ONE-STEP ACADEMIC PROGRAM PROPOSAL

Institution: The University of Georgia

Date Completed at the Institution: January 31, 2018

Name of Proposed Program/Inscription: Data Science

Degree: Bachelor of Science

Major: Data Science

CIP Code: 30300101

Anticipated Implementation Date: Fall 2019

Delivery Mode (check the most appropriate delivery mode in the box below):

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<th>On-campus, face-to-face only</th>
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School/Division/College: Franklin College of Arts and Sciences

Department: Computer Science and Statistics

Departmental Contact: Drs. Thiab Taha and T. N. Sriram

Approval by President or Vice President for Academic Affairs:

Approval by Vice President for Finance/Business (or designee) and contact information:

Approval by Vice President for Facilities (if different from VP- Finance or designee) and contact information:
ONE-STEP ACADEMIC PROGRAM PROPOSAL

We request approval to establish an interdisciplinary undergraduate major in Data Science. It will reside in the Franklin College of Arts & Sciences and will be jointly offered by the Department of Computer Science and the Department of Statistics. Students will receive their degree in Data Science from the Franklin College.

1. **Rationale:** (Provide the rationale for proposing the new academic program.)

With the rapid advances in computing and storage capacity, we now live in the “Big Data” era, where data are collected in real time and analyzed in science, business, industry, and government. Data Science has emerged as a prominent field of study because it can provide valuable insights using Big Data for making informed decisions in business, human health, security etc. The field of Data Science was in fact theorized over 50 years ago by John Tukey in his 1962 book, *The Future of Data Analytics*, in which he presented the broad topics of data analytics, interpretation, and visualization (Fig. 1) as their own field, rather than extensions or branches of mathematics and statistics. He argued that there is considerable value in training students in the practice of extracting information from data.

Data Science encompasses a wide range of concepts, methodologies and algorithms involved in collecting, managing, visualizing, analyzing, and transforming *data* into information, knowledge-creation and decision-making. The word *Data* refers to data collection, storage and management and retrieval, while the word *Science* deals with modeling, analysis, inference, interpretation, and decision-making. Inherently, Data Science is a field of study that clearly rests at the intersection of Computer Science and Statistics.

Voluminous data is being regularly collected and analyzed in science, business, industry, as well as by government and society at large. This “data deluge” is fundamentally changing the way corporations do business and is also leading to new discoveries in every scientific field. The collection, management, analysis, and interpretation of such data, with complex structures in the form of text, video, streaming data, are paving the way to exciting new research avenues. The US government and industry are investing substantial resources in research and development, under the umbrella of “Big Data.”

Currently, the Computer Science department offers courses related to Data Science and even a *Certificate of Applied Data Science* program. However, this certificate only requires minimal coursework in mathematics and statistics, which are fundamental topics for a rigorous Data Science program, for designing computational models in different fields, and for studying advanced topics in data analytics. The Terry College of Business has recently proposed a one-year (two-semester) *Master of Science in Business Analytics (MSBA)* program, which has been approved by the University and is awaiting approval from the Board of Regents. However, the MSBA program is aimed only at graduate students who are primarily interested in business.
applications. Thus, at the University of Georgia, there is no comprehensive undergraduate program that adequately trains students in all the areas involved in Data Science.

We explored the idea of offering Data Science as a track in the Statistics major or choose a single home department for the Data Science major – either Computer Science or Statistics. We did not pursue either model because, as noted earlier, Data Science is a field that sits squarely between Computer Science and Statistics, and the success of the program will require the support and full investment from both groups of faculty.

The proposed Data Science program will bridge key elements of Computer Science and Statistics into an interdisciplinary degree to develop future generations of data scientists. The program will also rely on prerequisites and electives taught in other units on campus, notably Mathematics and Management Information Systems, to provide students with a broad education and training. Faculty members in Computer Science and Statistics have spent more than a year envisioning, planning, and designing the new program. It has the support of the Dean of Franklin College, heads of the two departments, and members of the faculty in both departments. The proposal also includes letters of support from the Director of Georgia Informatics Institutes for Research and Education, the Dean of Terry College of Business, and the Head of Department of Mathematics.

2. **Mission Fit and Disciplinary Trends:** Description of the program’s fit with the institutional mission and nationally accepted trends in the discipline (explain in narrative form). If the program is outside of the scope of the institutional mission and sector, provide the compelling rationale for submission.

The development of this major fits in well with our larger goal of establishing the University of Georgia as a leader in the field of Data Science. The proposed Data Science program will build a strong relationship with the [Georgia Informatics Institutes for Research and Education](https://www.uga.edu/informatics/) (GII) at UGA, which is serving as a hub for informatics research and instruction. Undergraduate students in the Data Science program will benefit greatly from the synergistic activities organized by GII. This major also fits in with the trends in the nation. In order to meet the immediate demand for data scientists, many universities ([University of Wisconsin](https://www.wisc.edu), [University of California Berkeley](https://www.berkeley.edu), [Northwestern University](https://www.northwestern.edu), [Carnegie Mellon University](https://www.cmu.edu), [Columbia University](https://www.columbia.edu), and many more universities) across the U.S. have recently introduced Data Science programs at the graduate level. Furthermore, the [July 2015 issue of AMSTAT NEWS](https://www.amstat.org/news/amtstatnews/july2015/brief.html) published by the [American Statistical Association](https://www.amstat.org) carried an interesting article profiling five new undergraduate Data Science programs across US and Europe. More recently, three universities in the southeastern region of US ([Auburn University](https://www.auburn.edu), [College of Charleston](https://www.cofc.edu), and [Northern Kentucky University](https://www.nku.edu)) have started Bachelors programs in Data Science. We expect the number of new undergraduate Data Science programs to increase substantially in the near future.

3. **Description and Objectives:** Program description and objectives (explain in narrative form).

As industries and scientific research become more reliant on collecting and analyzing ever increasing amounts of data, the demand for data scientists is increasing dramatically. A data scientist will need to be able to manage the full lifecycle of data, which requires knowledge and
skills from both Computer Science and Statistics. The proposed undergraduate program in Data Science will provide necessary background in mathematics and build a strong foundation in Data Science, covering data structures, algorithms and database management (courses in Computer Science) and data collection, data mining, machine learning, modeling, and inference (courses in Statistics). Some of the courses, such as, data mining and machine learning will be team-taught by faculty in Computer Science and Statistics to present perspectives from both disciplines. Students graduating with a BS in Data Science will know how to develop software, design and maintain databases, process data in distributed environments, analyze the data using techniques from statistics, data mining and machine learning, provide visualizations of the data or the results of analysis, and assist decision makers. The program will include experiential learning via a capstone course, which will focus on applying the acquired knowledge and skills in a real-world data analytics project. Upon graduation, students will be in high demand in the workforce (e.g., Google, Amazon, Facebook, Coca-Cola, UPS, Delta airlines, Home Depot, IBM, Intel, Samsung, Boeing, Goldman Sachs, AIG, Liberty Mutual, Johnson & Johnson, NASA, NIST, DoD) or continue their education at the graduate level. Several avenues should be open to them, including MS/PhD in Data Science, Computer Science, Statistics, Management Information Systems or Industrial Engineering as well as Master of Business Administration (MBA) and MSBA, which has been approved by the University and is awaiting approval from the Board of Regents.

4. Need: Description of the justification of need for the program. (Explain in narrative form why the program is required to expand curricular academic offerings at the institution, the data to provide graduates for the workforce, and/or the data in response to specific agency and/or corporation requests in the local or regional area.)

As indicated in John Tukey’s book, the concept of a field of science dedicated to the curation, interpretation, and visualization of data is not novel to the current generation. Rather, a confluence of very specific events unique thus far to our society, have unlocked the potential for Data Science as a field. First and foremost, the effects of the internet have been felt across every aspect of our lives, and research is no exception. The ability to share data, collaboratively design methods, and engage in real-time across vast distances has and will continue to fundamentally change how we conduct and reproduce original research. Second, the abundance of cheap, dense digital storage mechanisms has fundamentally altered how datasets are created and stored. This has resulted in an explosion of digital datasets and led to the rise of the term “Big Data” that is now so ubiquitous. Huge amounts of data are being collected in all areas, made possible by rapid advances in computing, measurement, data storage, and data transfer technologies. Examples in business and industry range from transactional data captured by companies and data on the internet and social media to sensor data captured by smart phones, automobiles, industrial systems, and environmental networks. As we have seen recently, governments are also using automated algorithms to mine large databases for the purposes of security. Examples abound in science: Sloan Digital Sky Survey, the Great Lakes Environmental Database, GenBank DNA sequences are driving scientific discovery and creation of new knowledge. Put simply, the enormous interest in Data Science now is a direct consequence of this confluence.

