of mathematics and the sciences and developed through a synthesis of mathematics and computer science; more exactly, data science draws from analysis, statistics, databases, big data, artificial intelligence, numerical analysis, graph theory and visualization. Researchers continue to develop the foundations of data science, while researchers and practitioners are simultaneously finding and developing applications in the natural sciences, the health sciences, the social sciences and economics.

   The purpose of Kent State's M.S. degree in Data Science is to develop students' knowledge of the methods and tools of data science and their understanding of how to apply these methods and tools in diverse data environments. The significance of the degree program will be determined by how well students will be able to apply these methods and tools. The accelerating use of ubiquitous data will profoundly change how individuals interact with information, how scientists explore and how democracies operate, while simultaneously creating numerous new jobs and transforming existing professions. Kent State's goal with the proposed degree program is to help produce an innovated workforce for state, regional and international data-enabled industries, educational institutions and government agencies.

   The proposed degree program is a collaborative effort between Kent State's Department of Computer Science and Department of Mathematical Sciences in the College of Arts and Sciences with support and input from partnering disciplines across the campus.

2. **Definition of the focus of the program.**

   The focus of the proposed M.S. degree in Data is on the development of scientists who will understand the theories, methods and tools of data science so that they can apply data science to solving research and workplace questions in the natural, health and social sciences. The program will emphasize research and development in data science and data science applications and will zero-in on helping to fill industry's huge need for advanced STEM data analytics skills.

3. **Rationale for the degree name.**

   The Master of Science degree is appropriate for Kent State's proposed program, rather than a professional degree title, since students have the option to pursue original research through the culminating requirement.

4. **Duration of the program.**

   a. **Total credit hours for completion of the program.**

      The degree program will be 30 semester credit hours

b. Normal or typical length of time for students to complete the program.

Length of the program will be two years for a full-time student.

5. Proposed initial date for implementation of the program.

The proposed implementation of the M.S. degree in Data Science is fall 2020.

6. Admission requirements and admission timing.

Kent State will admit students to the program in the fall semester only. Applicants must hold a bachelor's degree with a minimum 3.000 GPA, submit two letters of recommendation and have previously completed courses in linear algebra, statistics, advanced calculus, discrete mathematics/structures, programming and data structures and database systems. If applicants have not completed all the prerequisite courses, program faculty may decide to admit them conditionally (based on a wholistic review of their application) until they complete the remaining courses being before beginning the program's coursework. See Appendix A for full admission criteria.

7. Primary target audience for the program.

The intended audience for the proposed data science degree program will be traditional college-aged students and working professionals.

8. Special efforts to enroll and retain underrepresented groups.

a. Plan to ensure recruitment, retention and graduation of groups underrepresented within the discipline.

The number of undergraduate female students in mathematics and computer science has been increasing, and the departments promote their master's degree programs to their domestic undergraduate students.

The Department of Computer Science started a women student chapter of the Association of Computing Machinery to encourage more female participation. The department also supports and funds students to attend women in tech conferences.

Student clubs and association student chapters in the Department of Mathematical Science include the Actuarial Math Club, Association for Women in Mathematics, Pi-Mu-Epsilon and the Mathematical Association of America, all of which promote female and minority participation.

The program will be advertised to underrepresented undergraduate student groups within both the departments, the university and other colleges at the national level. New proposals will be written to federal agencies and state agencies to attract funding for underrepresented students under STEM initiatives. The university has many scholarships to encourage underrepresented students, including women, to STEM areas.

A mentorship program consisting of industrial professionals and faculty members will be established to scout and advise prospective underrepresented students. The Department of Computer Science has an industrial advisory board consisting of computer science faculty and local industrial partners. The concept will be extended to the Data Science degree program. The departments work in collaboration with Kent State's Office of Diversity, Equity and Inclusion to enhance the impact. The departments also will allocate advisors for underrepresented students to improve retention of the students.

b. Provide as background a general assessment of the following: (1) institution and departmental profiles of total enrollment and graduate student enrollment of underrepresented groups within the discipline; and (2) comparison with nationally reported values from National Center for Educational Statistics, Council of Graduate Schools or other authoritative sources. Supply data by demographic group where available.

Data in Tables 1 and 2 were compiled by Kent State's Office of Institutional Research. The data on 91 four-year public, doctoral institutions in Table 3 was pulled from IPEDS.

In computer science, 5.9 percent of underrepresented students earned degrees at Kent State, compared to 15.7 percent represented in the IPEDS numbers. In mathematics, 7.6 percent of underrepresented students earned degrees at Kent State, compared to 21.6 percent represented in the IPEDS numbers.

Table 1: Kent State preponderant enrollment of underrepresented students (URS) on the Kent Campus in fall semester 2018, by academic department.

Student's Program	Computer Science		Mathematical Science		Other Departments		Total	
	All	URS	All	URS	All	URS	All	URS
Bachelor's	505	60	137	13	20,936	3,300	21,578	3,373
Master's	64	0	50	1	3,472	335	3,586	336
Doctoral	40	1	47	0	1,546	139	1,633	140
Total	**609**	**61**	**234**	**14**	**25,954**	**3,774**	**26,797**	**3,849**

Table 2: Kent State degrees awarded to underrepresented students (URS) on the Kent Campus in academic year 2018-19, by academic department.

Student's Program	Computer Science		Mathematical Science		Other Departments		Total	
	All	URS	All	URS	All	URS	All	URS
Bachelor's	84	6	43	3	5,462	716	5,589	725
Master's	49	0	15	0	1,572	143	1,636	143
Doctoral	10	2	8	2	257	20	275	24
Total	**143**	**8**	**66**	**5**	**7,291**	**879**	**7,500**	**892**

Table 3: First degrees awarded to underrepresented students (URS) at 91 four-year public, doctoral institutions in academic year 2016-17, by area of study.

Student's Program	Computer Science		Mathematical Science		Other Studies		Total	
	All	URS	All	URS	All	URS	All	URS
Bachelor's	8,411	1,655	2,570	539	211,629	51,998	222,610	54,192
Master's	6,623	401	873	90	60,419	11,272	67,915	11,763
Doctoral	219	13	129	5	5,397	679	5,745	697
Total	**13,184**	**2,069**	**2,938**	**634**	**280,148**	**63,949**	**296,270**	**66,652**

Institutional Planning for Program Change

1. **What are the physical facilities, equipment and staff needed to support the program?**

   The proposed degree program will share existing physical resources and laboratories with currently existing programs. Since 2012, the Department of Computer Science, with support from the Department of Mathematical Sciences and the College of Arts and Sciences, has operated a Data and Computing Center with advanced storage, virtual machines and computing resources used to support various data and computing intensive programs. There are also three research engineers with experience in a science data center and virtual machine support operations. Specialized labs are already functioning, including a Big Data Science Lab, Visual Analytics Lab, Cloud Computing Lab and Advanced Information Security and Privacy Lab.

   Furthermore, a Kent State computer science networking group is working with Ohio Research Network (OARNet), so that the group's resources will integrate with the vast national big-data resources, including national lab facilities, supercomputing facilities in Ohio and the Department of Energy, National Science Foundation repositories and industrial cloud service providers (e.g., Amazon, IBM, Microsoft) with extremely high bandwidth. The required equipment, network infrastructure and specialized staff resources will be abundantly available to the proposed research-intensive Data Science program and its students, researchers and affiliates to build a first-class program.

   Depending on how involved local businesses become with respect to working on joint projects, more technical staff may be needed. However, if local businesses do become increasingly involved, then it is expected that they will help support the technical sides of the projects.

2. **What is the evidence that a market for the new program(s) exists?**

   Information provided in Appendices B (Ohio employer analysis), C (occupational analysis) and D (support letters for area businesses) lead credence that a market for the proposed degree program exists.

a. How has estimated program demand been factored into realistic enrollment projections?

The college projects an initial cohort of 10 students. With further marketing of the program, in the second and third years, the college plans to increase the size of the first-year class by five students so that there will be 20 first-year students and 15 second-year students at the start of year three. By year four, the goal for each year will be to enroll 20 new students.

Based on the evidence shown in the appendices, the college believes that program demand will be greater than the enrollment goals. Thus, concern is not whether enough students will want to enroll in the program. The college is confident that once the quality of the program is established, students will be striving to get into the program.

b. How has this evidence been used in planning and budgeting processes to develop a quality program that can be sustained?

According to the current plan, the number of students in the new graduate program will be capped at 40. The college considers the evidence presented in the appendices as clearly showing that there will be significant interest in the new program to support more than 20 new students each year. The core classes in mathematics and computer science and the supporting classes across campus will be able to absorb the students for this new graduate program. Per the fiscal impact statement (see Appendix E), the program will operate with a net gain at implementation.

c. Provide evidence of need for the new degree program, including the opportunities for employment of graduates. Examples of potential metrics of program need include: (1) Student interest and demand: potential enrollment; ability to sustain the critical mass of students; (2) institutional need: plan for overall development of graduate programs at the university; and (3) societal demand: intellectual development; advancement of the discipline; employment opportunities to meet regional, national needs and/or international needs.

Graduate, as well as undergraduate, students have shown a strong interest in data science at Kent State, not only in computer science and mathematics, but also in geography and other disciplines. There is a high demand for the Big Data Analytics course (at the undergraduate, master's and doctoral level) offered by the Department of Computer Science. The average enrollment in this course was 48 students over the past three years. In spring 2019, 30 percent (15 out of 50) of students in Kent State's M.S. degree in Computer Science declared the Computational Data Science concentration.

Faculty from the Department of Computer Science and Department of Mathematical Sciences have forged close collaborations with faculty from many other units at Kent State, including the Department of Physics, Department of Chemistry and Biochemistry, Department of Psychological Sciences, Department of Geography, School of Information, School of Fashion Design and Merchandising and College of Public Health. Both departments offer data science courses open to students from other departments, schools and colleges.

Published reports state that machine learning engineer, data scientist and big data engineers rank among the top emerging jobs. According to one article, "Data scientist roles have grown over 650 percent since 2012, but currently 35,000 people in the [United States] have data science skills, while hundreds of companies are hiring for those roles—even those you may not expect in sectors like retail and finance—supply of candidates for these roles cannot keep up with demand."[1]

Another article leads with the headline "IBM predicts demand for data scientists will soar 28% by 2020" and notes that such is the demand that positions in data science and analytics remain open an average of 45 days, five days longer than the market average.[2]

Data science jobs are particularly important in the north-east Ohio economy, with its heavy concentration of insurance, energy and medical industries. More information is provided in Appendices B (Ohio employer analysis) and C (occupational analysis).

Statewide Alternatives

1. **What programs are available at other institutions, and how do they differ from the program being proposed?**

   Most similar master's degree programs in Ohio, see Table 4, are business analytics, which focuses on the application of data analytics techniques to improve business process. Data science focuses on the science of data analytics techniques, with the goal of developing new techniques and algorithms for data analytics and improving their computational efficiency.

   Table 4: Data Science and related programs in Ohio.

Ohio Universities	Master's Degree Programs
Bowling Green State University	M.S. degree in Analytics M.S. degree in Applied Statistics (Business Analytics specialization) M.S. degree in Data Science
Case Western Reserve University	Master of Science in Management degree in Business Analytics
Kent State University	M.B.A. degree (Business Analytics concentration) M.S. degree in Business Analytics
Miami University	M.S. degree in Business Analytics
Ohio State University	Specialized Master in Business degree in Analytics M.B.A. degree in Data Analytics
Ohio University	Master of Business Analytics degree M.B.A. degree (Business Analytics concentration)
University of Akron	M.B.A. degree (Business Analytics concentration)
University of Cincinnati	M.S. degree in Business Analytics
University of Dayton	Master of Business Analytics degree
University of Findlay	M.S. degree in Applied Security and Analytics
University of Toledo	Master of Applied Business Analytics degree

[1] LinkedIn's 2017 U.S. Emerging Jobs Report (7 December 2017). Retrieved from https://economicgraph.linkedin.com/research/LinkedIns-2017-US-Emerging-Jobs-Report.
[2] Columbus, L. (13 May 2017). IBM predicts demand for data scientists will soar 28% by 2020. Forbes. Retrieved from www.forbes.com/sites/louiscolumbus/2017/05/13/ibm-predicts-demand-for-data-scientists-will-soar-28-by-2020/#1b9ec2847e3b.

Ohio Universities	Master's Degree Programs
University of Toledo	M.S. degree in Applied Business Analytics
Wittenberg University	M.S. degree in Analytics
Xavier University	M.S. degree in Customer Analytics

Kent State's proposed degree in data science will require applicants to have more mathematics, statistics and computer science for admission than all the programs listed above, except for Bowling Green State University's M.S. degree in Data Science. Bowling Green's M.S. degree prepares students to enter the university's Ph.D. degree in Data Science, whereas Kent State's program will prepare graduates for immediate entry in the work force.

University of Cincinnati's admission requirements for its program are similar to that of Kent State's; however, Cincinnati's program focuses on business analytics and not data science.

2. **Explain the appropriateness of the specific locale for the program.**

   A search of "data analyst" positions on Indeed, the employment-related search engine, returned 640 job postings in Ohio and 857 in Pennsylvania.[3] These results show a high demand in the job market for Kent State's new graduate program.

   A close look at Appendix B (Ohio employer analysis) shows that there is a high concentration of data science positions in Northeast Ohio, especially, in the medical field. The Cleveland-Akron area needs and, in fact, demands a strong and vibrant Data Science program for the continuing business-industrial growth in the area.

3. **Are there opportunities for inter-institutional collaboration to offer the program?**

   Faculty and students from the Department of Computer Science have many joint research/educational collaborations with other universities. Kent State looks forward to leveraging these collaborations, as well as creating new ones in data science.

Growth of the Program

1. **What future growth do you anticipate over several years?**

   In first year of implementation, the college's goal to enroll 10 students. In years two and three, the college plans to increase the size of the first-year class by five per year. From year four onward, the program will be capped at 40 students (20 students per year).

2. **How do you plan to manage this growth?**

   Current resources will be able to manage the anticipated initial enrollment and future growth.

3. **When do you expect the program to be self-sufficient?**

   The expectation is that the program will be self-sufficient at implementation until at least year three. After that year, the college will evaluate whether to cap at 40 students or continue to grow enrollment; at that point the question of self-sufficiency will be addressed again.

[3] www.indeed.com, search on 16 January 2020 at approximately 5.00 p.m. ("data analyst" entered for "What," and "OH" and "PA" entered for "Where').

Curriculum and Instructional Design

4. Description of the proposed curriculum, including any concentrations, cognates or specializations within the major.

The proposed M.S. degree in Data Science is 30 credit hours, comprising 18 credit hours of a required core, 6 credit hours of electives and 6 credit hours of a culminating requirement, see table 5 below.

The elective coursework allows students to delve further into mathematics and computer science (that complement or go beyond the core) or to explore the applications of data science in diverse areas, including biological sciences, geography, information science, public health and psychology. Students will be expected to select electives that focus on one domain to ensure that the prerequisite dependencies between electives can be met within the total elective credit hours. These elective options will be expanded in the future as more data science-related courses are developed at Kent State University.

