Department of Applied Economics and Statistics

Department of Mathematical Sciences

Department of Computer and Information Sciences

Program Type: 

Degree Type: 

Provide a brief summary of the proposed program changes and describe the rationale for the change(s):

The proposed MS in Data Science is as a professional masters with a flexible set of core requirements in statistics, mathematics and computer and information sciences, together with electives from a range of possible application areas.  It is aimed at providing a solid background in the methods behind data science so that our graduates can go out into their fields and work well with data, and be better prepared for the next methods to come along to work with large and/or dynamic data sets.  The program will provide both the breadth of training, and the flexibility to apply them in different fields. The flexibility allows for training in different categories of positions in data science: data analysts (use mathematical, statistical and modeling techniques to solve problems), data engineers (design, build and maintain an organization’s data and analytical infrastructure) and data scientists (create sophisticated analytical models to build new data sets and derive new insights from data).

Numerous reports detail that there are tens of thousands of jobs or more, and growing each year, in every major metropolitan area in the country.  Some reports are quoted in the program policy statement. There will be no difficulty with graduates landing jobs after completing this degree.

List new courses required for the new curriculum. How do they support the overall program objectives of the major/ minor/ concentrations)?

No courses are directly proposed for this degree program but some related courses are planned or in the academic change pipeline.

The course MATH637 Mathematical Techniques in Data Science has been proposed separately in curriculog this fall.  The course has run as an experimental course at the 600 level once and 500 level twice (with less math emphasis).  The proposed course does not depend on this degree, hence the separate proposal.

A new experimental course is planned to run next year, MATH667 Topological Data Analysis, which should help distinguish us in this field.  The course (or the similar topic computational topology) is only offered in a few graduate programs around the country.  That course is also not dependent on this degree program, but certainly fits well with it as an elective as indicated in the proposal.

Identify other units affected by the proposed changes and provide letters of support from those units. :

The proposal has core course offerings from what the NSF and others indicate are the pillars of data science: statistics, math and computer science.  Accordingly, letters from the chairs of: Applied Economics and Statistics in CANR (Tom Ilvento); Computer and Information Sciences (Kathy McCoy); and Mathematical Sciences (Lou Rossi).

Elective course offerings are listed from the following departments, schools or centers: Department of Economics (Jim Butkiewicz); School of Public Policy and Administration (Maria Aristagueta);  Center for Bioinformatics and Computational Biology (Cathy Wu); and the Department of Civil Engineering (Sue McNeil).

The design of the degree is meant to bring in more departments and colleges.  We are expecting the School of Education to join, and have included one of their faculty in the initial affiliated faculty list.  We expect and encourage more departments and faculty to join in and offer elective courses to be approved by the executive committee of the program.

Resolutions:

WHEREAS, from “The Quant Crunch: How the demand for data science skills is disrupting the job market”, there are more than  2,350,000 job listings for Data Science and Analytics (DSA) in 2015, and the demand for DSA jobs is projected to grow by 15% over the following five years, which translate to additional 364,000 new job postings, and

          WHEREAS, from “Investing in America’s data science and analytics talent: the case for action”, there were about 58,000-70,000 ads for data science and analytics jobs in each of the Philadelphia-Camden-Wilmington area, Seattle, Boston, Dallas and Atlanta for 2015 alone, and in the larger metro areas of New York, Chicago, Los Angeles, San Francisco, and Washington DC combined to have postings of about 750,000 of such positions, and

          WHEREAS, all such national and regional data suggest a significant demand for the training in data science, which requires expertise in mathematics, computer science, statistics, as well as a domain (or application) field, and

          WHEREAS, the program allows students to take courses in three departments in and application domains; such flexibility allows training in different categories of positions (data analysts, data engineers and data scientists), and allow department/college cooperation, and

          WHEREAS, the proposed master in data science program can offer training with breath and depth, placing graduates from the program a better position to lead in new techniques in data science and analytics, and

          WHEREAS, the proposed program will contribute to a strategic initiative in data science on campus, and

           WHEREAS, the program could provide well-prepared applicants for those data intensive Ph.D. programs such as Financial Service Analytics or Bioinformatics, or for Ph.D. programs in Mathematics, Computer Science, and Statistics, as well as other application fields,

           WHEREAS, there has been a successful history in joint programs, such as the combined mathematics and economics major on campus,

           WHEREAS, students in the program can be expected to pay for their courses of study, which will generate revenue for the university; be it therefore

           RESOLVED, that the Faculty Senate recommends provisional approval of the establishment of a new Master of Science with a major in Data Science degree.