According to the McKinsey Report: there were 5 billion mobile phones in use in 2010; there are 30 billion pieces of content shared on Facebook every month; 15 out of 17 sectors in the US have more data stored per company than the US Library of Congress (which has 235 terabytes of
data); and, even more stunning, there is a 40% projected growth in global data generated per year! At the same time, costs of data storage technologies are shrinking fast: we can buy a disk drive for $600 to store all of the world’s music.

As a result of the technology changes, the McKinsey Report highlights that Big Data and Data Science will have a transformative potential in several domains in the coming years. As such, students graduating with a degree in Data Science will have a huge range of job opportunities. This is validated by the experience at North Carolina (NC) State University, which established a Master of Science in Analytics (MSA) in 2007. The NC State MSA Job placement rates have exceeded 90-percent by graduation over a period of nine consecutive years despite the cyclical job market. For example, the 113 students graduating in 2016 had about 280 reported job offers with an average salary of about $93,000 (see MSA Employment Outcomes for much more information). The 2016 Burch Work Study reports that the median salary for Data Science level 1 professionals increased from $91,000 in 2015 to $97,000 in 2016, with Data Science managers earning well over $145,000 annually.

Other universities have established or are beginning to establish both graduate and undergraduate programs. For example, Case Western Reserve University has recently committed $2.4 million towards establishing an undergraduate major in Data Science. Several schools, including Rochester, University of California Irvine, and Ohio State University have already established an undergraduate Data Science major. In each of these institutions, the average number of applications received for the Data Science major is about 25 per year, with about 8 to 10 enrolling in the program during the first year. However, these numbers are growing each year. The current Data Science graduation numbers range from 4 to 6 in each of these school, as many of these programs are very new. Each of the programs we contacted indicated that the number of Data Science majors is steadily growing each year, and they will be graduating lot more in the coming years. As mentioned earlier, Stanford, Berkeley, Carnegie-Mellon University, Northwestern, and Columbia also have graduate programs in Data Science. With the recent launching of GII, we believe University of Georgia is especially well-positioned to offer a highly ranked undergraduate Data Science degree.

This new program will enhance existing collaborations between Computer Science and Statistics departments who are spearheading the program. We also hope it will serve as a focal point for other units on campus to offer related courses as well as involve students in the program on internships and undergraduate research opportunities. There is considerable overlap in research interests in faculty and students in the two departments— in the areas of computational biology, machine learning, biomedical informatics, bioinformatics, and data-intensive computational techniques.

If we wait, there are significant risks. First, there are societal risks of not being able to meet the significant projected demand in the field for data analysts with deep Data Science skills in the coming decade and falling behind other institutions. Second, there is a unique opportunity to make a big impact in the Data Science area for Georgia by establishing the GII as well as an undergraduate program. The GII institute can also serve undergraduates in Data Science by providing opportunities for undergraduate research, encouraging students to participate in research seminars, etc.
5. **Demand:** Description of how the program demonstrates demand. (Explain in narrative form the data that supports demand for the program from existing and potential students and requests from regional industries.)

Data Science is already a fast-growing area and there is more growth expected over the next few decades. Enormous data generation in research, business, government, and society is fueling the necessity for highly trained data scientists who can manage, manipulate, and model voluminous data. It is well known that the demand for data scientists in the workforce over the next 5 to 10 years will far outpace supply. The 2011 [McKinsey Report](https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/big-data-agement-how-much-is-enough) on Big Data projects that by 2018 there will be a shortage of talent necessary for organizations to take advantage of Big Data. The worldwide demand for individuals with data analysis skills will grow to almost 500,000, and by 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million data-savvy managers and analysts to take full advantage of Big Data, analyze, and make decisions.

The [White House](https://www.whitehouse.gov) has responded by launching a "Big Data Research and Development Initiative", to "expand the workforce needed to develop and use Big Data technologies". This theme is reaffirmed by [Thomas Davenport](https://www.thomasdavenport.com)'s article "Data Scientist: The Sexiest Job in the 21st Century". There are already numerous job advertisements that specifically mention Data Science. Partly fueled by these reports, Data Science programs have exploded in academic departments across the globe (e.g., US, Canada, Australia, New Zealand, and Europe), as universities find ways to meet the demand. There has been rapid growth of undergraduate programs at both research institutions and liberal arts colleges; see, for example, p. 22 of [July 2015 issue of AMSTAT NEWS](https://amstatnews.amstat.org) cited earlier. Therefore, there is a critical need to educate a new generation of UGA students who are rigorously trained in this multidisciplinary program, people who are comfortable with databases and algorithms as much as statistical modeling, inference, and visualization.

Recently, we conducted two short surveys, one during the Summer 2017 semester and the other during the middle of Fall 2017 semester, covering a wide spectrum of students. The first survey included incoming freshman attending a Computational Science meeting held at the time of orientation on campus and students who took CSCI 1301 and STAT 4210 during Summer 2017 semester. The second survey included students enrolled in the Fall 2017 sections of CSCI 1302, CSCI 2610, CSCI 2720, STAT 4210, STAT 4220, STAT 4230, STAT 4510, and STAT 5010. The two surveys combined included a total of 642 respondents, consisting of students majoring in Computer Science (CS), Mathematics (MATH), Statistics (STAT), respectively; Double majoring in CS & STAT, CS & MATH, MATH & STAT; and those majoring in other disciplines. The survey requested the respondents to rate their level of interest in pursuing a Data Science major on a scale of 0 to 5, with three key ratings defined as follows: "0= No Interest”, “3=Consider changing to the Data Science major”, and “5=Change to the Data Science major”.

Out of the 642 respondents, 92 of them said they would “consider changing” to the Data Science major. More importantly, **65 (out of 642) definitively said they would change to the Data Science major**, which clearly establishes a very high level of interest in the new Data Science
major. Nevertheless, we conservatively estimate the projected enrollment numbers in the table under item 15 (Enrollment Projections).

We expect the new program grow to about 150-200 students declared in the program in four years (2022). This is significantly smaller than the current Computer Science program, but closer to the number of declared majors in Statistics. In the long term, we expect the program to have a healthy growth, as other institutions also start establishing undergraduate and graduate Data Science programs and recruiters specifically start asking for Data Science majors. At that point in the future, the field will become an established major with a distinct identity.

An important feature of this major will be its likely appeal to a diverse student body. As is well known, female students are seriously underrepresented in mathematics and computer science. However, female enrollments in statistics at the undergraduate level more closely mirror the overall campus gender distribution. We will send informative flyers about our Data Science program to public and private schools in Georgia, provide early exposure to Data Science to high school students through UGA Young Dawgs program, and hold multiple information sessions during new student orientations at UGA to make the program attractive to all high school students, especially women and members of under-represented groups. We also plan on emphasizing the essential connections between Data Science and its applications to a variety of fields such as biology, chemistry, medicine, social sciences, and marketing, which will also increase the demand for the new major.

6. **Duplication:** Description of how the program does not present duplication of existing academic offerings in the geographic area and within the system as a whole. If similar programs exist, indicate why these existing programs are not sufficient to address need and demand in the state/institution’s service region and how the proposed program is demonstrably different.

On campus, the Computer Science department offers courses related to Data Science and a *Certificate of Applied Data Science* program, but these do not provide a comprehensive, rigorous training in Data Science that the new program hopes to accomplish. Also, since MSBA proposed by the Terry College is a one-year program aimed only at graduate students who are primarily interested in business applications, our new undergraduate degree in Data Science does not present duplication of the proposed MSBA program, as the two programs are demonstrably different in terms of the nature of students, course work, and more importantly, the emphasis in training. In Georgia, there are six universities currently offering Master’s in Data Science (and/or a closely related program). Kennesaw State University has even started a *doctoral degree in Analytics and Data Science*. The students entering these programs have an undergraduate or MS degree in one of the following fields: Computer Science, Mathematics, Statistics, Industrial Engineering, Information Systems, Quantitative Finance, to name a few. The intrinsic problem with this model is that it ignores the fact that an ideal data scientist is one who has a solid training in multiple fields: computer science, statistics, and mathematics. While these graduate programs address the problem by requiring their students to take undergraduate-level courses to fill the major gaps in educational training, they end up providing inadequate training in other key components or areas of Data Science. At best, these graduate programs provide a reasonable short-term solution to meet the immediate demand, but a more coherent and sustainable solution is to adequately prepare students at the undergraduate level.
Our new Data Science program is unique in Georgia in that it is designed to produce students with a deeper and broad intellectual understanding of both statistical and computing principles when working with Big Data, with those principles being applicable to a variety of domains. This program will attract all UGA students who are interested using mathematics, statistics, and computing to solve a variety of Big Data problems. Further, the new program will help meet societal needs that otherwise would not be met, and more importantly, it increases the options for our undergraduate students. The McKinsey Report points to a shortfall of 140,000 -- 190,000 data scientists by 2018, jobs that need to have deep analytical skills. This program should help prepare students to fill that need. Based on the current projections, there will be plenty of jobs in different sectors of economy with different levels of experience required for them.