Students will fulfill the culminating requirement by either writing and publicly defending a master's thesis or completing an integrated learning experience. The integrated learning experience requires (1) a data science capstone project or (2) a data science capstone project and a graduate internship. Students must prepare a written document and then present publicly that explains and/or demonstrates their capstone project (or capstone project and internship activity). Students' thesis topic or integrated learning experience must be approved by their faculty supervisory committee.

All courses in the proposed curriculum are existing, with the exception of a new master's project and internship (noted below as new).

Catalog copy is in Appendix A. Course descriptions are in Appendix F.

Table 5: Curriculum for the proposed M.S. degree in Data Science.

Core Requirements (18 credit hours)		
CS 63005	Advanced Database Systems Design	3
CS 63015	Data Mining Techniques	3
CS 63016	Big Data Analytics	3
MATH 50015	Applied Statistics	3
MATH 50024	Computational Statistics	3
MATH 50028	Statistical Learning	3
Electives (6 credit hours)		
BSCI60103	Biological Statistics (3)	
CS 54201	Artificial Intelligence (3)	
CS 57206	Data Security and Privacy (3)	
CS 63017	Big Data Management (3)	
CS 63018	Probabilistic Data Management (3)	
CS 63100	Computational Health Informatics (3)	
CS 64201	Advanced Artificial Intelligence (3)	
CS 64402	Multimedia Systems and Biometrics (3)	
CS 67302	Information Visualization (3)	

Electives continued

CS 69098	Research (3)
or MATH 67098	Research (3)
ECON 62054	Econometrics I (3)
ECON 62055	Econometrics II (3)
ECON 62056	Time Series Analysis (3)
EHS 52018	Environmental Health Concepts in Public Health (3)
EPI 52017	Fundamentals of Public Health Epidemiology (3)
EPI 63016	Principles of Epidemiological Research (3)
EPI 63018	Observational Designs for Clinical Research (3)
EPI 63019	Experimental Designs for Clinical Research (3)
GEOG 59070	Geographic Information Science (4)
GEOG 59080	Advanced Geographic Information Science (3)
HI 60401	Health Information Management (3)
HI 60411	Clinical Analytics (3)
HI 60414	Human Factors and Usability in Health Informatics (3)
HI 60418	Clinical Analytics II (3)
KM 60301	Foundational Principles of Knowledge Management (3)
LIS 60010	The Information Landscape (3)
LIS 60020	Information Organization (3)
MATH 50011	Probability Theory and Applications (3)
MATH 50051	Topics in Probability Theory and Stochastic Processes (3)
MATH 50059	Stochastic Actuarial Models (3)
PSYC 61651	Quantitative Statistical Analysis I (3)
PSYC 61654	Quantitative Statistical Analysis II (3)
Culminating Requirement (6 credit hours)	
CS 69099	Capstone Project (6) **NEW**
or CS 69099	Capstone Project (3) **NEW**
and CS 69192	Graduate Internship (3) **NEW**
or CS 69199	Thesis I (6)
or MATH 67199	Thesis I (6)

Institutional Staffing, Faculty and Student Support

1. **How many and what types of faculty (full and part time) will be employed in the program? Describe how number and type of faculty is sufficient to support the program (especially if the program contains a research or heavily mentored activity).**

   Graduate faculty from the Department of Computer Science and the Department of Mathematical Sciences will teach the core and elective courses and advise students for the culminating experience. Faculty from the partnering units will teach the other elective courses. Those units include Economics, Geography, Psychology, Information and Public Health. Please see Appendix G for the faculty list and Appendix H for the faculty CV.

   With the fact that all content-based courses in the program are existing and offered currently, in addition to recent hires in mathematics and computer science, Kent State University has sufficient faculty capacity and credentials to support this new program.

2. **How many, if any, new faculty will be hired for the program?**

   It is anticipated that no new faculty will be hired for the program.

3. **What are the administrative arrangements for the proposed program, including oversight at the program, department/school and college level?**

   The M.S. degree in Data Science will be jointly sponsored by the Department of Computer Science and the Department of Mathematical Sciences in the College of Arts and Sciences.

   Oversight of the program will be handled by a faculty program director, an executive committee and a program committee.

   The executive committee will consist of three faculty members, one each from the computer science and mathematical science departments and one from the partnering disciplines. The computer science and mathematical sciences faculty will be appointed by their respective department chair, and one will also serve as the program director.

   The position of program director will alternate between the computer science and mathematical science departments every two years, although the faculty member appointed to the position may remain for more than two years upon agreement of the two department chairs. The inaugural director of the M.S. degree in Data Science will be the computer science faculty member of the executive committee.

   Membership of the program committee will consist of the computer science and mathematical science faculty who have been appointed to the executive committee and a faculty member from each of the partnering disciplines, who will be appointed by their chair, director or dean. Each spring semester, members of the program committee will choose one of their members from the partnering disciplines to serve on the executive committee for the next academic year.

   The faculty program director, executive committee and program committee report to the chairs of the Department of Computer Science and Department of Mathematical Sciences. The chairs, in turn, report to the dean of the College of Arts and Sciences.

   Every two years, on a rotating basis, the program committee will meet with representatives of each partnering unit. The purposes of these meetings are to evaluate how well the elective courses are supporting and enhancing the degree program, and how well the degree program is supporting and promoting the partnering unit. Additionally, at these meetings, the program committee and the partnering unit should discuss possible future data science collaborations in teaching and research. A goal will be to have the program committee hold annual meetings for all the partnering units to meet to discuss continuing and possible future collaborations in teaching and research.

   Each student enrolled in the M.S. degree in Data Science will form a supervisory committee, of which members should be chosen early in the student's second semester of the first year in the program and no later than the fall semester of the student's second year. The student's advisor will be a supervisory committee member. The advisor must approve the student's elective courses.

4. **Where will any needed financial support and staffing come from?**

   The faculty and courses for the proposed degree program are existing and support other graduate programs at Kent State.

Appendix A: Program Catalog Page

College of Arts and Sciences

Department of Computer Science
241 Mathematics and Computer Science Building
Kent Campus
330-672-9980
depsec@cs.kent.edu
www.kent.edu/cs

Department of Mathematical Sciences
233 Mathematics and Computer Science Building
Kent Campus
330-672-2430
math@math.kent.edu
www.kent.edu/math

Description

The Master of Science degree in Data Science provides a focus on developing scientists who will understand the theories, methods and tools of data science and apply data science to solving research and workplace questions in the natural, health and social sciences for businesses and industries.

Data science is an emerging STEM discipline founded on the principles of mathematics and the sciences and developed through a synthesis of mathematics and computer science. One may think of data science as a blending together of methods and ideas from analysis, statistics, databases, big data, artificial intelligence, numerical analysis, graph theory and visualization for the purposes of finding information in data and applying that information to solving real-world problems.

Fully Offered At:

- Kent Campus

Admission Requirements

- Bachelor's degree from an accredited college or university for unconditional admission
- Minimum 3.000 undergraduate GPA (on a 4.000 point scale) for unconditional admission
- Prerequisite mathematics and computer science courses[1]
- Official transcript(s)
- Two letters of recommendation
- English language proficiency - all international students must provide proof of English language proficiency (unless they meet specific exceptions) by earning one of the following:
    - Minimum 525 TOEFL PBT score (paper-based version)
    - Minimum 71 TOEFL IBT score (Internet-based version)
    - Minimum 74 MELAB score
    - Minimum 6.0 IELTS score
    - Minimum 50 PTE score

For more information about graduate admissions, please visit the Graduate Studies website. For more information on international admission, visit the Office of Global Education website.

1. Students entering the program are expected to have previously completed courses in linear algebra (equivalent to MATH 21001 or MATH 21012), statistics (equivalent to MATH 20011), advanced calculus (equivalent to MATH 22005), discrete mathematics/structures (equivalent to MATH 31011 or CS 23022), programming and data structures (equivalent to CS 23001) and database systems (equivalent to CS 33007). Applicants have not completed all the prerequisite courses may be admitted conditionally (based on a wholistic review of their application) until they complete the remaining courses being before beginning the program's coursework.

Program Learning Outcomes

Graduates of this program will be able to:

1. Ask the questions so that problems in a particular business or industrial situation become clear
2. Determine if the problem may be addressed with data science methods and tools, and if yes, propose potential methods for solving the problems
3. Make suggestions for how data science may be used to enhance the quality and value of currently existing products (whether the products are physical or methods) and how data science may be used in the development of new products

Program Requirements

Major Requirements

Major Requirements		
CS 63005	Advanced Database Systems Design	3
CS 63015	Data Mining Techniques	3
CS 63016	Big Data Analytics	3
MATH 50015	Applied Statistics	3
MATH 50024	Computational Statistics	3
MATH 50028	Statistical Learning	3
Major Electives, choose from the following:		6
BSCI60103	Biological Statistics	
CS 54201	Artificial Intelligence	
CS 57206	Data Security and Privacy	
CS 63017	Big Data Management	
CS 63018	Probabilistic Data Management	
CS 63100	Computational Health Informatics	
CS 64201	Advanced Artificial Intelligence	
CS 64402	Multimedia Systems and Biometrics	
CS 67302	Information Visualization	
CS 69098	Research	
or MATH 67098	Research	
ECON 62054	Econometrics I	
ECON 62055	Econometrics II	
ECON 62056	Time Series Analysis	
EHS 52018	Environmental Health Concepts in Public Health	
EPI 52017	Fundamentals of Public Health Epidemiology	
EPI 63016	Principles of Epidemiological Research	
EPI 63018	Observational Designs for Clinical Research	
EPI 63019	Experimental Designs for Clinical Research	
GEOG 59070	Geographic Information Science	
GEOG 59080	Advanced Geographic Information Science	
HI 60401	Health Information Management	
HI 60411	Clinical Analytics	
HI 60414	Human Factors and Usability in Health Informatics	
HI 60418	Clinical Analytics II	
KM 60301	Foundational Principles of Knowledge Management	
LIS 60010	The Information Landscape	

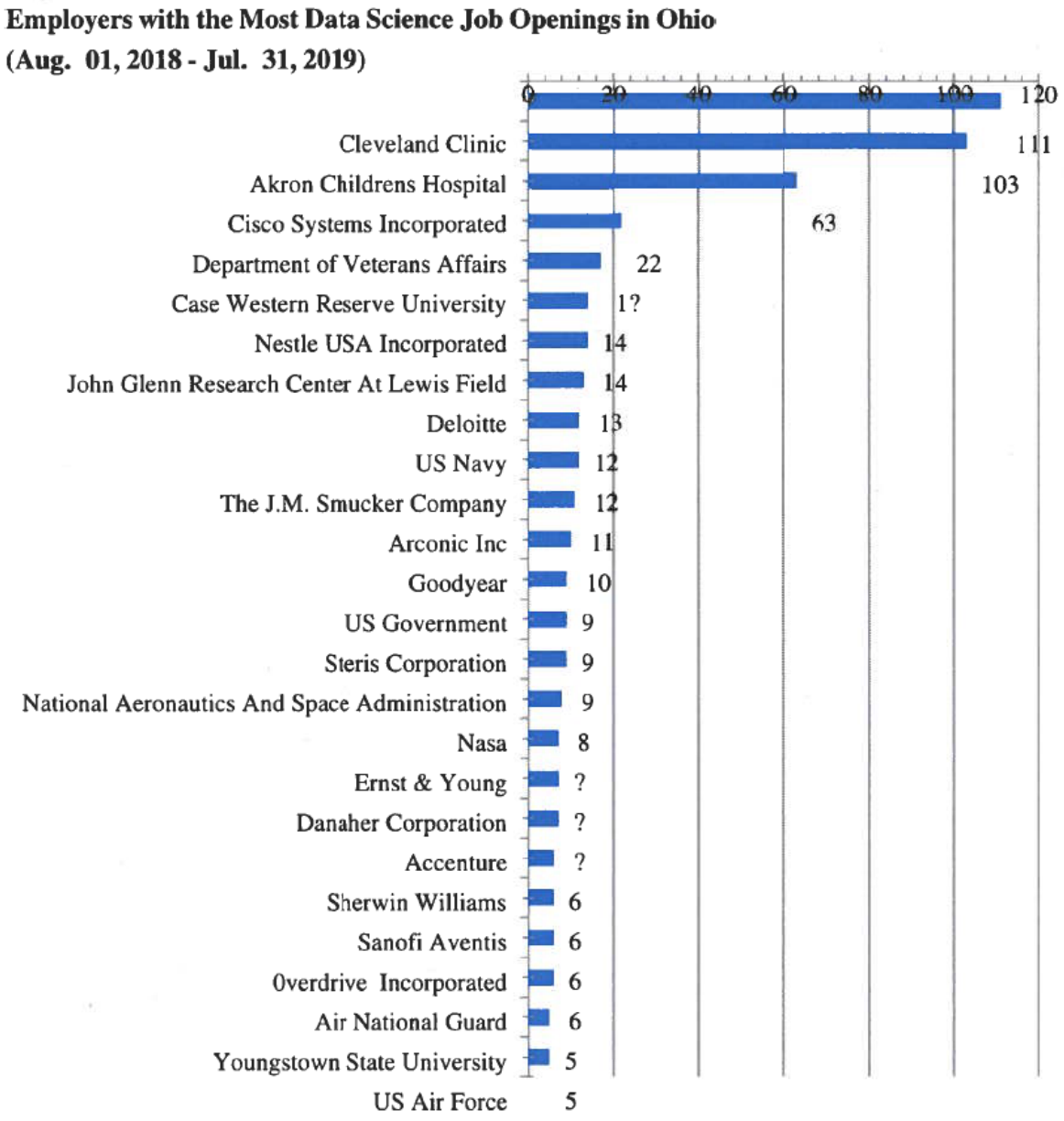
Major Electives continued		
LIS 60020	Information Organization	
MATH 50011	Probability Theory and Applications	
MATH 50051	Topics in Probability Theory and Stochastic Processes	
MATH 50059	Stochastic Actuarial Models	
PSYC 61651	Quantitative Statistical Analysis I	
PSYC 61654	Quantitative Statistical Analysis II	
Culminating Requirement		
Choose from the following:		6
CS 69099	Capstone Project (6) NEW	
CS 69099	Capstone Project (3) NEW	
and CS 69192	Graduate Internship (3) NEW	
CS 69199	Thesis I (6)	
MATH 67199	Thesis I (6)	
Minimum Total Credit Hours:		**30**

Graduation Requirements

The culminating experiences may be a master's thesis or an integrated learning experience. The master's thesis requires a written thesis, a public defense of the thesis and approval by the student's supervisory committee.

The integrated learning experience may include a substantial capstone project or a capstone project and internship. For either non-thesis option, students must prepare a written document explaining and/or demonstrating their capstone project or internship activity and its significance. In addition, students must give a public presentation of their capstone project or internship, and the written document and presentation must be approved by their supervisory committee.

Appendix B: Ohio Employer Analysis



Data Source: Sydney Martis, Research Manager
Division of Strategy and Research, Team NEO

Appendix C: Occupational Analysis

Occupation Analysis - Data Scientist

Utilizes skills and experience to systematically answer questions using data to provide actionable recommendations. Commonly utilizes advanced statistical analysis and machine learning techniques. Common responsibilities also include data cleaning and data management.

Common job titles: Data Scientist, Senior Data Scientist, Lead Data Scientist, Principal Data Scientist, Data Science Manager

Active Selections: Lorain, OH,Medina, OH,Summit, OH,Geauga, OH,Lake, OH,Cuyahoga, OH,Portage, OH,Ashtabula, OH,Trumbull, OH,Mahoning, OH,Columbiana, OH,Stark, OH,Tuscarawas, OH,Wayne, OH,Ashland, OH,Richland, OH,Huron, OH,Erie, OH, Data Scientist

Overview

Job Metrics

Job Postings
Last 12 Months

Average Demand
176

Projected Growth
10 Years

+9.8%

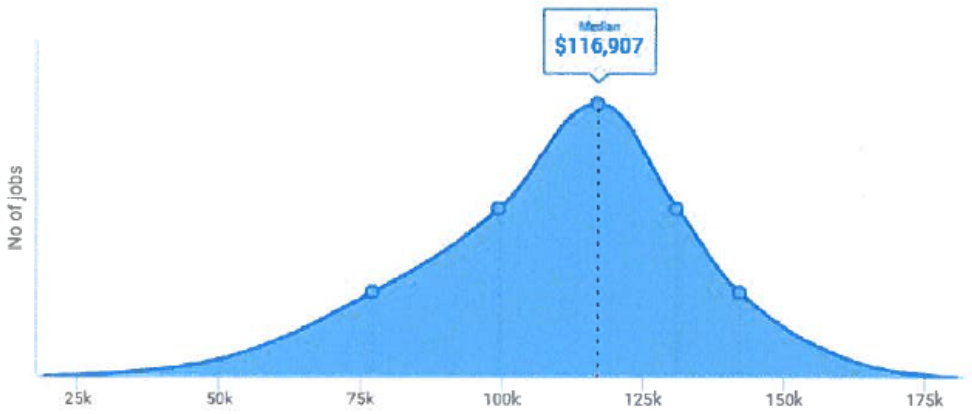
Time To Fill

Similar to Fill
47 days

Location Quotient

Very Low

Salary Overall



Job Qualifications

Years of Experience

Education Level

Certification

No certification data available for this report with your selected filters.

Top Skills

Specialized Skills

Data Science
Python
Machine Learning
SQL
Apache Hadoop
Predictive Models
Data Analysis

Baseline Skills

Communication Skills
Teamwork I Collaboration
Research
Creativity
Problem Solving
Presentation Skills
Decision Making

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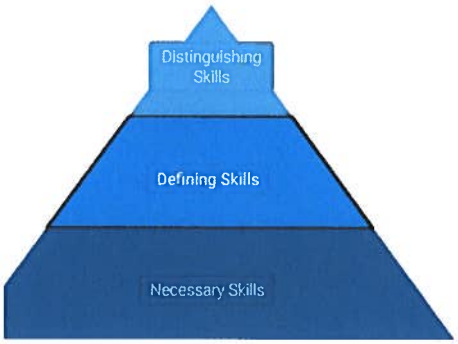

An occupation's Defining skills represent the day-to-day

hese skills to qualify for and perform successfully in this asks and responsibilities of the job. An employee needs

occupation.

Skill	Skill Type	Occupational Skills Category	Salary Premium	Job Postings Requesting Last 12 months	Projected Growth 2 Years	Location Quotient
Data Science	Specialized	Defining		166	+16.0%	0.3
Python	Software and Programming	Defining		135	+21.6%	0.4
Machine Learning	Specialized	Defining		128	+34.7%	0.4
SQL	Software and Programming	Defining		86	+2.8%	0.4
Apache Hadoop	Software and Programming	Defining		80	-1.6%	0.5
Predictive Models	Specialized	Defining		61	+12.5%	0.5
Data Analysis	Specialized	Defining		55	+1.3%	0.4
Data Mining	Specialized	Defining		50	-6.7%	0.4
SAS	Software and Programming	Defining		47	+4.3%	0.5
Big Data	Specialized	Defining		46	+0.8%	0.3
R	Software and Programming	Defining		45	+5.5%	0.4
Apache Hive	Software and Programming	Defining		34		0.4
TensorFlow	Specialized	Defining		28		0.4
Predictive Analytics	Specialized	Defining		25	+18.2%	0.5
Java	Software and Programming	Defining		23	-15.7%	0.2
Data Visualization	Software and Programming	Defining		23	+18.2%	0.3
MapReduce	Software and Programming	Defining		23	-27.7%	0.6
Natural Language Processing	Specialized	Defining		22	+22.8%	0.2
Deep Learning	Specialized	Defining		22	+84.0%	0.2
Data Transformation	Specialized	Defining		20	+12.2%	0.5
Artificial Intelligence	Specialized	Defining		17	+24.8%	0.2
Neural Networks	Specialized	Defining		17	+16.5%	0.3

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Scala	Software and Programming	Defining		16	+51.1%	0.2
Big Data Analytics	Specialized	Defining		15	+3.5%	0.3
PIG	Software and Programming	Defining		15	-27.1%	0.6
Data Modeling	Specialized	Defining		14	+2.4%	0.4

Learn more about Occupational Skill Categorie

Top Requested Skills for Data Scientist

Skill	Skill Type	Occupational Skills Category	Salary Premium	Job Postings Requesting Last 12 months	Projected Growth 2 Years	Location Quotient
Data Science	Specialized	Defining		166	+16.0 %	0.3
Python	Software and Specialized	Defining		135	+21.6 %	0.4
Machine Learning	Specialized	Defining		128	+34.7 %	0.4
SQL	Software and Specialized	Defining		86	+2.8 %	0.4
Apache Hadoop	Software and Specialized	Defining		80	-1.6 %	0.5
Communication Skills	Baseline	NA		67		0.4
Teamwork I Collaboration	Baseline	NA		64		0.4
Research	Baseline	NA		61		0.3
Predictive Models	Specialized	Defining		61	+12.5 %	0.5
Data Analysis	Specialized	Defining		55	+1.3 %	0.4
Data Mining	Specialized	Defining		50	-6.7 %	0.4
SAS	Software and Programming	Defining		47	+4.3 %	0.5
Big Data	Specialized	Defining		46	+0.8 %	0.3
Creativity	Baseline	NA		45		0.5
R	Software and Programming	Defining		45	+5.5 %	0.4
Problem Solving	Baseline	NA		44		0.4
Tableau	Software and Programming	Necessary		44	+28.2 %	0.5
Apache Hive	Software and Programming	Defining		34		0.4
Statistics	Specialized	Necessary		32	-2.6 %	0.4
Presentation Skills	Baseline	NA		31		0.5
Decision Making	Baseline	NA		29		0.7
Statistical Analysis	Specialized	Necessary		28	-5.3 %	0.4
TensorFlow	Specialized	Defining		28		0.4

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Project Management	Specialized	Necessary		27	-14.4 %	0.7
Cluster Analysis	Specialized	Necessary		26	+0.2 %	0.6
Predictive Analytics	Specialized	Defining		25	+18.2 %	0.5
Java	Software and Programming	Defining		23	-15.7 %	0.2
Data Visualization	Software and Programming	Defining		23	+18.2 %	0.3
Experiments	Specialized	Necessary		23	-12.7 %	0.3
MapReduce	Software and Programming	Defining		23	-27.7 %	0.6
Natural Language Processing	Specialized	Defining		22	+22.8 %	0.2
Physics	Specialized	Necessary		22	-14.3 %	0.3
Deep Learning	Specialized	Defining		22	+84.0 %	0.2
Clustering	Specialized	Necessary		22	+4.7 %	0.4
Data Transformation	Specialized	Defining		20	+12.2 %	0.5
Business Intelligence	Specialized	Necessary		20	-0.9 %	0.6
Data Management	Specialized	NA		19	+2.8 %	0.6
Economics	Specialized	Necessary		18	+14.4 %	0.2
Decision Trees	Specialized	NA		18	-2.1 %	0.5
Artificial Intelligence	Specialized	Defining		17	+24.8 %	0.2
Neural Networks	Specialized	Defining		17	+16.5 %	0.3
Scala	Software and Programming	Defining		16	+51.1 %	0.2
MATLAB	Software and Programming	Necessary		16	-12.9 %	0.3
Written Communication	Baseline	NA		15		0.4
Big Data Analytics	Specialized	Defining		15	+3.5 %	0.3
PIG	Software and Programming	Defining		15	-27.1 %	0.6
Writing	Baseline	NA		14		0.2
C++	Software and Programming	Necessary		14	-12.5 %	0.2
Data Modeling	Specialized	Defining		14	+2.4 %	0.4
Organizational Skills	Baseline	NA		13		0.4

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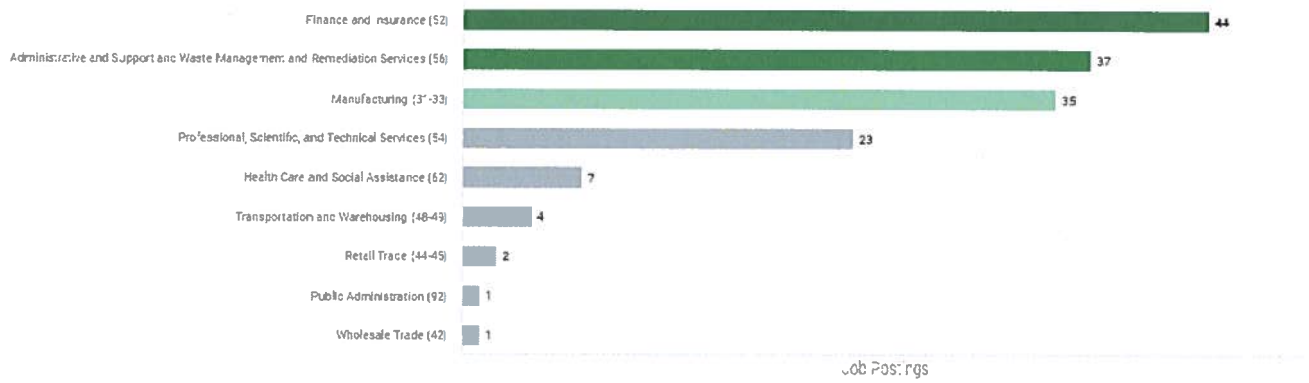
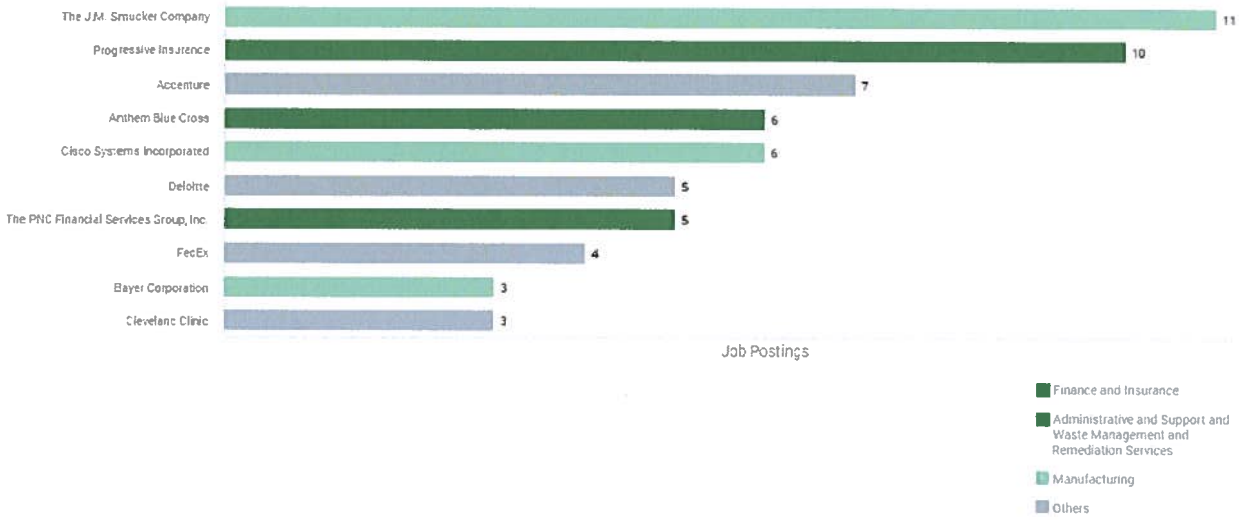
Employers & Industries

Top Industries

2-digit NAICS



Top Employers



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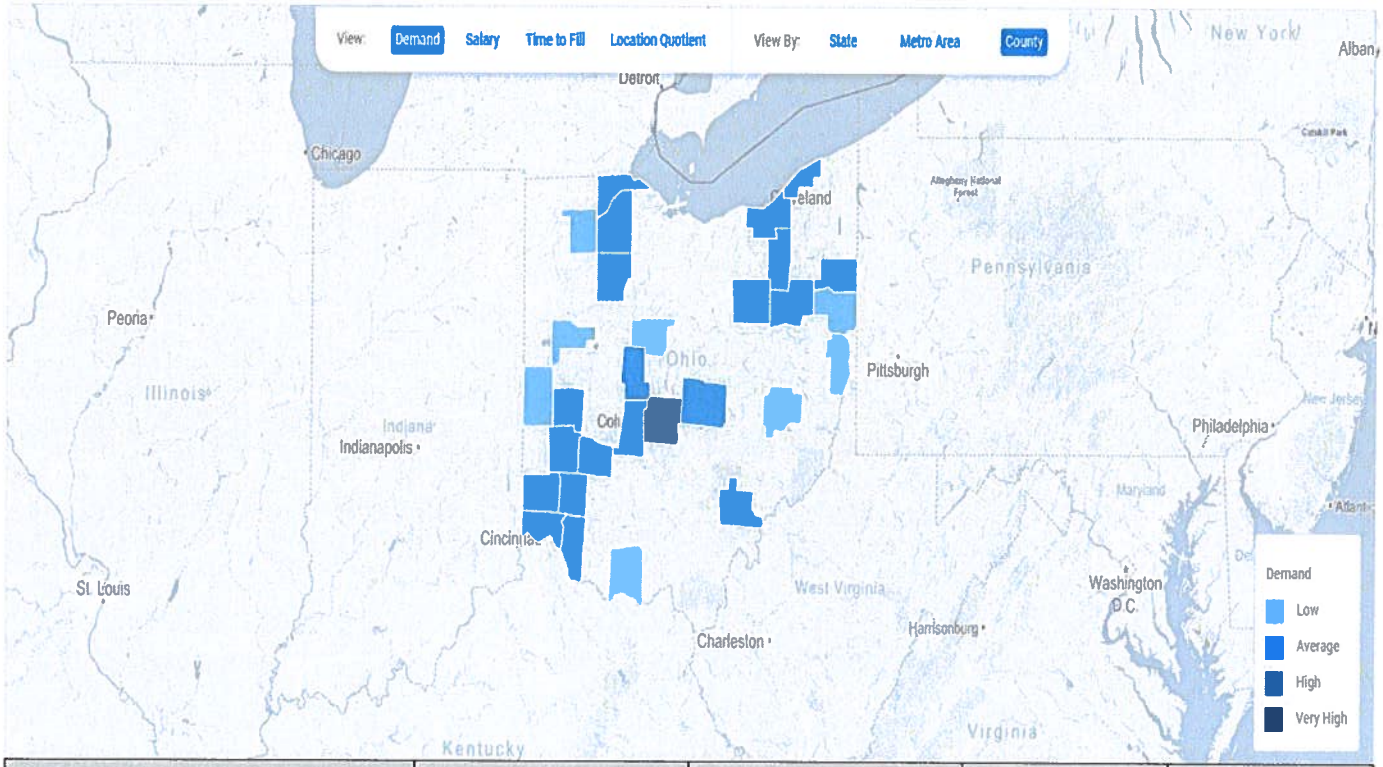
Top Locations