7. **Collaboration:** Is the program in collaboration with another USG Institution, TCSG institution, private college or university, or other entity?
   - Yes ____ or No ____X__ (place an X beside one)
   - If yes, list the institution below and include a letter of support from the collaborating institution’s leadership (i.e., President or Vice President for Academic Affairs) for the proposed academic program in the appendix.

8. **Forecast:** If this program was not listed on your academic forecast for the 2016 – 2017 academic year, provide an explanation concerning why it was not forecasted, but is submitted at this time.

   This program was not included in the University of Georgia’s Academic Forecast because it had not been submitted through the faculty governance process.

9. **Admission Criteria:** List the admission criteria for the academic program.
   a) Include all required minima scores on standardized tests.

      No minimum scores are required.

   b) Include the required grade point average requirement.

      Students must complete one of the following courses with a grade of “C” (2.0) or better before entry into the Data Science major: CSCI 1301, CSCI 1302, or STAT 2010. To complete the Data Science major, students must complete each of the following courses with a grade of “C” (2.0) or better: CSCI 1301, CSCI 1302, CSCI (MATH) 2610, CSCI 2720, and STAT 2010.

10. **Curriculum (See the form below this series of questions and please complete.)**

    a) List the entire course of study required to complete the academic program. Include the course prefixes, course numbers, course titles, and credit hour requirement for each course. Indicate the word “new” beside new courses.

    C.0. Summary of Course Requirements and Prerequisites:
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The course requirements for the B.S. in Data Science are listed below. The coursework consists of at least 67 semester hours with 18 hours of Foundation (Area VI) and at least 49 hours of major coursework.

- C.1. Foundation Courses (Area VI, 19 credit hours)
  
  CSCI 1302 (4) - Software Development  
  CSCI 1360 (4) - Foundations for Informatics and Data Analytics  
  CSCI 2150 (4) - Introduction to Computational Science  
  CSCI 2720 (4) – Data Structures  
  STAT 2010 (3) – Statistical Methods for Data Scientists (NEW)

- C.2. Major Required Courses (at least 37 credit hours)
  
  CSCI 3360 (4) - Data Science I  
  CSCI 4260/6260 (4) - Data Security and Privacy (NEW)  
  CSCI 4360/6360 (4) - Data Science II  
  CSCI 4380/6380(4) or STAT 4250 (3) - Data Mining or Applied Multivariate Analysis and Statistical Learning (NEW)  
  CSCI 4370/6370 (4) - Data Base Management  
  MATH 3300 (3) – Applied Linear Algebra  
  STAT 4220 (3) - Applied Experimental Designs  
  STAT 4230/6230 (3) - Applied Regression Analysis  
  STAT 4510/6510 (3) – Mathematical Statistics I  
  STAT 4530 (3) – Statistical Inferences for Data Scientists (NEW)  
  STAT (CSCI) 4990 (3) - Data Science Capstone (NEW)

- C.3 Major Elective Courses (choose 12 hours from the list below)
  
  BINF (PBIO) 4040/6040 (3) - Essential Biology for Quantitative Scientists  
  CSCI 3030 (3) - Computing, Ethics, and Society  
  CSCI 4050/6050 (4) - Software Engineering  
  CSCI 4150/6150(4) - Numerical Simulations in Science and Engineering  
  CSCI 4210/6210 (4) - Simulation and Modeling  
  CSCI 4470 (4)/6470 - Algorithms  
  CSCI 4850/6850 (4) - Biomedical Image Analysis  
  CSCI 5007/7007 (3) – Internship in Computer Science Business/Industry  
  FINA 3001 (3) – Financial Management  
  MARK 3001 (3) – Principles of Marketing  
  MARK 4350 (3) - Marketing Analytics  
  MARK 4650 (3) – Digital Marketing Analytics  
  MATH (CSCI) 4690 (3) - Graph Theory  
  MATH 4600 (3) – Probability  
  MGMT 3001 (3) – Principles of Management  
  MIST 5730 (3) - Advanced Data Management  
  PBIO (BINF) 4550/6550 (3) - Bioinformatics Applications
One-Step Academic Program Proposal

b) Provide a sample program of study that includes the course prefixes, course numbers, and course titles and credit hour requirement for each course. Indicate the word “new” beside new courses.

Please see Appendix A for a sample program of study

c) List and reference all course prerequisites for required and elective courses within the program. Include the course prefixes, numbers, titles, and credit hour requirements.

BINF (PBIO) 4040/6040
Credits: 3
Course Title: Essential Biology for Quantitative Scientists
Prerequisites: CHEM 1211 or CHEM 1411 or CHEM 1311H or permission of department

CSCI 1302
Credits: 4
Course Title: Software Development
Prerequisite: CSCI 1301-1301L

CSCI 1360
Credits: 4
Course Title: Foundations for Informatics and Data Analytics
Prerequisites: CSCI1301 and CSCI 2610

CSCI 2150-2150L
Credits: 4
Course Title: Introduction to Computational Science
Prerequisites: MATH 1113 or permission of department

CSCI 2720
Credits: 4
Course Title: Data Structures
Prerequisites: CSCI 1730 and [CSCI (MATH) 2610 or CSCI 2611]
CSCI 3030
Credits: 3
Course Title: Computing, Ethics, and Society
Prerequisites: ENGL 1050H or ENGL 1102

CSCI 3360
Credits: 4
Course Title: Data Science I
Prerequisites: (CSCI 1301-1301L or CSCI 1360 or CSCI 1360E) and (MATH 2250 or MATH 2250E or CSCI 2150-2150L)

CSCI 4260 (NEW)
Credits: 4
Course Title: Data Security and Privacy
Prerequisites: CSCI 1302

CSCI 4360/6360
Credits: 4
Course Title: Data Science II
Prerequisites: CSCI 3360

CSCI 4370/6370
Credits: 4
Course Title: Data Base Management
Prerequisites: CSCI 2720

CSCI 4380/6380
Credits: 4
Course Title: Data Mining
Prerequisites: CSCI 2720

CSCI 4050/6050
Credits: 4
Course Title: Software Engineering
Prerequisites: CSCI 2720

CSCI 4150/6150
Credits: 4
Course Title: Numerical Simulations in Science and Engineering
Prerequisites: (MATH 2250 and CSCI 1301-1301L) or permission of department

CSCI 4210/6210
Credits: 4
Course Title: Simulation and Modeling
Prerequisites: CSCI 2720
CSCI 4470
Credits: 4
Course Title: Algorithms
Prerequisites: CSCI 2720

CSCI 4850/6850
Credits: 4
Course Title: Biomedical Image Analysis
Prerequisites: CSCI 2720 or permission of department

CSCI 5007/7007
Credits: 3 hours. Repeatable for maximum 12 hours credit.
Course Title: Internship in Computer Science Business/Industry
Prerequisites: Permission of department

FINA 3001
Credits: 3
Course Title: Financial Management
Prerequisites: ACCT 2101 or ACCT 2101E or ACCT 2101H or ACCT 1160 and MIST 2090 or MIST 2090E or MIST 2190H or CSCI 1100-1100L

MARK 3001
Credits: 3
Course Title: Principles of Marketing
Prerequisites: None

MARK 4350
Credits: 3
Course Title: Marketing Analytics
Prerequisites: MARK 3000 or MARK 3000E or MARK 3000H or MARK 3001 or MARK 3001H or MARK 3001E

MARK 4650
Credits: 3
Course Title: Integrated Marketing and Brand Communication
Prerequisites: MARK 3000 or MARK 3000E or MARK 3000H or MARK 3001 or MARK 3001H or MARK 3001E

MATH 3300
Credits: 3
Course Title: Applied Linear Algebra
Prerequisites: MATH 2260

MATH 4600/6600
Credits: 3
Course Title: Probability
Prerequisites: [(MATH 2270 or MATH 2500) and (MATH 2260 or MATH 3100)] or MATH 3510 or MATH 3510H

MATH (CSCI) 4690/6690
Credits: 3
Course Title: Graph Theory
Prerequisites: CSCI(MATH) 2610 or MATH 3200

MATH (BINF) 4780/ 6780
Credits: 3
Course Title: Mathematical Biology
Prerequisites: (MATH 2270 or MATH 2500 or MATH 3510 or MATH 3510H) and [(MATH 4700/6700 or MATH 2700) and permission of department]

MGMT 3001
Credits: 3
Course Title: Principles of Management
Prerequisites: (ACCT 2101 or ACCT 2101E or ACCT 2101H or ACCT 1160) and (MIST 2090 or MIST 2090E or MIST 2190H or CSCI 1100-1100L)