County	Job Postings Last 12 months	Median Salary	Time to Fill Days	Location Quotient
Franklin, OH	298	$113k	42	1.6
Hamilton, OH	285	$114k	42	2.1
Cuyahoga, OH	121	$117k	42	0.6
Montgomery, OH	61	$105k	42	0.9
Summit, OH	30	$109k	42	0.4
Warren, OH	21	$110k	42	0.9
Lucas, OH	19	$112k	42	0.3
Mahoning, OH	10	$133k	42	0.4
Union, OH	10	$92k	42	1.2
Greene, OH	9	$97k	42	0.5
Licking, OH	9	$125k	42	0.6
Stark, OH	8	$122k	42	0.2
Hancock, OH	5	$119k	42	0.4
Jefferson, OH	4	$90k	42	0.7
Lake, OH	4	$121k	42	0.2
Auglaize, OH	3	$101k	42	0.5
Madison, OH	3	$107k	42	0.7
Wood, OH	3	$111k	42	0.2
Clermont, OH	2	$75k	42	0.1

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Darke, OH	2	$103k	42	0.4
Wayne, OH	2	$135k	42	0.2
Adams, OH	1	$116k	42	0.7
Athens, OH	1	$64k	42	0.2
Butler, OH	1	$106k	42	0.0
Columbiana, OH	1	$99k	42	0.1
Guernsey, OH	1	$108k	42	0.2
Henry, OH	1	$110k	42	0.3
Marion, OH	1	$105k	42	0.2
Miami, OH	1	$109k	42	0.1

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Data Scientist at a Glance

Salary

Job Postings
Last 12 Months

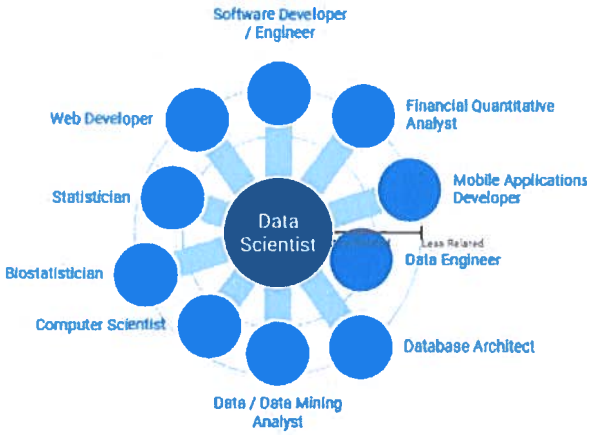
Projected Growth
10 Years

Time To Fill

Location Quotient

Source: Bureau of Labor Statistics (Projected Growth) and Burning Glass analysis

Related Jobs



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Appendix D: Business Support Letters

IBM
11501 Burnet Rd.
Austin, Tx 78758

November 6, 2018

To : Dr. Javed Khan, Chair of Computer Science Department
& Dr. Andrew Tonge, Chair of Mathematical Sciences

From : Rosa Bolger
IBM Director of Security Incident Response

I am pleased to formally support Kent State University on the creation of a new Data Science program based on a strong emphasis on mathematics and computer science.

Companies use data to run, grow and give direction to their business. Data scientists are helping companies interpret large amounts of data to solve complex problems, make quicker and better decisions, and evaluate market needs in order to reshape industries. At IBM, we are in constant need of data scientists. Kent State is well positioned, and this program could help fill some of the needs we have in the state of Ohio, specifically within the Security and Watson business units. As a Director for IT Incident Response, my team requires professionals that can quickly analyze data, detect suspicious behaviors, identify the source and apply remediation when needed. I would be pleased to consider students from this program as future employees.

I can enthusiastically support the creation of Kent State's new data science program.

Regards,

Name: Rosa Bolger
IBM Director, IT Security Incident Response
rbolger@us.ibm.com

Powering Business Worldwide

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122, USA
tel: 440 523-2193

November 13, 2019

Dr. Javed Khan
Chair of Computer Science
Dr. Andrew Tonge
Chair of Mathematical Sciences.
Kent State University
Kent, OH 44242

Dear Dr. Khan and Dr. Tonge,

As alumni of Kent State University and an active member on two KSU advisory committees focused on ensuring the institution is preparing students for relevant and rewarding careers, I am honored to write this letter validating the need for an advanced degree in the discipline of Data Science.

Eaton is a power management company made up of 100,000 employees, doing business in more than 175 countries, and with an annual revenue of more than $21 billion. Our energy-efficient products and services help our customers effectively manage electrical, hydraulic and mechanical power more reliably, efficiently, safely and sustainably. We do this by giving people tools to use power more efficiently, helping companies do business more sustainably, and encouraging each and every employee at Eaton to think differently about our business, our communities, and the positive impact we can make on the world.

As the digital transformation of our world impacts our business and essentially all businesses across Ohio and beyond, it becomes even more critical for our educational institutions to embrace the challenge and institute programs and degrees to advance our knowledge and ability to compete in today's global and connected markets. Northeast Ohio has a rooted history in industry and innovation. The need for advanced skills in STEM, including data sciences and analytics, is prevalent today and growing. An opportunity exists to differentiate our great state of Ohio by meeting the talent needs of global companies such as Eaton and others across Ohio and the region.

Today, Kent State University is one of a select number of state universities where we recruit IT talent to meet our organizational needs. We would welcome the future opportunity to consider employment for Kent State graduates with advanced degrees in Data Sciences. Please do not hesitate to reach out if I can provide further assistance.

Sincerely,

Dale O. Schroeder
Senior Manager, IT Learning
Eaton

Veteran Owned Small Business
ISO 9001:2015 Certified

520 S. Main Street, Suite 2448 Akron, OH 44311 • ph: 877-724-4552 • www.bgi-llc.com

From: Tom Ritzman, Executive Director
To: Dr. Javed Khan, Chair of Computer Science and Dr. Andrew Tonge, Chair of Mathematical Sciences
Re: Letter of Support for Master's Program in Data Science

Dr. Khan and Dr. Tonge,

I'm writing today to state BGI's support for a Master's Program in Data Science at Kent State University.

BGI is a defense contractor headquartered in Akron, Ohio. One of our corporate competencies is the creation of specialized Data Science solutions for aviation. We help our government customers create enterprise systems that benefit the engineers, scientists, pilots and maintainers in the aviation community. The types of systems and data that our engineers work with are unique; aircraft across the military fleet produce a highly fascinating data set with the most challenging problems to solve!

Our Computer Scientists develop software components for enterprise systems that store and operate on aviation data. It's challenging to store the high-dimension, high-volume data sets in a way that makes it accessible and useful to the aviation community. Data Scientists at BGI bridge this gap, using collected data to transform information into knowledge.

We have reviewed the draft proposal of Kent State's proposed Master's Degree in Data Science and have had direct conversations with the faculty on the intent of the program. We believe this program is highly aligned with the needs of our business. The proposed core courses and electives map directly to work our employees perform daily. Furthermore, the opportunity for students to participate in integrated learning through internships deepens the connection to the corporate community.

As a company, BGI needs individuals with strength in Data Science. As a university, we believe Kent State University is supporting that need. Our people require education and experience that is strongly grounded in mathematics, especially statistics. The same people need a firm understanding of computer science to create a system that makes the data usable. The Data Science skills bred at Kent State University will support our future growth, providing individuals who are qualified to create computing systems and derived information for other Data Scientists and aviation end-users.

Data Science is an emerging industry with immense potential. It is clear to us that Kent State University's Master's Degree program is a benefit to the State of Ohio. We strongly recommend approval of the proposed program as it strengthens Northeast Ohio's foothold in this area.

Best regards,

Thomas Ritzman
Executive Director
BGI, LLC

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To whom it may concern,

It is with great enthusiasm that I write this letter in support of the proposed master's degree program in Data Science at Kent State University.

Data Science is a rapidly growing new field at the intersection of mathematics, computer science, and machine learning. Its sudden emergence as an essential business discipline has resulted from the explosion in data quantity, availability, and cheap computing that has occurred over the past 10 to 15 years.

To succeed in the field of data science, a rare combination of skills and experience is required. A deep knowledge of mathematical and statistical principles is required for a practitioner to properly understand the virtues of various potential approaches to solving a problem, such as overall problem formulation (classification or regression?), what algorithm to use (parametric or nonparametric?), how to define the data set (what object is represented by each row of the data set?), how to measure success (mean squared error or maximum likelihood?), regularization, the bias variance tradeoff, and so on. In my experience, the vast majority of graduates in the fields of computer science or business intelligence do not have the depth of mathematical and statistical knowledge that is essential for mastery of the principles of data science. Having interviewed hundreds of data scientists and hired dozens, I have found first hand that it is very easy to find hundreds of applicants who have a high-level understanding of various algorithms, who have memorized various facts about popular algorithms, or who have copied and pasted code into a terminal to run a convolutional neural network or a gradient boosted machine. But it is very hard to find someone with the depth of mathematical problem solving ability that is required to properly understand the limitations, risks, subtle advantages and disadvantages of the myriad approaches that could be applied to any given problem. In short, I am of the opinion that the vast majority of people who aspire to be, or call themselves, data scientists, are severely lacking in mathematical fundamentals, in particular linear algebra, probability, and applied statistics, and that graduate level mathematics courses taught within a mathematics department are an essential component of preparation for a career in data science.

At the other end of the spectrum, I know from personal experience that solid mastery of mathematical and statistical fundamentals, while necessary, is not sufficient for success in the field of data science. When I began my first job in industry, I had very strong mathematical problem solving skills, but limited experience with programming and machine learning algorithms, and almost no exposure to real-world data. It took several years for me to grow from an applied mathematician to a leader in the field of data science. Therefore, I know from experience that a solid foundation in algorithms and programming skills afforded by rigorous computing and applied machine learning courses taught within a computer science department, is essential for a graduate to be ready to hit the ground running in the field of data science.

While my graduate education in Applied Mathematics at Kent State University afforded

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me an excellent mastery in the applied mathematical problem solving aspect of data science, the computing, machine learning, and real-world data experience essential to the field were largely absent in my curriculum. That being said, I am not sure that there existed a better program at Kent State University to prepare me for this career at that time, and if I could go back, I am not sure I would do anything differently in terms of coursework. What I *would* do differently, is to spend considerable time independently building up my skills in computer science and machine learning and working with real-world data. However, the vast majority of students do not have the foresight, motivation, and discipline to effectively navigate the endless ocean of possible reading materials without structured guidance. I, for one, did not, so I graduated with only part of the skillset necessary for a career in data science, and it took me several years in industry before I could call myself a true data scientist. Clearly, the only reliably way to produce graduates who are qualified to be called data scientists, immediately upon graduation, is to make available a multidisciplinary curriculum with heavy exposure to the principles of mathematical and statistical problem solving, computing, and machine learning. The proposed masters degree in Data Science at Kent State University accomplishes this.

Data science is a rapidly growing, and highly lucrative field, and with few exceptions, every large company in every industry is rapidly growing its data science department and machine learning capabilities. Speaking for my company, my department currently has 20 data scientists, and I plan to double that number in the next year. Only recently have universities begun to offer programs combining the multidisciplinary skills needed for success in the field, and as a result, the supply of qualified data scientists still does not nearly meet demand.

In my expert opinion, the Data Science master's degree program proposed by Kent State University meets all the requirements necessary for producing qualified data science candidates, both for my company and the industry as a whole. Many universities are creating programs similar to this one (though, most of them not having the essential level of mathematic rigor that this program enjoys), so it is imperative for Kent State to launch this program in order to remain competitive in attracting STEM students.

When graduates from this program start to emerge, I will be first in line to hire them!

Sincerely,
David Royce Martin, Ph.D.
Chief Data Scientist, Root Insurance
david@joinroot.com

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Omar Tahboub, PhD
PayPal, 2211 North First Street,
San Jose, CA, 95131

Dear Dr. Javed Khan and Dr. Andrew Tonge,

I am writing this letter in support of the proposed Data Science master's degree at Kent State University.

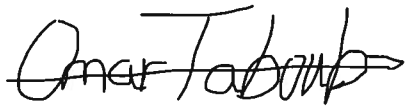
Data Science has been among the top five growing areas in Information Technology due to its cross disciplinary nature. The growth of the majority Billion Dollar companies like Google, Facebook, Amazon, Netflix, Uber and PayPal is attributed to Data Science due to its ability to provide precise business insights that enable these companies to rapidly grow with Billions of Dollars in profits.

In the online payments industry, Data Science is a crucial field. The world leading online payment processing PayPal's differentiating payment Risk service depends on it to guarantee secure payments for 250 million customers and merchants world-wide.

Due to the continuous growth of Data Science, a new research area has emerged recently. Deep Learning spare-headed by Google that made Autonomous Vehicles a reality for Tesla and Uber.

Finally, Kent State University does have all the elements needed to become leader in Data Science due to its historically proven programs in Applied Mathematics, Physics, Biology and Computer Science. I strongly believe that offering this program at Kent State University would be the right step in addressing the current market skillset demands.

Best Regards,



Omar Tahboub, PhD
Member Technical Staff, PayPal Checkout Optimization

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To: Kent State University:
Date: November 13, 2018
Re: KSU Data Science Program

My name is Doug Meil from IBM Watson Health and I am writing a note of support for the proposed Data Science program at Kent State.

I have been engaged producing software solutions that involve large scale data aggregation and analytics for the past 15 years, in medical informatics (Explorys/IBM Health) and in cable/telco before that (Everstream) and something that has become exceedingly clear is that data science is not only as critical as software engineering in terms of delivering successful products, but it is also *related* to software engineering and computer science. Long gone are the days where it was enough for analysts to work in data silos, apart from product teams. Successful analytics today need software engineering skills like unit testing, continuous deploy of models, an understanding of distributed processing frameworks, an understanding of cloud architectures, etc. The Data Science program can provide an environment for those on an analytics career path and expose them to essential software engineering topics.

Likewise, traditional software engineers can easily become inundated with data from a myriad of sources (e.g., application logs, operational logs). It's not enough just to *collect* this data, one needs analytics skills to *do* something with it and make sense of it. The Data Science program can benefit students who are on a software engineering career path but would like expand their skillsets.