MIST 5730
Credits: 3
Course Title: Advanced Data Management
Prerequisites: MIST 4600 and MIST 4610

PBIO (BINF) 4550/6550
Credits: 3
Course Title: Bioinformatics Applications
Prerequisites: BCMB 3600 or BCMB 3600H or GENE 3200-3200D

RMIN 4000
Credits: 3
Course Title: Risk Management and Insurance
Prerequisites: None

STAT 2010 (NEW)
Credit Hours: 3
Course Title: Statistical Methods for Data Scientists
Prerequisite: None

STAT 4220
Credit Hours: 3
Course Title: Applied Experimental Designs
Prerequisite: STAT 4110H or STAT 4210

STAT 4230/6230
Credit Hours: 3
Course Title: Applied Regression Analysis
Undergraduate Prerequisite: STAT 4210 or STAT 4110H
Graduate Prerequisite: STAT 6210 or STAT 6310 or STAT 6315 or permission of department

STAT 4240/6240
Credit Hours: 3
Course Title: Sampling and Survey Methods
Undergraduate Prerequisite: STAT 4210 or STAT 4110H
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department

STAT 4250/6250 (NEW)
Credit Hours: 3
Course Title: Applied Multivariate Analysis and Statistical Learning
Undergraduate Prerequisite: STAT 4230 and (MATH 3000 or MATH 3300)
Graduate Prerequisite: (A course on linear algebra and either STAT 6420, STAT 6220, or STAT 6315) or permission of the department

STAT 4260/6260
Credit Hours: 3
Course Title: Statistical Quality Assurance
Undergraduate Prerequisite: STAT 4210 or STAT 4110H
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department

STAT 4280/6280
Credit Hours: 3
Course Title: Applied Time Series Analysis
Undergraduate Prerequisite: STAT 4230/6230 and STAT 4360/6360
Graduate Prerequisite: [STAT 4360/6360 and (STAT 4230/6230 or STAT 6320 or STAT 6420)] or permission of department

STAT 4290/6290
Credit Hours: 3
Course Title: Nonparametric Methods
Undergraduate Prerequisite: STAT 4210 or STAT 4110H
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department

STAT 4510/6510
Credit Hours: 3
Course Title: Mathematical Statistics I
Prerequisite: MATH 2270 or MATH 2500
 STAT 4530 / CSCI 4530 (NEW)  
Credit Hours: 3  
Course Title: Estimation Methods for Data Science  
Prerequisite: CSCI 3360, STAT4510

STAT 4620/6620 (NEW)  
Credit Hours: 3  
Course Title: Applied Categorical Data Analysis  
Graduate Prerequisite: STAT 6420 and STAT 6510

STAT 4710/6710  
Credit Hours: 3  
Course Title: Introduction to Probability Theory I  
Prerequisite: MATH 2500 or MATH 2270

STAT 4720/6720  
Credit Hours: 3  
Course Title: Introduction to Probability Theory II  
Prerequisite: STAT 4710/6710

STAT 4990 / CSCI 4990 (NEW)  
Credit Hours: 3  
Course Title: Data Science Capstone Course  
Prerequisite: CSCI 4360/6360, CSCI 4370/6370, STAT4220, STAT4230

STAT 5700/7700  
Credit Hours: 3 hours. Repeatable for maximum 15 hours credit  
Course Title: Internship in Statistics  
Prerequisites: None

d) State the total number of credit hours required to complete the program, but do not include orientation, freshman year experience, physical education, or health and wellness courses per the Academic and Student Affairs Handbook, Section 2.3.1.

Program of Study Form  
(Modify appropriately for undergraduate versus graduate programs.)

The core curriculum for the University of Georgia can be found at http://bulletin.uga.edu/GenEdCoreBulletin.aspx. Preferred courses for this major are included in the table.
## ONE-STEP ACADEMIC PROGRAM PROPOSAL

### Area I: Foundation Courses
- **ENGL 1101, English Composition I**  
  First Year, Fall  
  3
- **ENGL 1102, English Composition II**  
  First Year, Spring  
  3
- **MATH 2250, Calculus I for Science and Engineering**  
  First Year, Fall  
  4

### Area II: Physical and Life Sciences
- **Life Science with a Laboratory**  
  Second Year, Fall  
  4
- **Physical Science**  
  Second Year, Spring  
  3

### Area III: Quantitative Reasoning
- **MATH 2260, Calculus II for Science Engineering**  
  First Year, Spring  
  4

### Area IV: World Languages and Culture
- **World Language and Culture**  
  Third Year, Fall  
  3
- **World Language and Culture**  
  Third Year, Spring  
  3
- **World Language and Culture**  
  Fourth Year, Spring  
  3

### Area IV: Humanities and the Arts
- **Humanities and the Arts**  
  Fourth Year, Fall  
  3

### Area IV: Humanities and the Arts
- **HIST 2111, American History to 1865**  
  First Year, Fall  
  3
- **HIST 2112, American History since 1865**  
  Second Year, Fall  
  3
- **POLS 1101, American Government**  
  Fourth Year, Fall  
  3

### Area VI:
- **CSCI 1302, Software Development**  
  First Year, Spring  
  4
- **CSCI 1360, Foundations for Informatics and Data Analytics**  
  First Year, Fall  
  4
- **CSCI 2150, Introduction to Computational Science**  
  Second Year, Spring  
  4
- **CSCI 2720, Data Structures**  
  Second Year, Spring  
  4
- **STAT 2010, Statistical Methods for Data Scientists**  
  First Year, Spring  
  3

### Major Area Courses – Common Curriculum
- **CSCI 3360, Data Science**  
  Third Year, Fall  
  4
- **CSCI 4260, Data Security and Privacy**  
  Fourth Year, Fall  
  4
- **CSCI 4360, Data Science II**  
  Third Year, Spring  
  4
- **CSCI 4370, Data Base Management**  
  Third Year, Spring  
  4
- **CSCI 4380, Data Mining, or STAT 4250, Applied Multivariate Analysis and Statistical Learning**  
  Third Year, Fall  
  4 or 3
- **MATH 3300, Applied Linear Algebra**  
  Second Year, Spring  
  3
- **STAT 4220, Applied Experimental Designs**  
  Second Year, Spring  
  3
- **STAT 4230, Applied Regression Analysis**  
  Second Year, Spring  
  3
- **STAT 4510, Mathematical Statistics I**  
  Third Year, Fall  
  3
- **STAT 4530, Estimation Methods for Data Science**  
  Third Year, Spring  
  3
- **STAT(CSCI) 4990, Data Science Capstone**  
  Fourth Year, Spring  
  2

## Concentration
### Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Elective</td>
<td>Fourth Year, Spring</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>Fourth Year, Fall</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>Fourth Year, Fall</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>Fourth Year, Spring</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>Fourth Year, Spring</td>
<td>3</td>
</tr>
<tr>
<td>Major Elective</td>
<td>Third Year, Spring</td>
<td>3</td>
</tr>
<tr>
<td>Multicultural Course</td>
<td></td>
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</tbody>
</table>

**Total Semester Credit Hours**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**List below health and physical education, basic health, orientation, etc. per Board Policy 3.8.1**

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**e)** If this is a doctoral program, provide the names of four external reviewers of aspirational or comparative peer programs complete with name, title, institution, e-mail address, and telephone number. External reviewers must hold the rank of associate professor or higher in addition to other administrative titles.

N/A

**f)** If internships, assistantships, or field experiences are required to complete the academic program, provide information documenting internship or field experience availability and how students will be assigned, supervised, and evaluated.

Internships are optional, but not required. Students may take one of the two following courses:

- CSCI 5007/7007: Internship in Computer Science Business/Industry
- STAT 5700/7700: Internship in Statistics

**g)** Within the appendix, append the course catalog descriptions for new courses. Include the course prefixes, course numbers, course titles, and credit hour requirements.

**11. Waiver to Degree-Credit Hour** (if applicable): State whether semester credit-hours exceed maximum limits for the academic program and provide a rationale.

N/A

**12. Student Learning Outcomes:** Student Learning outcomes and other associated outcomes of the proposed program (provide a narrative explanation).

All graduates earning B.S. in Data Science degree offered by the Franklin College of Arts and Sciences will learn the essential skills necessary to pursue careers in a variety of data-oriented companies [e.g., computing/internet companies (Google, Amazon, Facebook, IBM); engineering companies (Intel, Samsung, Boeing); finance/insurance (Goldman Sachs, AIG, 
ONE-STEP ACADEMIC PROGRAM PROPOSAL

Liberty Mutual) companies; pharmaceutical companies (Johnson & Johnson)]; government/national labs (NASA, NIST, DoD) or pursue graduate studies. All graduates will be able to:

- Develop software, algorithms; design and manage a variety of databases and structures, process data in distributed environments;
- Collect and analyze the data using techniques from statistics, data mining, machine learning;
- Provide visualizations of the data and build statistical models to facilitate inference
- Interpret results of statistical analysis and assist decision makers

13. Assessment and Quality: Describe institutional assessments throughout the program to ensure academic quality, viability, and productivity as this relates to post-approval enrollment monitoring, degree productivity, and comprehensive program review.