Thank you, and I look forward to great things from this program.

Doug Meil
IBM Distinguished Engineer
10500 Cedar
Cleveland, Ohio 44106

(c) 440-318-5298

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Appendix E: Fiscal Impact Statement

	Year 1	Year 2	Year 3	Year 4
I. Projected Enrollment				
Headcount full-time (1)	10	25	35	40
Headcount part-time	0	0	0	0
Full-time equivalent (FTE) enrollment	10	25	35	40
II. Projected Program Income				
Tuition (2)	$ 168,590	$ 421,475	$ 590,065	$ 674,360
Expected state subsidy (3)	$ 67,436	$ 168,590	$ 236,026	$ 269,744
Externally funded stipends, as applicable	$ -	$ -	$ -	$ -
Other Income	$ -	$ -	$ -	$ -
Total Projected Program Income	**$ 236,026**	**$ 590,065**	**$ 826,091**	**$ 944,104**
III. Program Expenses (4)				
New personnel:				
- Instruction				
Full-time:	$ -	$ -	$ -	$ -
Part-time:	$ -	$ -	$ -	$ -
-Non-instruction				
Full-time:	$ -	$ -		
Part-time:	$ -	$ -	$ -	$ -
Current personnel:				
- Instruction				
Full-time:	$ -	$ -	$ -	$ -
Part-time:	$ -	$ -	$ -	$ -
-Non-instruction				
Full-time:	$ -	$ -	$ -	$ -
Part-time:	$ -	$ -	$ -	$ -
Benefits for all personnel	$ -	$ -	$ -	$ -
New facilities/building/space renovation (describe in narra	$ -	$ -	$ -	$ -
Scholarship/stipend support	$ -	$ -	$ -	$ -
Additional library resources	$ -	$ -	$ -	$ -
Additonal technology or equipment needs	$ -	$ -	$ -	$ -
Other expenses (see below)	$ -	$ -	$ -	$ -
Total Projected Program Expenses	**$ -**	**$ -**	**$ -**	**$ -**
Projected Program Net	**$ 236,026**	**$ 590,065**	**$ 826,091**	**$ 944,104**

Other Expenses				
Allocation of expenses covered by general fee (5)	$ 36,844	$ 92,109	$ 128,953	$ 147,375
RCM overhead - estimated at 50% (6)	$ 99,591	$ 248,978	$ 348,569	$ 398,365
RCM tuition allocation to other colleges	$ -	$ -	$ -	$ -
Professional development	$ -	$ -	$ -	$ -
Supplies (office, computer software, duplication, printing)	$ -	$ -	$ -	$ -
Telephone, network, and lines	$ -	$ -	$ -	$ -
Other info and communication pool	$ -	$ -	$ -	$ -
Total Other Expenses	**$ 136,435**	**$ 341,087**	**$ 477,522**	**$ 545,739**

BUDGET NARRATIVE:

(1) 10 students in the initial cohort; increasing to 15 in the second cohort (while the initial cohort is in Year 2); then increasing to 20 students for the subsequent cohorts. By Year 4, the total number of students stabilizes at 40.

(2) Projection based on half of the students qualifying for in-state tuition and half not.

(3) The State contribution is estimated at 40% of the tuition amount.

(4) Not applicable - no new resources needed

(5) Using the Estimate Percentage Distribution of Instructional and General Fee FY 19/20, Kent Campus: General Fee: 15.61%

(6) 50% of the Projected Program Net, after subtracting the Allocation of expenses covered by the general fee.

Appendix F: Course Descriptions

Many of the course descriptions are taken verbatim from the KSU catalog descriptions of the courses.

MATH 50011 Probability Theory and Applications [3 hours]
Permutations and combinations, discrete and continuous distributions, random variables, conditional probabilities, Bayes' formula, mathematical expectation, law of large numbers, normal approximations, basic limit theorems. Prerequisite: Graduate standing

MATH 50015 Applied Statistics [3 hours]
This course is based on classical linear regression techniques with an emphasis on real data using the principles of sound data analysis. Close attention will be given to issues of interpretation, diagnostics, outliers and influential points, goodness of fit, and model selection. Topics include simple and multiple linear regression, transformation and modifications of covariates and responses, design matrices, variable selection, and logistic regression. Prerequisite: Graduate standing

MATH 50024 Computational Statistics [3 hours]
This course is about the use of computational tools to manage, explore, summarize, and visualize data, as well as the computational underpinnings of fitting statistical models. It uses mostly the statistical computation language R, but also other languages like Python and Matlab. It also covers: simulation and random number generation, computationally intensive methods like the bootstrap and permutation tests, Expectation-Maximization and related algorithms, and dimensionality reduction via matrix decomposition. Prerequisite: Graduate standing

MATH 50028 Statistical Learning [3 hours]
This course is about the statistical foundations of modern machine learning techniques. The main focus is classification and prediction, using regression-based, tree-based, and kernel-based methods. Specific methods include logistic regression, classification and regression trees, random forests, and support vector machines. The course also includes an introduction to unsupervised and semi-supervised learning. Prerequisite: MATH 40015 or 50015 and MATH 40024 or 50024.

MATH 50051 Topics in Stochastic Processes and Applications [3 hours]
Topics from conditional expectations, Markov chains, Markov processes, Brownian Motion and Martingales and their applications to stochastic calculus. Prerequisite: MATH 50011 and graduate standing.

MATH 67098 Research [3 or 6 hours]
Research or individual investigation. Credits are applied toward degree requirements (electives) with approval if letter grade of "S" is given. Prerequisite: Graduate standing.

MATH 67199 Thesis I [6 hours]
Thesis student must register for a total of 6 hours, 2 to 6 hours in a single semester distributed over several semester if desired. Prerequisite: Graduate standing.

CS 54201 Artificial Intelligence [3 hours]
Examines goals, problems, concepts and methods of artificial intelligence heuristic versus algorithmic methods, natural language comprehension, and theorem proving.
Prerequisite: Graduate Standing

CS 57206 Data Security and Privacy [3 hours]
The goal of the course is to familiarize the students with basic concepts of security and privacy, their definitions, applications and current advances in research community and industry. This course addresses the security and privacy issues in legacy systems and also studies security and privacy policies and legislations. This course also reviews current research projects in the area of security and privacy. Prerequisite: Graduate standing.

CS 63005 Advanced Database Systems Design [3 hours]
Introduction to a variety of advanced database topics and on-going trends in modern database systems. The course includes advanced issues of object-oriented database, XML, advanced client server architecture and distributed database techniques. Prerequisite: Graduate standing

CS 63015 Data Mining Techniques [3 hours]
Concepts and techniques of data mining. Data mining is a process of discovering information from a set of large databases. This course takes a database perspective on data mining.
Prerequisite: Graduate standing

CS 63016 Big Data Analytics [3 hours]
This course will cover a series of important Big-Data-related problems and their solutions. Specifically, we will introduce the characteristics and challenges of the Big Data, state-of-the-art computing paradigm sand platforms (e.g., MapReduce), big data programming tools (e.g., Hadoop and MongoDB), big data extraction and integration, big data storage, scalable indexing for big data, big graph processing, big data stream techniques and algorithms, big probabilistic data management, big data privacy, big data visualizations, and big data applications (e.g., spatial, finance, multimedia, medical, health, and social data).
Perquisite: Graduate standing

CS 63017 Big Data Management [3 hours]
Introduces computing platforms with focus on how to use them in processing, managing and analyzing massive datasets. Utilizes several key data processing tasks, including simple statistics, data aggregation, join processing, frequent pattern mining, data clustering, information retrieval, pagerank and massive graph analytics as the case study for large scale data processing. Prerequisite: Graduate Standing

CS 63018 Probabilistic Data Management [3 hours]
This course addresses the fundamental concepts and techniques for probabilistic data management in the area of databases. Probabilistic data are pervasive in many real-world applications, such as sensor networks, GPS system, location-based services, mobile computing, multimedia databases, data extraction and integration, trajectory data analysis, semantic web, privacy preserving, and so on. This class also covers major research topics such as probabilistic or uncertain data models, probabilistic queries, probabilistic query answering techniques, and data quality issues in databases. Prerequisite: Graduate standing.

CS 63100 Computational Health Informatics [3 hours]
The course describes computational techniques and software tools for managing and transmitting health related information and automated analysis of medical and biosignal data. Prerequisite: Graduate Standing

CS 64201 Advanced Artificial Intelligence [3 hours]
Additional topics in AI such as logic programming, advanced problem-solving systems, understanding natural languages, vision, learning, plan-generating systems. Prerequisite: Graduate standing.

CS 64402 Multimedia Systems and Biometrics [3 hours]
This course discusses computational techniques for the fusion of multimedia data recorded by sensors for human-identification using automated analysis of biometric signals. Prerequisite: Graduate Standing.

CS 67302 Information Visualization [3 hours]
Information visualization is the science that unveils the underlying structure of data sets using visual representations that utilize the powerful processing capabilities of the human visual perceptual system. In this class, we will study algorithms and systems for visually exploring, understanding, and analyzing large, complex data sets. Information visualization focuses on abstract data such as symbolic, tabular, networked, hierarchical, or textual information sources. The objectives of the course are to learn the principals involved in information visualization and a variety of existing techniques and systems. The students will also gain backgrounds and skills that will aid the design of new, innovative visualizations in realistic applications.
Prerequisite: Graduate standing.

CS 69098 Research [3 hours]
Research or individual investigation. Credits are applied toward degree requirements with approval if grade of "S" is given. Prerequisite: Graduate standing.

CS 69099 Capstone Project [3 hours]
Prerequisite: Graduate standing.

CS 69192 Graduate Internship [3 hours]
Prerequisite: Graduate standing.

CS 69199 Thesis I [6 hours]
Thesis student must register for total of 6 hours, 2 to 6 hours in a single semester distributed over several semesters if desired. Prerequisite: Graduate standing.

BSCI 60103 Biological Statistics [3 hours]
Principles of experimental design and statistical analysis and how to choose and interpret statistical tests using biological data sets.
Prerequisite: Graduate standing.

GEOG 59070 Geographic Information Science [4 hours]
Introduction to theories and methods for geographic data processing, including data capture and input, data storage and management, and data analysis and displays. Emphasis is on laboratory exercises using GIS software packages for real world applications.
Prerequisite: Graduate standing.

GEOG 59080 Advanced Geographic Information Science [3 hours]
Provides both an overview of GIS data structures, analytical functions and usage, and modeling approaches. Students will learn how to manage GIS data in different formats or projections, select GIS analytical tools for solving different problems, and model changes of geographical phenomena as represented by GIS data.
Prerequisite: GEOG 49070 or GEOG 59070 and Graduate standing.

PSYC 61651 Quantitative Statistical Analysis I [3 hours]
Review of univariate statistics and an introduction to using bivariate and multivariate statistics. Part one of a two semester sequence on statistical analysis.
Prerequisite: Graduate standing in Psychology and special approval.

PSYC 61654 Quantitative Statistical Analysis II [3 hours]
Multivariate statistics for classifying individuals and variables. Additional topics include power/effect size and handling missing data. Part two of a two-semester sequence on statistical analysis.
Prerequisite: PSYC 61651 or 71651 and Graduate standing in Psychology

ECON 62054 Econometrics I [3 hours]
Introduction to problems and methods of the empirical estimation of economic relationships. Prerequisite: Graduate standing.

ECON 62055 Econometrics II [3 hours]
Covers generalized linear regression, mixed estimation, simultaneous equation systems, their identification and estimation by single equation and systems estimation. Prerequisite: ECON 62054 and graduate standing.

ECON 62056 Time Series Analysis [3 hours]
Covers various linear and non-linear time series models, market risk and value at risk (VAR). Students will gain hands on-experience with all models learned in the course. This course uses advanced analytical software and hardware on the financial engineering trading floor. Prerequisite: Graduate standing; and special approval of instructor.

EHS 52018 Environmental Health Concepts in Public Health [3 hours]
Provides a comprehensive overview of the core topics in environmental health as related to public health. Prerequisite: Graduate standing.

EPI 52017 Fundamentals of Public Health Epidemiology [3 hours]
Introduces principles, methods and application of epidemiology. Covers the history of epidemiology, concepts of disease causation and prevention, measures of disease frequency and excessive risk, epidemiologic study designs, causal inference, outbreak investigation and screening. Provides experience with calculation of rate standardization; measures of disease frequency, association and impact; and sensitivity and specificity of screening tests. Highlights applications of epidemiology to understanding of disease etiology, transmission, pathogenesis and prevention; evaluation and public policy development. Prerequisite: Graduate standing.

EPI 63016 Principles of Epidemiological Research [3 hours]
Course builds upon EPI 52017 to explore deeper the concepts and methods in epidemiologic research. Reviews the measures of disease frequency; association and impact; epidemiologic reasoning and causal inference; and methods and techniques for designing, implementing, analyzing and interpreting various epidemiologic study designs. Discusses advantages and limitations of various study designs. Explores threats to validity, precision and generalizability of epidemiologic studies. Prerequisite: BST 52019 and EPI 52017; and graduate standing.

EPI 63018 Observational Designs for Clinical Research [3 hours]
Course provides students the skills to design, conduct and perform clinical epidemiology studies using an observational design. Students understand major concepts of clinical research, develop clinical research questions, and solve clinical research problems. Topics include study design, risk, causation, exposures, bias, measurement and validity and disease prognosis. Prerequisite: BST 52019 (or approved MATH statistics courses) and EPI 52017 and graduate standing.

EPI 63019 Experimental Designs for Clinical Research [3 hours]
Principles of experimental designs as they apply to clinical research and clinical trials are presented at an intermediate level. Students understand randomized control trial designs and alternative designs. Study methodology, including randomization and blinding techniques, is covered. Topics include evidence-based medicine; risk prediction and risk scores; instruments and measurement; data issues; and recruitment, retention and adherence. Prerequisite: EPI 63018; and graduate standing.

HI 60401 Health Information Management [3 hours]
Covers the areas encompassing health informatics management including the planning, selection, deployment, and management of electronic medical records (EMR), management decision-support and tracking systems (DSS), and other health information technologies (HIT). Prerequisite: Graduate standing.

HI 60411 Clinical Analytics [3 hours]
The use of well-defined and well-integrated clinical analytics throughout the healthcare value chain can be transformative. Through careful implementation of health analytics, hospitals can transform unwieldy amalgamations of data into information that can: improve patient outcomes, increase safety, enhance operational efficiency and support public health. Given the immense size of the data challenge, the distinctness and geographic spread of many healthcare-related activities, and the fact that so many healthcare activities are conducted by different entities which must interact with each other, there is really no other way to provide operations management tools necessary to deliver personalized medicine and to control spiraling costs. Since clinical analytics is an immature discipline, we carefully examine the practices of those institutions who are standard setters in the industry. Pre/co-requisite: Graduate standing and HI 60401.

HI 60414 Human Factors and Usability in Health Informatics [3 hours]
Provides students with the foundational principles of usability and human factors as applied to safety and quality in health informatics technology. Course readings and materials review the concepts of human factors, usability and the cognitive consequences of health information technology on clinical performance and decision making. Attention is given to the role of mobile computing in health care, as well as information visualization. Pre/co-requisite: Graduate standing and HI 60401.

HI 60418 Clinical Analytics II [3 hours]
As the volume and complexity of health data continues to grow, analysis of that data requires more advanced tools to transform that data into meaningful information for clinical decisions. Not only is data from electronic medical records (EMRs) growing at a rapid pace but new types of data are available for analysis, such as, genomic data and patient generated data. These advanced analytic tools break down into three areas, each of which will be examined in this course: new data warehousing techniques to manage big data, new analytic tools including cognitive computing and predictive analytics and new ways to visualize the data. All of these techniques transform the raw data into use cases, such as, population health, precision medicine

and clinical decision support using artificial intelligence and machine learning which will also be addressed in this course. Prerequisite: HI 60411 and graduate standing.

KM 60301 Foundational Principles of Knowledge Management [3 hours]
This course covers an introduction to: historical roots for knowledge and knowledge management; theories/definitions of knowledge; theories, applications tools and practices of KM; Knowledge Management Life-Cycle Framework and Models; significant issues in KM--best practices, culture, economics, strategy, intellectual capital, sustainable innovation. Prerequisite: Graduate standing.

KM 60312 Business Intelligence-Competitive Intelligence [3 hours]
An introduction to strategic intelligence consisting of competitive and business intelligence. Strategic intelligence is an art, science and craft. Businesses and governments require effective intelligence programs, processes and tools to track businesses competitors, markets and trends by acquiring, creating, managing and disseminating intelligence knowledge. Prerequisite: KM 60301 with a minimum C grade and graduate standing.

LIS 60010 The Information Landscape [3 hours]
Exploration of the nature of information and technology in information-intensive environments. Topics to be addressed include information lifecycle processes such as production, storage, sharing, and consumption; social, cultural, economic, legal, and technological contexts for understanding information processes; the roles of information professionals and agencies, and their place in the larger information marketplace; current and emerging information technologies that shape the information economy. Prerequisite: Graduate standing.

LIS 60020 Information Organization [3 hours]
Introduction to the theory and practice of information organization and retrieval in various information environments. Familiarity with principles, standards, tools and current systems relating to organization of information and retrieval. Exploration of supported information system functions such as searching, browsing, and navigation. Assessment and evaluation of information organization and retrieval systems. Graduate standing. Pre/corequisite: Graduate standing and LIS 60010 or LIS 60607.

Appendix G: Faculty Listing

Faculty	Credential	Courses Taught
Department of Biological Sciences		
Bahlai, Christine Assistant Professor	Ph.D., Environmental Biology, University of Guelph, 2012 Years teaching: 2	BSCI 60103 Biological Statistics
Department of Computer Science		
Bansal, Arvind Professor	Ph.D., Computer Science, Case Western Reserve University, 1985 Years teaching: 30	CS 54201 Artificial Intelligence CS 63100 Computational Health Informatics CS 64201 Advanced Artificial Intelligence CS 64402 Multimedia Systems and Biometrics
Guan, Qiang Assistant Professor	Ph.D., Computer Science, University of North Texas, 2014* Years teaching: 2	CS 69098 Research
Jin, Ruoming Associate Professor	Ph.D., Computer Science, Ohio State University, 2001 Years teaching: 14	CS 63005 Advanced Database Systems Design CS 63015 Data Mining Techniques
Lian, Xiang Assistant Professor	Ph.D., Computer Science and Engineering, Hong Kong University of Science and Technology, 2009 Years teaching: 8	CS 63016 Big Data Analytics CS 63017 Big Data Management CS 63018 Probabilistic Data Management
Melton, Austin Professor	Ph.D., Mathematics, Kansas State University, 1980 Years teaching: 35	CS 57206 Data Security and Privacy
Zhao, Ye Professor	Ph.D., Computer Science, State University of New York, Stony Brook, 2006 Years teaching: 13	CS 67302 Information Visualization
Department of Economics		
Johnson, Eric Associate Professor	Ph.D., Economics, University of California-San Diego, 1997 Years teaching: 22	ECON 62054 Econometrics I ECON 62055 Econometrics II ECON 62056 Time Series Analysis
Department of Geography		
Lee, Jay Professor	Ph.D., Geography, University of Western Ontario, 1989 Years teaching: 19	GEOG 59080 Advanced Geographic Information Science
Widner, Emariana Associate Professor	Ph.D., Geography, Texas State University, 2009 Years teaching: 10	GEOG 59070 Geographic Information Science
School of Information		
Cunningham, Christopher Adjunct Instructor	Ph.D., Information Science, University of South Carolina, 2015 Years teaching: 4	LIS 60010 The Information Landscape
Edgar, William Adjunct Instructor	Ph.D., Library and Information Studies, University of Alabama, 2000 Years teaching: 20	KM 60301 Foundational Principles of Knowledge Management
Empel, Sofia Adjunct Instructor	Ph.D., Information Studies, Long Island University, 2014 Years teaching: 6	LIS 60010 The Information Landscape
Hajibayova, Lala Assistant Professor	Ph.D., Information Science, Indiana University-Bloomington, 2014 Years teaching: 9	LIS 60020 Information Organization

Faculty	Credential	Courses Taught
School of Information continued		
Hajibayova, Lala Assistant Professor	Ph.D., Information Science, Indiana University-Bloomington, 2014 Years teaching: 9	LIS 60020 Information Organization
Hudak, Christine Professor	Ph.D., Urban Education Administration, Cleveland State University, 1998 Years teaching: 20	HI 60401 Health Information Management KM 60301 Foundational Principles of Knowledge Management
Meehan, Rebecca Associate Professor	Ph.D., Sociology, Case Western Reserve University, 1997 Years teaching: 7	HI 60414 Human Factors and Usability in Health Informatics
Northup, Jeffrey Adjunct Instructor	M.S., Knowledge Management, Kent State University, 2018 Years teaching: 1	KM 60301 Foundational Principles of Knowledge Management
Sharp, John Adjunct Instructor	M.S., Social Administration, Health Informatics, Case Western Reserve University, 1980 Years teaching: 15	HI 60411 Clinical Analytics HI 60418 Clinical Analytics II
Smith, Catherine Associate Professor	Ph.D., Information Science, Rutgers University, 2010 Years teaching: 13	LIS 60010 The Information Landscape
Department of Mathematical Science		
de la Cruz Cabrera, Omar Assistant Professor	Ph.D., Statistics, University of Chicago, 2008* Years teaching: 12	MATH 50011 Probability Theory and Applications MATH 50015 Applied Statistics MATH 50024 Computational Statistics MATH 50028 Statistical Learning MATH 50051 Topics in Probability Theory and Stochastics Processes MATH 50059 Stochastic Actuarial Models
Li, Jun Associate Professor	Ph.D., Statistics, Iowa State University, 2013 Years teaching: 6	MATH 50011 Probability Theory and Applications MATH 50015 Applied Statistics MATH 50024 Computational Statistics MATH 50028 Statistical Learning
Tsai, Tsung-Heng Assistant Professor	Ph.D., Electrical Engineering, Virginia Polytechnic Institute and State University, 2014* Years teaching: 1	MATH 50011 Probability Theory and Applications MATH 50015 Applied Statistics MATH 50024 Computational Statistics MATH 50028 Statistical Learning
Faculty	**Credential**	**Courses Taught**
Department of Psychological Sciences		
Was, Christopher Associate Professor	Ph.D., Psychology, Univ. of Utah, 2005 Years teaching: 14	PSYC 61651 Quantitative Statistical Analysis I PSYC 61654 Quantitative Statistical Analysis II
College of Public Health		
Beaird, Heather Associate Professor	Ph.D., Epidemiology, Case Western Reserve University, 2005 Years teaching: 10	EPI52017 Fundamentals of Public Health Epidemiology
Bhatta, Madhav Professor	Ph.D., Epidemiology, University of Alabama-Birmingham, 2007 Years teaching: 10	EPI 52017 Fundamentals of Public Health Epidemiology EPI 63016 Principles of Epidemiological Research
Stedman-Smith, Maggie Associate Professor	Ph.D., Environmental Health Science, University of Minnesota, 2010 Years teaching: 10	EHS 52018 Environmental Health Concepts in Public Health
Zullo, Melissa Associate Professor	Ph.D., Epidemiology, Case Western Reserve University, 2009* Years teaching: 10	EPI 63018 Observational Designs for Clinical Research EPI 63019 Experimental Designs for Clinical Research

Appendix H: Faculty CV

See attached document.

Kent Sate Support Memos

Haley, Mary Ann

From: Bogoniewski, Scott
Sent: Wednesday, December 11, 2019 3:42 PM
To: Javed I. Khan; Albright, Kendra
Cc: Reynolds, Amy; Haley, Mary Ann; TONGE, ANDREW
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Hi Javed,

I support this proposed proposal.

-Scott

Scott Bogoniewski
Interim Director
School of Digital Sciences
Kent State University
314B Library

Design Innovation Initiative Team Member
www.kent.edu/designinnovation

From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, December 11, 2019 3:40 PM
To: Albright, Kendra <kalbrig7@kent.edu>
Cc: Reynolds, Amy <areyno24@kent.edu>; Haley, Mary Ann <mhaley@kent.edu>; TONGE, ANDREW <atonge@kent.edu>
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Hi Amy & Kendra,

Thanks for your support for the program. The curriculum team has included the courses from unit (9 courses) from CCI. We look forward for continued collaboration.
The full proposal is not heading for approvals. We look forward to your continued support and cooperation.

Best Regards,

-Javed.

CS/MATH 86

Albright, Kendra wrote:

Thanks, Austin!

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Sunday, December 8, 2019 3:56 PM
To: Albright, Kendra <kalbrig7@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Kendra,

Attached is a two-page format which was prepared when we were starting to develop the data science proposal. (At first, we had planned on having two-page CVs.) However, given that faculty members are very busy now and that they are looking forward to a much needed break, I would be happy to get a one or two-page CV in (almost) any format.

Thanks,
Austin

From: Albright, Kendra <kalbrig7@kent.edu>
Sent: Sunday, December 8, 2019 8:42 AM
To: MELTON JR, AUSTIN <amelton@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Thanks, Austin. We'll start working on the cvs right away. Do you have a particular format you'd like for us to follow?

Thanks!

Kendra

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Saturday, December 7, 2019 4:35 PM
To: KORZENKO, JANNA <jkorzenk@kent.edu>; Albright, Kendra <kalbrig7@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Kendra and Janna,

I apologize for the following request.

Unfortunately, the proposal for the new Data Science master's degree did not get processed as soon as we (the Departments of Mathematics Sciences and Computer Science) had planned. We finally submitted the proposal this past week.

CS/MATH
87

The guidelines for new master's degree proposals recently changed, and under the current guidelines accompanying CVs may not be longer than two pages. You sent us fifteen CVs; those for Cunningham, Edgar, Empel, Hudak, Hughes, Johnson, Meehan, Miller, Petiya, and Sharp are longer than two pages.

The College of Arts & Sciences will review our proposal this coming week, but we don't need the shorter CVs for our college. We do need the shorter CVs when the proposal is forwarded to the EPC. Thus, if possible, within the next two weeks, we need two-page CVs for the ten faculty members listed above. Can you help us get shorter CVs, or should Marcy or I email the ten faculty members directly?

Thanks,
Austin

P.S. I only learned of the new guidelines about 10 days ago.

From: KORZENKO, JANNA <jkorzenk@kent.edu>
Sent: Monday, September 30, 2019 2:26 PM
To: Albright, Kendra <kalbrig7@kent.edu>; MELTON JR, AUSTIN <amelton@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Apologies for sending these along today, rather than Friday. Please let us know if you need anything else or if you have any trouble with the attachment.

Regards,

Janna Korzenko

Academic Program Director, Student Services
School of Information
Kent State University
P.O. Box 5190
Kent, OH 44242-0001
direct: 330-672-5841

ISCHOOL.KENT.EDU

View our latest online open house about the MLIS program!

From: Albright, Kendra <kalbrig7@kent.edu>
Sent: Monday, September 23, 2019 9:25 PM
To: MELTON JR, AUSTIN <amelton@kent.edu>
Cc: KORZENKO, JANNA <jkorzenk@kent.edu>; ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Thank you, Austin!

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Monday, September 23, 2019 4:43 PM

CS/MATH 88

To: Albright, Kendra <kalbrig7@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Kendra and Janna,

I appreciate your help!

I like the HI 60414 suggestion.

Thanks,
Austin

From: Albright, Kendra <kalbrig7@kent.edu>
Sent: Sunday, September 22, 2019 3:13 PM
To: MELTON JR, AUSTIN <amelton@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Austin,

We should have the materials you need to you by Friday. Meanwhile, we thought of one more course you might want to consider: HI 60414: Human Factors and Usability in Health Informatics. We'll include that one, just in case you also want to know about it as well.

I'll be out of the office all week, but checking email regularly. I'm copying Janna Korzenko, who is our Director of Student Services, who is pulling the materials together for you.

Best wishes,
Kendra

******
Kendra Albright, Ph.D.
Professor and Director
Kent State University
School of Information
Editor, *Libri*: International Journal of Libraries and Information Studies

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Sunday, September 15, 2019 7:25 PM
To: Albright, Kendra <kalbrig7@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Dear Kendra,

Javed forwarded your email regarding iSchool courses which might be included as electives in the new Data Science master's degree to the committee preparing the master's degree proposal. The committee talked about your suggested courses, and we would like to include the following ones in the proposal.

CS/MATH 89

HI 60401 Health Information Management
HI 60411 Clinical Analytics
HI 60418 Clinical Analytics II
KM 60301 Foundational Principles of Knowledge Management
LIS 60010 The Information Landscape
LIS 60020 Information Organization
LIS 60510 Digital Technologies I: Data Fundamentals
LIS 60511 Digital Technologies II: Internet Fundamentals
LIS 60512 Digital Technologies III: Information Systems Fundamentals
LIS 60636 Knowledge Organization Structures, Systems and Services
LIS 60637 Metadata Architecture and Implementation
LIS 60638 Digital Libraries

When we submit the proposal, we also need to submit a resume for each person who may be teaching courses in the new program. Would you identify the iSchool faculty members who may be teaching in the new program, and could you please ask them to send a resume to Marcy Curtiss (mcurtiss@kent.edu) or to me? They may submit the standard two-page grant resume, or they may submit any updated resume.

Also, as part of the proposal we also need for each faculty member the information requested in the attached spreadsheet.

A current draft of the Data Science master's degree proposal is attached.

If you have questions, please ask, and thanks very much for your help!