All academic programs are reviewed annually to assess the program outcomes and student learning outcomes. Students completing B.S. in Data Science are required to complete a capstone project, which requires applying combination of concepts from computer science and statistics to do advanced data analytics in a domain area. The capstone course objectives will encompass the student learning outcomes for the program. In addition, the new degree will be assessed as part of the UGA comprehensive program review carried out every seven years.

14. Accreditation: Describe disciplinary accreditation requirements associated with the program (if applicable, otherwise indicate NA).

NA

15. Enrollment Projections: Provide projected enrollments for the program specifically during the initial years of implementation.
   a) Will enrollments be cohort-based? Yes_____ or No____ X____ (place an X beside one)
   b) Explain the rationale used to determine enrollment projections.

The University of Georgia has an existing base of students in the Certificate of Applied Data Science program offered by the Computer Science department. Our conservative enrollment projection assumes that in year 1, 2 of the existing certification students will shift into the new major and 8 new students will enter the major. We believe that the numbers shifted from other programs will slightly increase in subsequent years. Additionally, we conservatively estimate new enrollments at 9 new students for year 2, followed by a modest increase in the numbers during years 3 and 4, respectively, reaching a projected total number of 56 majors by 2022.

If projections are not met, the directors of the program—heads of Computer Science and Statistics—along with the two respective undergraduate coordinators will develop a recruitment strategy to increase enrollment.
### ONE-STEP ACADEMIC PROGRAM PROPOSAL

<table>
<thead>
<tr>
<th>Student Majors</th>
<th>First FY 2019</th>
<th>Second FY 2020</th>
<th>Third FY 2021</th>
<th>Fourth FY 2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shifted from other programs</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>New to the institution</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total Majors</strong> (Previous + new)</td>
<td>10</td>
<td>22</td>
<td>36</td>
<td>56</td>
</tr>
<tr>
<td>(10+12)</td>
<td></td>
<td>(22+14)</td>
<td></td>
<td>(36+20)</td>
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</table>

<table>
<thead>
<tr>
<th>Course Sections Satisfying Program Requirements</th>
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</thead>
<tbody>
<tr>
<td>Previously existing</td>
</tr>
<tr>
<td>New</td>
</tr>
<tr>
<td><strong>Total Program Course Sections</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Credit Hours Generated by Those Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing enrollments</td>
</tr>
<tr>
<td>New enrollments</td>
</tr>
<tr>
<td><strong>Total Credit Hours</strong></td>
</tr>
</tbody>
</table>

**16) Faculty**

a) Provide the total number of faculty members that will support this program: **38**

b) Provide an inventory of faculty members directly involved with the administration and instruction of the program. Annotate in parentheses the person who holds the role of department chair. For each faculty member listed, provide the information below in tabular form. Indicate whether any positions listed are projected new hires and currently vacant. (Multiple rows can be added to the table.) Note: The table below is similar to the SACS-COC faculty roster form. *(see narrative at the end of table)*

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Rank</th>
<th>Courses Taught (including term, course number &amp; title, credit hours (D, UN, UT, G))</th>
<th>Academic Degrees &amp; Coursework (relevant to courses taught, including institution &amp; major; list specific graduate coursework, if needed)</th>
<th>Current Workload</th>
<th>Other Qualifications &amp; Comments (related to courses taught)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. N. Sriram</td>
<td>Professor (Interim)</td>
<td><strong>Spring 2017</strong></td>
<td>Ph.D. Statistics, 3-6 credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Position</td>
<td>Course 1</td>
<td>Course 2</td>
<td>Credits/Year</td>
<td>Thesis Focus</td>
</tr>
<tr>
<td>-----------------------</td>
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</tr>
<tr>
<td>Abhyuday Mandal</td>
<td>Associate Professor</td>
<td>STAT 4110H, Honors Applied Statistics, 3.0 (UT)</td>
<td>Michigan State University M.S. Statistics, University of Pune B.S. Statistics, Madras Christian College</td>
<td>3-6 credit hours/sem</td>
<td>Ph.D. thesis was in Design and Analysis of Experiments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 2017 STAT 4/6280, Applied Time Series Analysis, 3.0 (UT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summer 2017 STAT 4220, Applied Experimental Designs, 3.0 (UT)</td>
<td>B.S. Statistics, Indian Statistical Institute</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 2017 STAT 4220, Applied Experimental Designs, 3.0 (UT)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark Werner</td>
<td>Senior Lecturer</td>
<td>Spring 2017 MSIT 3000, Statistical Analysis for Business I, 3.0 (UT) [Taught 3 large sections of the course]</td>
<td>Ph.D. Applied Mathematics, University of Colorado Denver M.S. Applied Mathematics, University of Stellenbosch</td>
<td>18-24 credit hours per academic year</td>
<td>Ph.D. thesis was in Identification of Multivariate Outliers in Large Data Sets M.S. thesis was in Identifying Chaos in Experimental Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summer 2017 MSIT 3000, Statistical Analysis for Business I, 3.0 (UT)</td>
<td>B.S. Honors, Applied Mathematics, University of Stellenbosch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## ONE-STEP ACADEMIC PROGRAM PROPOSAL

<table>
<thead>
<tr>
<th></th>
<th>STAT 4/6230, Applied Regression Analysis, 3.0 (UT)</th>
<th>B.S. Applied Mathematics, University of Stellenbosch</th>
<th>Fall 2017</th>
<th>MSIT 3000, Statistical Analysis for Business I, 3.0 (UT) [Taught 3 large sections of the course]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ping Ma</td>
<td>Professor</td>
<td>Ph.D. Statistics, Purdue University</td>
<td></td>
<td>Ph.D. thesis was in nonparametric estimation; Co-direct the Big Data Analytics Lab; Member of Georgia Informatics Institute; Adjunct Faculty Member of Computer Science</td>
</tr>
<tr>
<td></td>
<td>Spring 2017 STAT 4/6280, Applied Time Series Analysis, 3.0 (UT)</td>
<td>Ph.D. Statistics, Purdue University</td>
<td>3-6 credit hours/sem</td>
<td>Ph.D. thesis was in dimension reduction; Co-direct the Big Data Analytics Lab; Founding Member of Georgia Informatics Institute</td>
</tr>
<tr>
<td>Wenxuan Zhong</td>
<td>Associate Professor</td>
<td>Ph.D. Statistics, Purdue University</td>
<td>3-6 credit hours/sem</td>
<td>Ph.D. thesis was in dimension reduction; Co-direct the Big Data Analytics Lab; Founding Member of Georgia Informatics Institute</td>
</tr>
<tr>
<td></td>
<td>Spring 2017 STAT 8460, Advanced Bioinformatics, 3.0 (GT)</td>
<td>Ph.D. Statistics, Purdue University</td>
<td>3-6 credit hours/sem</td>
<td>Ph.D. thesis was in dimension reduction; Co-direct the Big Data Analytics Lab; Founding Member of Georgia Informatics Institute</td>
</tr>
<tr>
<td>Pengsheng Ji</td>
<td>Assistant Professor</td>
<td>Ph.D. Statistics, Cornell University</td>
<td>3-6 credit hours/sem</td>
<td>Ph.D. thesis was in variable selection and nonparametric testing, which form the foundation of modern data science.</td>
</tr>
<tr>
<td></td>
<td>Spring 2017, STAT 6520, Mathematical Statistics, 3.0 (UT)</td>
<td>M.S. Statistics, Cornell University</td>
<td></td>
<td>Ph.D. thesis was in variable selection and nonparametric testing, which form the foundation of modern data science.</td>
</tr>
<tr>
<td></td>
<td>Fall 2017, STAT 4/6230, Applied Regression Analysis, 3.0 (UT)</td>
<td>M.S. Statistics, Cornell University</td>
<td></td>
<td>Ph.D. thesis was in variable selection and nonparametric testing, which form the foundation of modern data science.</td>
</tr>
<tr>
<td></td>
<td>STAT 6810,</td>
<td>M.S. Statistics, Nankai University</td>
<td></td>
<td>Ph.D. thesis was in variable selection and nonparametric testing, which form the foundation of modern data science.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Mathematics,</td>
<td></td>
<td>Ph.D. thesis was in variable selection and nonparametric testing, which form the foundation of modern data science.</td>
</tr>
</tbody>
</table>
## ONE-STEP ACADEMIC PROGRAM PROPOSAL