Kind regards,
Austin

From: javedkent <javedkent@gmail.com>
Sent: Friday, August 02, 2019 6:21 PM
To: MELTON JR, AUSTIN <melton@cs.kent.edu>; Lian, Xiang <xlian@kent.edu>; Marcy Curtiss <curtiss@cs.kent.edu>; De La Cruz Cabrera, Omar <odelacru@kent.edu>
Subject: Fwd: RE: MS in Data Science Proposal- Request for Course Proposal

Sent from my T-Mobile 4G LTE Device

-------- Original message --------
From: "Albright, Kendra" <kalbrig7@kent.edu>
Date: 8/2/19 5:53 PM (GMT-05:00)
To: javedkent <javedkent@gmail.com>
Cc: "ZHANG, YIN" <yzhang4@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Dear Javed,

Here are some of the iSchool courses that may be of interest to your new data science courses. Thank you for giving us the opportunity to share our courses with you!

LIS 60613 Information Needs, Seeking and Use

CS/MATH 90

LIS 60631 Introduction to Digital Preservation
LIS 60633 Digital Curation
LIS 60636 Knowledge Organization Structures, Systems and Services
LIS 60637 Metadata Architecture and Implementation
LIS 60638 Digital Libraries
LIS 60639 Implementation of Digital Libraries
LIS 61095(Special Topics) Applied Quantitative Methods for Research and Management in the Information Professions
KM 60312 Business Intelligence –Competitive Intelligence
KM 60370 Semantic Analysis Methods
UXD 60001 User Experience Design Principles and Concepts
HI 60411 Clinical Analytics 1
HI 60418 Clinical Analytics 2

Best wishes,

Kendra

******

Kendra Albright, Ph.D.
Professor and Director
Kent State University
School of Information
Editor, *Libri*: International Journal of Libraries and Information Studies

--

Dr. Javed I. Khan, Professor and Chair
Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page: http://www.cs.kent.edu/~javed

"Imagination will often carry us to worlds that never were.
But without it we go nowhere."

- Carl Sagan

Towards the Galactic internet?
OSPF: An Area Hierarchic Routing Protocol for Routers in Motion
https://www.researchgate.net/publication/237665335_Space_OSPF_An_Area_Hierarchic_Routing_Protocol_for_Routers_in_Motion

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Haley, Mary Ann

From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, December 11, 2019 3:40 PM
To: Albright, Kendra
Cc: Reynolds, Amy; Haley, Mary Ann; TONGE, ANDREW
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Hi Amy & Kendra,

Thanks for your support for the program. The curriculum team has included the courses from unit (9 courses) from CCI. We look forward for continued collaboration.
The full proposal is not heading for approvals. We look forward to your continued support and cooperation.

Best Regards,

-Javed.

Albright, Kendra wrote:

> Thanks, Austin!
>
> **From:** MELTON JR, AUSTIN <amelton@kent.edu>
> **Sent:** Sunday, December 8, 2019 3:56 PM
> **To:** Albright, Kendra <kalbrig7@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
> **Cc:** ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
> **Subject:** RE: MS in Data Science Proposal- Request for Course Proposal
>
> Hi Kendra,
>
> Attached is a two-page format which was prepared when we were starting to develop the data science proposal. (At first, we had planned on having two-page CVs.) However, given that faculty members are very busy now and that they are looking forward to a much needed break, I would be happy to get a one or two-page CV in (almost) any format.
>
> Thanks,
> Austin
>
> **From:** Albright, Kendra <kalbrig7@kent.edu>
> **Sent:** Sunday, December 8, 2019 8:42 AM
> **To:** MELTON JR, AUSTIN <amelton@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
> **Cc:** ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan

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<javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Thanks, Austin. We'll start working on the cvs right away. Do you have a particular format you'd like for us to follow?

Thanks!

Kendra

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Saturday, December 7, 2019 4:35 PM
To: KORZENKO, JANNA <jkorzenk@kent.edu>; Albright, Kendra <kalbrig7@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Kendra and Janna,

I apologize for the following request.

Unfortunately, the proposal for the new Data Science master's degree did not get processed as soon as we (the Departments of Mathematics Sciences and Computer Science) had planned. We finally submitted the proposal this past week.

The guidelines for new master's degree proposals recently changed, and under the current guidelines accompanying CVs may not be longer than two pages. You sent us fifteen CVs; those for Cunningham, Edgar, Empel, Hudak, Hughes, Johnson, Meehan, Miller, Petiya, and Sharp are longer than two pages.

The College of Arts & Sciences will review our proposal this coming week, but we don't need the shorter CVs for our college. We do need the shorter CVs when the proposal is forwarded to the EPC. Thus, if possible, within the next two weeks, we need two-page CVs for the ten faculty members listed above. Can you help us get shorter CVs, or should Marcy or I email the ten faculty members directly?

Thanks,
Austin

P.S. I only learned of the new guidelines about 10 days ago.

From: KORZENKO, JANNA <jkorzenk@kent.edu>
Sent: Monday, September 30, 2019 2:26 PM
To: Albright, Kendra <kalbrig7@kent.edu>; MELTON JR, AUSTIN <amelton@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Apologies for sending these along today, rather than Friday. Please let us know if you need anything else or if you have any trouble with the attachment.

Regards,

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93

Janna Korzenko

Academic Program Director, Student Services

School of Information
Kent State University
P.O. Box 5190
Kent, OH 44242-0001
direct: 330-672-5841

ISCHOOL.KENT.EDU

View our latest online open house about the MLIS program!

From: Albright, Kendra <kalbrig7@kent.edu>
Sent: Monday, September 23, 2019 9:25 PM
To: MELTON JR, AUSTIN <amelton@kent.edu>
Cc: KORZENKO, JANNA <jkorzenk@kent.edu>; ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Thank you, Austin!

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Monday, September 23, 2019 4:43 PM
To: Albright, Kendra <kalbrig7@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Kendra and Janna,

I appreciate your help!

I like the HI 60414 suggestion.

Thanks,
Austin

From: Albright, Kendra <kalbrig7@kent.edu>
Sent: Sunday, September 22, 2019 3:13 PM
To: MELTON JR, AUSTIN <amelton@kent.edu>; KORZENKO, JANNA <jkorzenk@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Hi Austin,

We should have the materials you need to you by Friday. Meanwhile, we thought of one more course you might want to consider: HI 60414: Human Factors and Usability in Health Informatics. We'll include that one, just in case you also want to know about it as well.

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I'll be out of the office all week, but checking email regularly. I'm copying Janna Korzenko, who is our Director of Student Services, who is pulling the materials together for you.

Best wishes,
Kendra

******

Kendra Albright, Ph.D.
Professor and Director
Kent State University
School of Information
Editor, *Libri*: International Journal of Libraries and Information Studies

From: MELTON JR, AUSTIN <amelton@kent.edu>
Sent: Sunday, September 15, 2019 7:25 PM
To: Albright, Kendra <kalbrig7@kent.edu>
Cc: ZHANG, YIN <yzhang4@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>; Javed I Khan <javedkent@gmail.com>; MELTON JR, AUSTIN <amelton@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Dear Kendra,

Javed forwarded your email regarding iSchool courses which might be included as electives in the new Data Science master's degree to the committee preparing the master's degree proposal. The committee talked about your suggested courses, and we would like to include the following ones in the proposal.

HI 60401	Health Information Management
HI 60411	Clinical Analytics
HI 60418	Clinical Analytics II
KM 60301	Foundational Principles of Knowledge Management
LIS 60010	The Information Landscape
LIS 60020	Information Organization
LIS 60510	Digital Technologies I: Data Fundamentals
LIS 60511	Digital Technologies II: Internet Fundamentals
LIS 60512	Digital Technologies III: Information Systems Fundamentals
LIS 60636	Knowledge Organization Structures, Systems and Services
LIS 60637	Metadata Architecture and Implementation
LIS 60638	Digital Libraries

When we submit the proposal, we also need to submit a resume for each person who may be teaching courses in the new program. Would you identify the iSchool faculty members who may be teaching in the new program, and could you please ask them to send a resume to Marcy Curtiss (mcurtiss@kent.edu) or to me? They may submit the standard two-page grant resume, or they may submit any updated resume.

Also, as part of the proposal we also need for each faculty member the information requested in the attached spreadsheet.

A current draft of the Data Science master's degree proposal is attached.

If you have questions, please ask, and thanks very much for your help!

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Kind regards,
Austin

From: javedkent <javedkent@gmail.com>
Sent: Friday, August 02, 2019 6:21 PM
To: MELTON JR, AUSTIN <melton@cs.kent.edu>; Lian, Xiang <xlian@kent.edu>; Marcy Curtiss <curtiss@cs.kent.edu>; De La Cruz Cabrera, Omar <odelacru@kent.edu>
Subject: Fwd: RE: MS in Data Science Proposal- Request for Course Proposal

Sent from my T-Mobile 4G LTE Device

-------- Original message --------
From: "Albright, Kendra" <kalbrig7@kent.edu>
Date: 8/2/19 5:53 PM (GMT-05:00)
To: javedkent <javedkent@gmail.com>
Cc: "ZHANG, YIN" <yzhang4@kent.edu>
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Dear Javed,

Here are some of the iSchool courses that may be of interest to your new data science courses. Thank you for giving us the opportunity to share our courses with you!

LIS 60613 Information Needs, Seeking and Use

LIS 60631 Introduction to Digital Preservation

LIS 60633 Digital Curation

LIS 60636 Knowledge Organization Structures, Systems and Services

LIS 60637 Metadata Architecture and Implementation

LIS 60638 Digital Libraries

LIS 60639 Implementation of Digital Libraries

LIS 61095(Special Topics) Applied Quantitative Methods for Research and Management in the Information Professions

KM 60312 Business Intelligence –Competitive Intelligence

KM 60370 Semantic Analysis Methods

CS/MATH 96

UXD 60001 User Experience Design Principles and Concepts

HI 60411 Clinical Analytics 1

HI 60418 Clinical Analytics 2

Best wishes,

Kendra

******

Kendra Albright, Ph.D.

Professor and Director

Kent State University

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Editor, *Libri*: International Journal of Libraries and Information Studies

--

Dr. Javed I. Khan, Professor and Chair
Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page: http://www.cs.kent.edu/~javed

"Imagination will often carry us to worlds that never were.
But without it we go nowhere."

- Carl Sagan

Towards the Galactic internet?
OSPF: An Area Hierarchic Routing Protocol for Routers in Motion

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https://www.researchgate.net/publication/237665335_Space_OSPF_An_Area_Hierarchic_Routing_Protocol_for_Routers_in_Motion

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98

Haley, Mary Ann

From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, December 11, 2019 2:49 PM
To: Haley, Mary Ann; TONGE, ANDREW
Subject: Fwd: RE: MS in Data Science Proposal- Request for Course Proposal

-------- Forwarded Message --------
Subject:RE: MS in Data Science Proposal- Request for Course Proposal
Date: Wed, 11 Dec 2019 19:28:29 +0000
From:WILSON, KATHRYN <kwilson3@kent.edu>
To: Javed I. Khan <javedkent@gmail.com>

Thanks, Javed, for seeking our input and including our classes. Best of luck with the new program!

Sincerely,

Kathy

From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, December 11, 2019 1:44 PM
To: WILSON, KATHRYN <kwilson3@kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>
Cc: Liu, Dandan <dliu1@kent.edu>; JOHNSON, ERIC <ejohns4@kent.edu>; TONGE, ANDREW <atonge@kent.edu>; Haley, Mary Ann <mhaley@kent.edu>
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Hi Kathy,

Many thanks for your support and working with our curricular team over the last months. I am glad to see they have added now courses from your program.
The proposal is now heading for approvals. Once again many thanks for the support.

Regards,

-Javed.

WILSON, KATHRYN wrote:

> Hi Marcy,
>
> The Economics department would suggest three possible courses:

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- **ECON 62054 ECONOMETRICS I - (Slashed with ECON 72054) Introduction to problems and methods of the empirical estimation of economic relationships.**
- **ECON 62055 ECONOMETRICS II - (Slashed with ECON 72055) Covers generalized linear regression, mixed estimation, simultaneous equation systems, their identification and estimation by single equation and systems estimation.**
- **ECON 62056 TIME SERIES ANALYSIS - Covers various linear and non-linear time series models, market risk and value at risk (VAR). Students will gain hands on-experience with all models learned in the course. This course uses advanced analytical software and hardware on the financial engineering trading floor.**

ECON 62054 and 62055 are taught by Eric Johnson and ECON 62056 is taught by Dandan Liu. A copy of the most recent syllabus and the CV for both faculty is attached.

Please let me know if you need any additional information.

Sincerely,

Kathy

From: Javed I. Khan <javedkent@gmail.com>
Sent: Tuesday, June 18, 2019 12:32 PM
To: WILSON, KATHRYN <kwilson3@kent.edu>
Cc: VAN DULMEN, MANFRED <mvandul@kent.edu>; Haley, Mary Ann <mhaley@kent.edu>; TONGE, ANDREW <atonge@kent.edu>; Marcy Curtiss <curtiss@cs.kent.edu>
Subject: MS in Data Science Proposal- Request for Course Proposal

Dear Kathy,

Hope you are enjoying the summer. Based on our earlier conversation, we are finally in rich course set planing stage! As outlined in this proposal, we are now seeking additional course suggestions from related disciplines units at KSU. We think your unit can a great contributor of the program. You might have received the proposal copy already, but I am copying you again.

What type of courses to consider:

So, in this design these courses are to be added into the "Advanced Skill and Domain Skill Courses" pool (see page-2 in the proposal). It will be wonderful to get suggestion from the existing **graduate courses** from your unit. From the program's design perspective for assimilation, we are requesting that the proposed courses should be a) accessible for students with proposed background (mostly Computer Science and/or Mathematics UG), and b) should enrich the student with complementary knowledge/technique/skill from the course courses listed from your domain with rich scope of application of computational and quantitative methods. c) As you will note topics in machine learning, database systems, probability, statistical analysis, are covered in advanced level in this core part of this curriculum. You can see a sample set of courses in the proposal (page 3).

We anticipate that the teaching faculty would allow the new stream students to join in their class(s) and work intensively with them to overcome the challenge of mastering interdisciplinary

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curriculum. These new students are expected to be from mostly CS & Math background. On the positive side, it will be a rewarding opportunity for the faculty to be an affiliate of the new data science program and build data science collaboration with other faculty from Kent including those from math and CS. We will need 2-page CV of the faculty for the assimilated courses in the full proposal.
We are seeking your timely support.

What to send now:

We are seeking your help in identifying the course(s) and the professor(s) who are teaching or has detail knowledge about the content of the courses that you would like to suggest.

We will greatly appreciate if you or some one from your department can provide us the following: a) **suggested course(s) from DS program from your unit, with the Course Data Sheet/Syllabi & Description for the courses**, and c) **the professor(s), and a 2-page CV of the professor(s)**. Please copy the list to Marcy Curtiss (mcurtiss@kent.edu). I wonder if the following can be send perhaps by June 30th. A short email will suffice.In the following weeks, the proposal's curricular design team will then schedule a meeting with the professor(s) and discuss the details for assimilation.

Don't hesitate to let me know if you have any suggestion, or need more details.

Best Regards,

Javed

--

Dr. Javed I. Khan, Professor and Chair
Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page: http://www.cs.kent.edu/~javed

"Imagination will often carry us to worlds that never were.
But without it we go nowhere."

- Carl Sagan

--

Dr. Javed I. Khan, Professor and Chair

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Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
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https://www.researchgate.net/publication/237665335_Space_OSPF_An_Area_Hierarchic_Routing_Protocol_for_Routers_in_Motion

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Haley, Mary Ann

From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, December 11, 2019 12:24 PM
To: Alemagno, Sonia; Marcy Curtiss
Cc: Hallam, Jeffrey; Javed Khan; Haley, Mary Ann; TONGE, ANDREW
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Dear Sonia,

Many thanks for your support for the program with the courses.
The curricular design team have included the courses as suggested.
Finally the proposal is heading for approvals.

Best Regards,

-Javed.

Alemagno, Sonia wrote:
> Please see this response from Dr. Zullo in the College of Public Health as possible courses. If you are interested in any of these courses, we can send you basic data sheets, syllabi or the credentials of instructors.
>
>
> EPI 52017 Fundamentals of Epidemiology (online or traditional) EPI
> 63016 Principles of Epidemiology (traditional) or EPI 63018
> Observational Designs for Clinical Research (online) EPI 63019
> Experimental Designs for Clinical Research (online) EPI 63020 Advanced Epidemiology and Clinical Research Methods (online) would be good too but it does require the first 3 classes.
>
> Note that there are pre-reqs (EPI 52017 being the first required course).
>
> Thank you,
> Melissa
>
> Melissa D. Zullo, PhD, MPH
> Associate Professor
> College of Public Health
> Kent State University
> 316 Lowry PO Box 5190
> Kent, OH 44242
> 330-672-6509
> _____
>
> -----Original Message-----
> From: Marcy Curtiss <curtiss@cs.kent.edu>
> Sent: Monday, July 1, 2019 12:57 PM
> To: Alemagno, Sonia <salemagn@kent.edu>; Hallam, Jeffrey
> <jhallam1@kent.edu>

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> Cc: Javed Khan <javed@cs.kent.edu>; CURTISS, MARCELLA
> <mcurtiss@kent.edu>
> Subject: Re: MS in Data Science Proposal- Request for Course Proposal
>
> Good afternoon,
>
> Thank you for participating in the Data Science Proposal. I am following up on the email sent by Javed Khan. We were looking for a response by June 30. Can we expect your input sometime this week?
>
> Thank you,
>
> Marcy Curtiss
> Administrative Secretary
> Graduate Studies
> Department of Computer Science
> http://www.kent.edu/cs
> 330-672-9047
>
>
>
>
> On 6/21/2019 12:36 PM, Javed I. Khan wrote:
>> Dear Sonya and Jeff,
>>
>> Hope you are enjoying the summer. You probably have already seen the
>> MS in Data Science proposal from CS and Math. As outlined in this
>> proposal, we are now seeking additional course suggestions from
>> related disciplines units. We think your unit can a great partner of
>> this program. You might have received the proposal copy already, but
>> I am copying you again.
>>
>>
>> *What type of courses to consider:*
>>
>> So, in this design these courses are to be added into the "Advanced
>> Skill and Domain Skill Courses" pool (see page-2 in the proposal). It
>> will be wonderful to get suggestion from the existing *graduate
>> courses* from your unit. From the program's design perspective for
>> assimilation, we are requesting that the proposed courses should be
>> a)_accessible for students with proposed background_ (mostly Computer
>> Science and/or Mathematics UG), and b) should enrich the student with
>> _complementary knowledge/technique/skill_ from the course courses
>> listed from your domain with rich scope of application of
>> computational and quantitative methods. c) As you will note topics in
>> machine learning, database systems, probability, statistical
>> analysis, are covered in advanced level in the core part of this
>> curriculum. You can see a sample set of courses in the proposal (page 3).
>>
>> We anticipate that the teaching faculty would allow the new stream
>> students to join in their class(s) and work intensively with them to
>> overcome the challenge of mastering interdisciplinary curriculum.
>> These new students are expected to be from mostly CS & Math

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>> background. On the positive side, it will be a rewarding opportunity
>> for the faculty to be an affiliate of the new data science program
>> and build data science collaboration with other faculty from Kent
>> including those from math and CS. We will need 2-page CV of the
>> faculty for the assimilated courses in the full proposal.
>> We are seeking your timely support.
>> *
>> What to send now:
>>
>> *We are seeking your help in identifying the course(s) and the
>> professor(s) who are teaching or has detail knowledge about the
>> content of the courses that you would like to suggest.
>>
>> We will greatly appreciate if you or some one from your department
>> can provide us the following: a)*suggested course(s) from DS program
>> from your unit, with the Course Data Sheet/Syllabi & Description for
>> the courses*, and c)*the professor(s), and a 2-page CV of the professor(s)*.
>> Please copy the list to Marcy Curtiss (mcurtiss@kent.edu). I wonder
>> if the following can be send perhaps by June 30th. A short email will
>> suffice.In the following weeks, the proposal's curricular design team
>> will then schedule a meeting with the professor(s) and discuss the
>> details for assimilation.
>>
>> Don't hesitate to let me know if you have any suggestion, or need
>> more details.
>>
>>
>> Best Regards,
>>
>> Javed
>>
>> --
>> _____
>> _ _____ Dr. Javed I. Khan, Professor and Chair Department of
>> Computer Science Kent State University, 241 MSB, Kent, OHIO-44242,
>> USA
>> Tel: (330)-672-9055, Fax:(330)-672-0737 Email:javed@cs.kent.edu Home
>> page:http://www.cs.kent.edu/~javed
>> _____
>> _
>> _____
>>
>> "Imagination will often carry us to worlds that never were.
>> But without it we go nowhere."
>>
>> - Carl Sagan
>>

--

Dr. Javed I. Khan, Professor and Chair

CS/MATH 105

Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page:
https://nam03.safelinks.protection.outlook.com/?url=http:%2F%2Fwww.cs.kent.edu%2F~javed&data=02%7C01%7Cmhaley%40kent.edu%7Ca805108ab90649cca13308d77e5edadc%7Ce5a06f4a1ec44d018f73e7dd15f26134%7C1%7C0%7C637116818174501759&sdata=e7Qx5ITiN%2FfLpKuxnBf40lRvZkouikXH%2B6CX79OGSWI%3D&reserved=0

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But without it we go nowhere."

- Carl Sagan

Towards the Galactic internet?
OSPF: An Area Hierarchic Routing Protocol for Routers in Motion
https://nam03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F237665335_Space_OSPF_An_Area_Hierarchic_Routing_Protocol_for_Routers_in_Motion&data=02%7C01%7Cmhaley%40kent.edu%7Ca805108ab90649cca13308d77e5edadc%7Ce5a06f4a1ec44d018f73e7dd15f26134%7C1%7C0%7C637116818174501759&sdata=xCEpCmUpf6FHZ%2BbfaQwafWYhJ3%2BpF8MGRlv%2Fczg%2FfLI%3D&reserved=0

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Haley, Mary Ann

From: SHERIDAN, SCOTT
Sent: Wednesday, December 11, 2019 6:54 PM
To: Javed I. Khan
Cc: Haley, Mary Ann; TONGE, ANDREW
Subject: RE: MSDS Proposal

Hi Javed,

Thanks for forwarding me the final proposal for the new program. I am happy to offer my support for this program to be established here at Kent, as I think it would substantially avail upon the collective expertise we have.

Regards,
Scott

-----Original Message-----
From: Javed I. Khan <javedkent@gmail.com>
Sent: Wednesday, 11 December, 2019 15:51
To: SHERIDAN, SCOTT <ssherid1@kent.edu>
Cc: Haley, Mary Ann <mhaley@kent.edu>; TONGE, ANDREW <atonge@kent.edu>
Subject: MSDS Proposal

Dear Scott,

Thanks for your support in developing the full proposal. The curriculum team in glad to include the five courses. Please find attached the latest version of the full proposal. Will appreciate if you provide the support email, and continued support.

Best,

-Javed.

--

Dr. Javed I. Khan, Professor and Chair
Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page:
https://nam03.safelinks.protection.outlook.com/?url=http:%2F%2Fwww.cs.kent.edu%2F~javed&data=02%7C01%7Cmhaley%40kent.edu%7Cac11976e170d46c3a99808d77e956561%7Ce5a06f4a1ec44d018f73e7dd15f26134%7C1%7C0%7C637117052431744838&sdata=fgqMIeLoq7PrYd9CzJhZ6yCcoUfWG9YwOcaeQeOqy8k%3D&reserved=0

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- Carl Sagan

Towards the Galactic internet?
OSPF: An Area Hierarchic Routing Protocol for Routers in Motion
https://nam03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F237665335_Space_OSPF_An_Area_Hierarchic_Routing_Protocol_for_Routers_in_Motion&data=02%7C01%7Cmhaley%40kent.edu%7Cac11976e170d46c3a99808d77e956561%7Ce5a06f4a1ec44d018f73e7dd15f26134%7C1%7C0%7C637117052431754829&sdata=%2FQE4EWzUIJl1i6405EPo4VI0kCdz7eCirjBWbyEfPek%3D&reserved=0

Haley, Mary Ann

From: Zaragoza, Maria
Sent: Thursday, December 19, 2019 2:54 PM
To: javedkent
Cc: Haley, Mary Ann
Subject: RE: MS in Data Science Proposal- Request for Course Proposal

Dear Javed:

The Department of Psychological Sciences is very pleased to support Computer Science's MS in Data Science Proposal.

Please let me know if you need additional information from me.

I wish you much success with your new program,

Maria Zaragoza

Maria S. Zaragoza, PhD
Professor and Chair
Department of Psychological Sciences
Kent State University

From: javedkent <javedkent@gmail.com>
Sent: Thursday, December 19, 2019 10:18 AM
To: Javed I. Khan <javedkent@gmail.com>; Zaragoza, Maria <mzaragoz@kent.edu>
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Dear Maria,

Mary Ann indictated can we have a support letter from you. Will appreciate one. Feel free to copy it to Mary Ann too.

Happy holidays..

Javed

Sent from my T-Mobile 4G LTE Device

-------- Original message --------
From: "Javed I. Khan" <javedkent@gmail.com>
Date: 12/11/19 3:00 PM (GMT-05:00)
To: "Zaragoza, Maria" <mzaragoz@kent.edu>
Cc: "HALEY, MARY ANN" <mhaley@KENT.EDU>, "TONGE, ANDREW" <atonge@kent.edu>
Subject: Re: MS in Data Science Proposal- Request for Course Proposal

Dear Maria,

Thanks for your support for the program. The curriculum team has included the courses from unit. We look forward for continued collaboration.
The full proposal is not heading for approvals.

Best Regards,

-Javed.

Zaragoza, Maria wrote:
> I'll see what I can do - has been difficult to meet with people because of conflicting travel schedules. I was out quite a lot in June and some of the relevant faculty are out this week.
>
> I will try!
>
> Maria
>
> -----Original Message-----
> From: Marcy Curtiss <curtiss@cs.kent.edu>
> Sent: Monday, July 1, 2019 1:01 PM
> To: Zaragoza, Maria <mzaragoz@kent.edu>
> Cc: Javed Khan <javed@cs.kent.edu>; CURTISS, MARCELLA <mcurtiss@kent.edu>
> Subject: Re: MS in Data Science Proposal- Request for Course Proposal
>
> Good afternoon,
>
> Thank you for participating in the Data Science Proposal. I am following up on the email sent by Javed Khan. We were looking for a response by June 30. Can we expect your input sometime this week?
>
> Thank you,
>
> Marcy Curtiss
> Administrative Secretary
> Graduate Studies
> Department of Computer Science
> http://www.kent.edu/cs
> 330-672-9047
>
>
>
> On 6/18/2019 1:37 PM, Javed I. Khan wrote:
>> Dear Maria,
>>
>> Hope you are enjoying the summer. Based on our earlier conversation,
>> we are finally in rich course set planing stage! As outlined in this
>> proposal, we are now seeking additional course suggestions from
>> related disciplines units at KSU. We think your unit can a great

>> partner. You might have received the proposal copy already, but I am copying you again.
>>
>>
>> *What type of courses to consider:*
>>
>> So, in this design these courses are to be added into the "Advanced.

>> Skill and Domain Skill Courses" pool (see page-2 in the proposal). The
>> team has suggested few courses from your unit (see list). It will be
>> wonderful to get updated suggestion from the existing *graduate
>> courses* from your unit. From the program's design perspective for
>> assimilation, we are requesting that the proposed courses should be
>> a)_accessible for students with proposed background_ (mostly Computer
>> Science and/or Mathematics UG), and b) should enrich the student with
>> _complementary knowledge/technique/skill_ from the course courses
>> listed from your domain with rich scope of application of
>> computational and quantitative methods. c) As you will note topics in
>> machine learning, database systems, probability, statistical analysis,
>> are covered in advanced level in this core part of this curriculum.
>> You can see a sample set of courses in the proposal (page 3).
>>
>> We anticipate that the teaching faculty would allow the new stream
>> students to join in their class(s) and work intensively with them to
>> overcome the challenge of mastering interdisciplinary curriculum.
>> These new students are expected to be from mostly CS & Math
>> background. On the positive side, it will be a rewarding opportunity
>> for the faculty to be an affiliate of the new data science program and
>> build data science collaboration with other faculty from Kent
>> including those from math and CS. We will need 2-page CV of the
>> faculty for the assimilated courses in the full proposal.
>> We are seeking your timely support.
>> *
>> What to send now:
>>
>> *We are seeking your help in identifying the course(s) and the
>> professor(s) who are teaching or has detail knowledge about the
>> content of the courses that you would like to suggest.
>>
>> We will greatly appreciate if you or some one from your department can
>> provide us the following: a)*suggested course(s) from DS program from
>> your unit, with the Course Data Sheet/Syllabi & Description for the
>> courses*, and c)*the professor(s), and a 2-page CV of the professor(s)*.
>> Please copy the list to Marcy Curtiss (mcurtiss@kent.edu). I wonder if
>> the following can be send perhaps by June 30th. A short email will
>> suffice.In the following weeks, the proposal's curricular design team
>> will then schedule a meeting with the professor(s) and discuss the
>> details for assimilation.
>>
>> Don't hesitate to let me know if you have any suggestion, or need more
>> details.

>>
>>
>> Best Regards,
>>
>> Javed
>>
>> --
>> _____
>> _____ Dr. Javed I. Khan, Professor and Chair Department of
>> Computer Science Kent State University, 241 MSB, Kent, OHIO-44242, USA
>> Tel: (330)-672-9055, Fax:(330)-672-0737 Email:javed@cs.kent.edu Home
>> page:http://www.cs.kent.edu/~javed
>> _____
>> _____
>>
>> "Imagination will often carry us to worlds that never were.
>> But without it we go nowhere."
>>
>> - Carl Sagan
>>

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Dr. Javed I. Khan, Professor and Chair
Department of Computer Science
Kent State University, 241 MSB, Kent, OHIO-44242, USA
Tel: (330)-672-9055, Fax:(330)-672-0737
Email: javed@cs.kent.edu
Home page: http://www.cs.kent.edu/~javed

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