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Title</th>
<th>Courses</th>
<th>University/Credit Hours</th>
<th>PhD/Research Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicole Lazar</td>
<td>Professor</td>
<td>Probability Distributions, 3.0 (UT)</td>
<td>Nankai University</td>
<td>PhD in Statistics, University of Chicago; MS in Statistics, Stanford University; BA in Statistics and Psychology, Tel Aviv University; 6-9 credit hours per academic year; PhD in advanced likelihood methods; research in functional neuroimaging and other large data applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 2017 STAT 5010/5020, Capstone Course, 3.0 (UT)</td>
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<tr>
<td></td>
<td></td>
<td>Fall 2016 STAT 4/6230, Applied Regression Analysis, 3.0 (UT)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>STAT 6420, Applied Linear Models, 3.0 (UT)</td>
<td></td>
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</tr>
<tr>
<td>Paul Schlickelman</td>
<td>Associate Professor</td>
<td>Spring 2017 STAT 5010/5020, Capstone Course, 3.0 (UT)</td>
<td>Ph.D. in Biomathematics, North Carolina State University Master of Biomathematics, North Carolina State University B.S. in Physics, Iowa State University</td>
<td>9 credit hours per academic year; PhD dissertation and research interests are interdisciplinary and involve large data sets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fall 2017 STAT 6510, Mathematical Statistics I, 3.0 (UT)</td>
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<tr>
<td></td>
<td></td>
<td>STAT 8060, Computing Techniques in Statistics I, 3.0 (UT)</td>
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<tr>
<td>Jaxk Reeves</td>
<td>Associate Professor</td>
<td>Spring 2017 STAT 4/6290, Nonparametric Methods, 3.0 (UT)</td>
<td>Ph.D. in Statistics, University of California, Berkeley</td>
<td>6 credit hours; Serving as Statistical Consulting Center (SCC) Director.</td>
</tr>
<tr>
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<tr>
<td>Lecturer</td>
<td>Courses</td>
<td>Degree/Field</td>
<td>Credit Hours</td>
<td>Notes</td>
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<tr>
<td>-------------------</td>
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<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Megan Lutz</td>
<td>Spring 2017 MSIT 3000 (2 sections), Business Statistics, 3.0 (UT)</td>
<td>Phd in Psychology, Georgia Institute of Technology</td>
<td>24 credit</td>
<td>PhD dissertation is in Psychology, which is an interdisciplinary area</td>
</tr>
<tr>
<td></td>
<td>STAT 4510, Mathematical Statistics, 3.0 (UT)</td>
<td>MS in Psychology, Georgia Institute of Technology</td>
<td>hours per</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STAT 6220, Introduction to Statistics II, 3.0 (UT)</td>
<td>MS in Statistics, Virginia Polytechnic Institute and State University</td>
<td>academic year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fall 2017 STAT 4210 (2 sections), Statistical Methods, 3.0 (UT)</td>
<td>MS in Applied Statistics, Rochester Institute of Technology</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>STAT 4/6260 (Statistical Quality Assurance), 3.0 (UT)</td>
<td>BS in Industrial Engineering, Georgia Institute of Technology</td>
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</tr>
<tr>
<td></td>
<td>STAT 4510, Mathematical Statistics, 3.0 (UT)</td>
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</tr>
<tr>
<td>Catherine Case</td>
<td>Spring 2017 STAT 2100H (2 sections), Business Statistics, 3.0 (UT)</td>
<td>Ph.D. in Mathematics &amp; Statistics, 3.0 (UT)</td>
<td>24 credit</td>
<td>PhD dissertation is in statistics</td>
</tr>
<tr>
<td></td>
<td>STAT 4510, Mathematical Statistics, 3.0 (UT)</td>
<td></td>
<td>hours per</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>academic year</td>
<td></td>
</tr>
<tr>
<td>Gauri S. Datta</td>
<td>Professor</td>
<td>Spring 2017</td>
<td>Ph.D. in Statistics, University of Florida</td>
<td>9 credit hours per academic year</td>
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<tr>
<td></td>
<td></td>
<td>STAT 8530, Advanced Statistical Inference I, 3.0 (UT)</td>
<td>M.Sc. in Statistics, University of Calcutta</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STAT 4210 (3 sections), Statistical Methods, 3.0 (UT)</td>
<td>B.Sc. in Statistics, Ramakrishna Mission Residential College</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STAT 2100H (2 sections), 4.0 (UT)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>MSIT 3000 (2 sections), Business Statistics, 3.0 (UT)</td>
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<tr>
<td></td>
<td></td>
<td>Fall 2017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiab Taha</td>
<td>Professor (Head)</td>
<td><strong>Spring 2017</strong></td>
<td>Ph.D. Applied Mathematics &amp; Computer Science, Clarkson University</td>
<td>5 credit hours/year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CSCI 2150, Introduction to Computational Science, 4.0 (UT)</td>
<td>M.Sc. Mathematics</td>
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<td>Ph.D. Applied Mathematics &amp; Computer Science, Clarkson University</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>M.Sc. Mathematics</td>
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</tbody>
</table>

Sections), 4.0 (UT)

Statistics Education, University of Florida

MS in Statistics, University of Florida

B.S. in Mathematics and Spanish, University of Alabama at Birmingham

Fall 2017

STAT 2100H (2 sections), 4.0 (UT)

MSIT 3000 (2 sections), Business Statistics, 3.0 (UT)

Gauri S. Datta

Professor

Spring 2017

STAT 8530, Advanced Statistical Inference I, 3.0 (UT)

Ph.D. in Statistics, University of Florida

M.Sc. in Statistics, University of Calcutta

B.Sc. in Statistics, Ramakrishna Mission Residential College

9 credit hours per academic year

Research expertise in Bayesian Inference, and collaborates extensively with Census Bureau, CDC, and other Federal Agencies

Thiab Taha

Professor (Head)

**Spring 2017**

CSCI 2150, Introduction to Computational Science, 4.0 (UT)

Ph.D. Applied Mathematics & Computer Science, Clarkson University

M.Sc. Mathematics

5 credit hours/year

## ONE-STEP ACADEMIC PROGRAM PROPOSAL

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Courses</th>
<th>Degree Information</th>
<th>Credits/sem.</th>
<th>Thesis/Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brad Barnes</td>
<td>Lecturer (Undergrad. Coordinator)</td>
<td>Spring 2017: CSCI 1301, Introduction to Programming, 4.0 (UT)&lt;br&gt;Fall 2017: CSCI 1301, Introduction to Programming,</td>
<td>Ph.D. Computer Science, University of Georgia B.S. Computer Science, College of Charleston</td>
<td>8 credit hours/sem.</td>
<td>Ph.D. dissertation: “A Regression Based System for Accurate Scalability Prediction on Large-Scale Machines”</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Spring 2017</td>
<td>Fall 2017</td>
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<td>Michael Cotterell</td>
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<td>CSCI 1302, Software Development, 4.0 (UT)</td>
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<td>Prashant Doshi</td>
<td>Professor</td>
<td>CSCI 8920, Decision Making, 4.0 (G)</td>
<td>CSCI 4530/6530, Introduction to Robotics, 4.0 (UT/G)</td>
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<td>Ph.D. dissertation: “Optimal Sequential Planning in Partially Observable Multiagent Settings”</td>
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<td>Shelby Funk</td>
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<td>CSCI 2670, Introduction to Theoretical Computing, 4.0 (UT)</td>
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<td>Bill Hollingsworth</td>
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<td>Ph.D. dissertation: “Using Lexical Chains to Characterize Scientific Text”</td>
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<td>CSCI 4690/6690, Graph Theory, 3.0 (UT/G)</td>
<td>CSCI 2150, Introduction to Scientific Computing, 4.0 (UT)</td>
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<td>M.Phil. thesis: “Rhythmic and Segmental Contributions to Timing in Speech Synthesis”</td>
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<td>Yi Hong</td>
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<td>Maria Hybinette</td>
<td>Associate Professor</td>
<td>CSCI 4070/6070 Game Programming, 4.0 (UT/G)</td>
<td>CSCI 4730/6730 Operating Systems, 4.0 (UT/G)</td>
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<td>5 credit hours/sem.  Ph.D. dissertation: &quot;Interactive Parallel Simulation Environments&quot;</td>
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<td>Manijeh Keshtgari</td>
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<td>CSCI 4760, Computer Networks, 4.0 (UT)</td>
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<td>12 credit hours/sem.  Ph.D. dissertation: &quot;Survivability of Networks M.S. thesis: “Performance Evaluation of FDDI-II Networks”</td>
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<td>Krzysztof Kochut</td>
<td>Professor</td>
<td>CSCI 4570/6570, Compilers, 4.0 (UT/G)</td>
<td>CSCI 4050/6050, Software Engineering,</td>
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<td>5 credit hours/sem.  Ph.D. dissertation: &quot;Resolution Proof Technique in Linear Temporal Logic&quot; M.S. thesis: “Augmented Transition Network Grammar for Parsing of the Polish Language&quot;</td>
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<td>Kyu Hyung Lee</td>
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<td>Kang Li</td>
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<td>Fall 2017</td>
<td>Ph.D. Computer Science and</td>
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<td>Tianming Liu</td>
<td>Distinguished Research Professor</td>
<td>Spring 2017</td>
<td>Ph.D. Computer</td>
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Ph.D. dissertation: "Selective Logging for Accurate, Space Efficient Forensic Analysis and Reducible Execution Replay"

M.S. thesis: "PFC: Transparent Optimization of Existing Prefetching Strategies for Multi-level Storage Systems"

Ph.D. dissertation: "Achieving Practical Differential Privacy"

M.S. thesis: "Efficiently Tracing Clusters over High-dimensional Data Streams"


M.S. thesis:
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<tr>
<td>Sachin Meena</td>
<td>Lecturer</td>
<td><strong>Fall 2017</strong> CSCI 8860, Biomedical Informatics, 4.0 (G)</td>
<td>M.S. Automation, Northwestern Polytechnical University, China</td>
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<td>“Artificial Neural Networks for Object Detection”</td>
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<td>B.S. Automation, Northwestern Polytechnical University, China</td>
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<td>John Miller</td>
<td>Professor (Associate Head)</td>
<td><strong>Fall 2017</strong> CSCI 2720, Data Structure, 4.0 (UT)</td>
<td>Ph.D. Computer Science, University of Missouri, B.S. Electrical</td>
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<td>Roberto Perdisci</td>
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<td><strong>Fall 2017</strong> CSCI 4760/6760, Computer Networks, 4.0 (UT/G)</td>
<td>Ph.D. Computer Engineering, University of Cagliari, Italy M.S.</td>
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<td>Ph.D. thesis: “Statistical Pattern Recognition Techniques for Intrusion Detection in Computer Networks”</td>
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<td><strong>Spring 2017</strong> CSCI 8370, Advanced Database, 4.0 (G)</td>
<td>Ph.D. Information and Computer Science, Georgia Institute of Technology</td>
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<td><strong>Fall 2017</strong> CSCI 4370/6370, Database Management, 4.0 (UT/G)</td>
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<td>B.S. Applied Mathematics, Northwestern University</td>
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<td><strong>Spring 2017</strong> CSCI 4760/6760, Computer Networks, 4.0 (UT/G)</td>
<td>Ph.D. Computer Engineering, University of Cagliari, Italy M.S.</td>
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<td>Ph.D. dissertation: “Dissertation was in Markovian Analysis and Optimization of Database Recovery Protocols”</td>
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<td>Challenges and Solutions</td>
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<td>Shannon Quinn</td>
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<td>CBIO (CSCI) 4835/6835, Introduction to Computational Biology, 3.0 (UT/G)</td>
<td>Ph.D. Computational Biology, University of Pittsburgh</td>
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<td>Ph.D. dissertation: &quot;Distributed Spectral Graph Methods for Analyzing Large-Scale Unstructured Biomedical Data&quot;</td>
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<td>Lakshmish Ramaswamy</td>
<td>Professor</td>
<td>CSCI 4780/6780, Distributed Computing Systems, 4.0 (UT/G)</td>
<td>CSCI 8780, Advanced Distributed Systems, 4.0 (G)</td>
<td>Ph.D. Computer Science, Georgia Institute of Technology</td>
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<td>M.S. Computer Science and Automation, Indian Institute of Science, India</td>
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<td>Khaled Rasheed</td>
<td>Professor</td>
<td>CSCI 8950, Machine Learning, 4.0 (G)</td>
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<td>Ph.D. Computer Science, Rutgers University</td>
<td>M.S. Computer</td>
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### Fall 2017

- **CSCI 4380/6380, Data Mining**, 4.0 (UT/G)

### Spring 2017

- **CSCI 2720, Data Structures**, 4.0 (UT)

### Fall 2017

- **CSCI 4050/6050, Software Engineering**, 4.0 (UT/G)

### Fall 2017

- **CSCI 1730, Systems Programming**, 4.0 (UT)

### Fall 2017

- **CSCI 2610, Discrete Mathematics**, 4.0 (UT)

### Fall 2017

- **Science, Rutgers University**
- **B.S. Computer Science, Alexandria University, Egypt**

### Spring 2017

- **Ph.D. Computer Science, University of Cairo, Egypt**
- **M.S. Computer Science, University of Jordan, Jordan**
- **B.S. Computer Science, University of Jordan, Jordan**

### Spring 2017

- **IN PROGRESS**
- **Ph.D. Computer Science, University of Georgia**

### Fall 2017

- **IN PROGRESS**
- **Ph.D. Computer Science, University of Georgia**
- **B.S. Computer Engineering, Qazvin Azad University, Iran**

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<tr>
<td>Eman Saleh</td>
<td>Lecturer</td>
<td><strong>Fall 2017</strong> CSCI 4380/6380, Data Mining, 4.0 (UT/G)</td>
<td>Science, Rutgers University, B.S. Computer Science, Alexandria University, Egypt</td>
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<td><strong>Spring 2017</strong> CSCI 2720, Data Structures, 4.0 (UT)</td>
<td>Ph.D. Computer Science, University of Cairo, Egypt, M.S. Computer Science, University of Jordan, Jordan, B.S. Computer Science, University of Jordan, Jordan</td>
<td>12 credit hours/sem.</td>
<td>Ph.D. dissertation: “Model-Driven Engineering Design Approach for Developing Multi-Platform User Interfaces”</td>
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<td>Michael Scott</td>
<td>Lecturer</td>
<td><strong>Fall 2017</strong> CSCI 1730, Systems Programming, 4.0 (UT)</td>
<td>(IN PROGRESS) Ph.D. Computer Science, University of Georgia</td>
<td>12 credit hours/sem.</td>
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<tr>
<td>Delaram Yazdansepas</td>
<td>Lecturer</td>
<td><strong>Fall 2017</strong> CSCI 2610, Discrete Mathematics, 4.0 (UT)</td>
<td>(IN PROGRESS) Ph.D. Computer Science, University of Georgia, B.S. Computer Engineering, Qazvin Azad University, Iran</td>
<td>12 credit hours/sem.</td>
<td>(IN PROGRESS) Ph.D. dissertation: “Human Activity Recognition using Wearable Sensors”</td>
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*F, P: Full-time or Part-time: D, UN, UT, G: Developmental, Undergraduate Non-transferable, Undergraduate Transferable, Graduate*

*The Department of Statistics and the Department of Computer Science are in the process of hiring 8 new faculty who will teach courses in this new Data Science program.*

c) Explain how faculty workloads will be impacted by the proposed new program.
For Statistics: It is anticipated that the new Co-Director of the Data Science program (T. N. Sriram) will teach the new course—STAT 4530, Statistical Inferences for Data Scientists; Abhyuday Mandal will teach the new course—STAT (CSCI) 4990, Data Science Capstone and the existing course—STAT 4220, Applied Experimental Designs; and Catherine Case will teach the new course— STAT 2010, Statistical Methods for Data Scientists and Mark Werner will teach the existing course—STAT 4230/6230, Applied Regression Analysis.

For Computer Science: The Foundation Course (C.1) are offered frequently. For the Major Related Courses (C.2), several faculty members are available to teach these courses: CSCI 1360 Foundations for Informatics and Data Analytics will be taught by Dr. Quinn; CSCI 2150 Introduction to Computational Science will be taught by Dr. Taha; CSCI 3360 Data Science will be taught by Drs. Hong, J. Lee, Miller and Quinn; CSCI 4260 Data Security and Privacy (NEW) will be taught by Dr. J. Lee; CSCI 4360 Data Science II will be taught by Drs. Hong, J. Lee, Miller and Quinn; CSCI 4380 Data Mining will be taught by Dr. Rasheed; CSCI 4370 Database Management will be taught by Drs. Arpinar and Miller.

In subsequent years, new faculty positions will be justified by increased enrollments.

d) Explain whether additional faculty will be needed to establish and implement the program. Describe the institutional plan for recruiting additional faculty members in terms of required qualifications, financial preparations, timetable for adding faculty, and whether resources were shifted from other academic units, programs, or derived from other sources.

The Department of Statistics hired two top quality faculty in 2013, both working in Big Data and generating over 3 million in extramural funding from the National Institute of Health and National Science Foundation. Both of them are members of the new Georgia Informatics Institutes for Research and Education. In addition, they also maintain a Big Data Analytics Lab that supports about 10 graduate students each year. Statistics has also hired a tenure-track faculty member and a non-tenure-track faculty member each year since 2015, and have been authorized to hire at least one tenure-track faculty member and a non-tenure-track faculty member in Spring 2018. In addition, from the 2018 Presidential Hiring Initiative for investing in the “Student Experience,” Statistics has been authorized to hire a tenure-track faculty in statistical machine learning and a lecturer in the area of statistics and business statistics. Similarly, The Computer Science department has also added 3 top quality faculty in the last three years and received approval to hire 4 more tenure-track assistant professors, starting August 2018. With these new positions in Computer Science and Statistics, this program is designed to be self-supportive at this time. In subsequent years, new faculty positions will be justified by increased enrollments.

17) Fiscal and Estimated Budget
a) Describe the resources that will be used specifically for the program.
All resources needed for the program are pre-existing. We will utilize the current resources (personnel, library, equipment, laboratory, and computing) available at the departmental and university level.

b) Budget Instructions: Complete the form further below and provide a narrative to address each of the following:

c) For Expenditures:

i. Provide a description of institutional resources that will be required for the program (e.g., personnel, library, equipment, laboratories, supplies, and capital expenditures at program start-up and recurring).

- All faculty resources needed for the program are pre-existing. Given that this program will be jointly managed by the Department of Computer Science and Department of Statistics, the faculty members from both the departments will fulfill the instructional needs in the proposed program. We will also use the current infrastructure and staff support provided to both departments.

- Personnel expenditures for each fiscal year are calculated using average per course instructional cost associated with offering major required courses offered that year. In our calculations, the average instructional cost for each new course in the major is taken to be $16,000, whereas for courses that are common to the Data Science (DS) major and the Statistics and Computer Science (CS) majors, we take the average instructional cost to be $4,000. The average instructional cost is calculated using the average faculty salary multiplied by the average instructional EFT and divided by the average course load.

- For the first year, the expenditure is determined based on offering one new course (STAT 2010) for the major. In the second year, the expenditure is based on offering three courses (STAT 4230, MATH 3300, STAT 4220) that are common to Statistics, CS, and DS majors and the new course (STAT 2010) for those new students joining the major. In the third and fourth year, expenditures are determined based on similar calculations.

ii. If the program involves reassigning existing faculty and/or staff, include the specific costs/expenses associated with reassigning faculty and staff to support the program (e.g., cost of part-time faculty to cover courses currently being taught by faculty being reassigned to the new program, or portion of full-time faculty workload and salary allocated to the program).

Instructional time will be reallocated to teach new courses.
d) For Revenue:

i. If using existing funds, provide a specific and detailed plan indicating the following three items: source of existing funds being reallocated; how the existing resources will be reallocated to specific costs for the new program; and the impact the redirection will have on units that lose funding.

1. **Source of existing funds being reallocated**
   Existing faculty lines budgeted for instruction will be utilized to cover instructional costs associated with courses that are common to this major and the Statistics and Computer Sciences majors. Funds to teach the 6 new courses for the major will be reallocated using the new faculty lines which are already allocated to both departments.

2. **How the existing resources will be reallocated to specific costs for the new program**
   Instructional time for existing and newly authorized faculty lines will be used to cover the needed program instruction.

3. **The Impact the redirection will have on units that lose funding**
   No funding or instruction will be lost as a result of this program.

ii. Explain how the new tuition amounts are calculated.

   Tuition is calculated from the 2017-2018 rate of $4,776 for 6+ hours/semester. For each year, the anticipated number of students enrolled in the program during the fall and spring, respectively, is multiplied by $4,776 to obtain the total tuition per year. For example, we anticipate that 10 students will be enrolled in the program during the first year. Therefore, for Year 1, the total tuition amount is 10x$4,776 (Fall) + 10x$4,776 (Spring) = $95,520. Similarly, we calculated the tuition amounts for years 2 to 4 using the respective anticipated enrollment numbers; see calculations in the table below.

iii. Explain the nature of any student fees listed (course fees, lab fees, program fees, etc.). Exclude student mandatory fees (i.e., activity, health, athletic, etc.).

   There are no new student or program fees.

iv. If revenues from Other Grants are included, please identify each grant and indicate if it has been awarded.
v. If Other Revenue is included, identify the source(s) of this revenue and the amount of each source.

N/A

e) When Grand Total Revenue is not equal to Grand Total Costs:

i. Explain how the institution will make up the shortfall. If reallocated funds are the primary tools being used to cover deficits, what is the plan to reduce the need for the program to rely on these funds to sustain the program?
N/A. There is no shortfall because there is no new cost as a result of this program.

ii. If the projected enrollment is not realized, provide an explanation for how the institution will cover the shortfall.

If the enrollments do not match projections, there will be no budget shortfall and there would be no additional cost to the University, because the existing courses will continue to be taught for the Statistics and Computer Science majors, and the new courses for the Data Science major will not be offered.

<table>
<thead>
<tr>
<th>Personnel – reassigned or existing positions</th>
<th>First FY Dollars</th>
<th>Second FY Dollars</th>
<th>Third FY Dollars</th>
<th>Fourth FY Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty (see 15.a.ii)</td>
<td>$16,000</td>
<td>$28,000</td>
<td>$72,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Part-time Faculty (see 15.a.ii)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Graduate Assistants (see 15.a.ii)</td>
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</tr>
<tr>
<td>Administrators (see 15.a.ii)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Support Staff (see 15.a.ii)</td>
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</tr>
<tr>
<td>Fringe Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Personnel Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Existing Personnel Costs</strong></td>
<td><strong>$16,000</strong></td>
<td><strong>$28,000</strong></td>
<td><strong>$72,000</strong></td>
<td><strong>$100,000</strong></td>
</tr>
</tbody>
</table>

**EXPENDITURES (Continued)**

Personnel – new positions (see 15.a.i)

Faculty
Part-time Faculty
Graduate Assistants
Administrators
Support Staff
Fringe Benefits
## One-Step Academic Program Proposal

### Other personnel costs

<table>
<thead>
<tr>
<th></th>
<th>$0</th>
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**Total New Personnel Costs**

### Start-up Costs (one-time expenses) (see 15 a.i)

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Library/learning resources

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Equipment

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Other

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### Physical Facilities: construction or renovation (see section on Facilities)

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<thead>
<tr>
<th></th>
<th>$0</th>
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</table>

**Total One-time Costs**

### Operating Costs (recurring costs – base budget) (see 15 a.i)

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Supplies/Expenses

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Travel

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Equipment

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Library/learning resources

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Other

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</thead>
</table>

**Total Recurring Costs**

### GRAND TOTAL COSTS

<table>
<thead>
<tr>
<th></th>
<th>$16,000</th>
<th>$28,000</th>
<th>$72,000</th>
<th>$100,000</th>
</tr>
</thead>
</table>

### III. REVENUE SOURCES

#### Source of Funds

- Reallocation of existing funds (see 15 b.i)  $16,000 $28,000 $72,000 $100,000
- New student workload
- New Tuition (see 15 b.ii)  $95,520 $210,144 $343,872 $534,912
- Federal funds
- Other grants (see 15 b.iv)
- Student fees (see 15 b.iii)
  Exclude mandatory fees (i.e., activity, health, athletic, etc.).
- Other (see 15 b.v)
  New state allocation requested for budget hearing

**GRAND TOTAL REVENUES**  $111,520 $238,144 $415,872 $634,912

#### Nature of Revenues

- Recurring/Permanent Funds
- One-time funds

**Projected Surplus/Deficit**  $95,520 $210,144 $343,872 $534,912
(Grand Total Revenue – Grand Total Costs) (see 15.c.i. & c.ii).
18) Facilities/Space Utilization for New Academic Program Information

Facilities Information — Please Complete the table below.

<table>
<thead>
<tr>
<th>Type of Space</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Construction of new space is required (x)</td>
<td>N/A</td>
</tr>
<tr>
<td>ii. Existing space will require modification (x)</td>
<td>N/A</td>
</tr>
<tr>
<td>iii. If new construction or renovation of existing space is anticipated, provide the justification for the need.</td>
<td>N/A</td>
</tr>
<tr>
<td>iv. Are there any accreditation standards or guidelines that will impact facilities/space needs in the future? If so, please describe the projected impact.</td>
<td>No</td>
</tr>
<tr>
<td>v. Will this program cause any impact on the campus infrastructure, such as parking, power, HVAC, other? If yes, indicate the nature of the impact, estimated cost, and source of funding.</td>
<td>No</td>
</tr>
<tr>
<td>vi. Indicate whether existing space will be used.</td>
<td>X Existing facilities will be sufficient</td>
</tr>
</tbody>
</table>

If new space is anticipated, provide information in the spaces below for each category listed:

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Provide the estimated construction cost. N/A</td>
</tr>
<tr>
<td>ii.</td>
<td>Provide the estimated total project budget cost. N/A</td>
</tr>
<tr>
<td>iii.</td>
<td>Specify the proposed funding source. N/A</td>
</tr>
<tr>
<td>iv.</td>
<td>What is the availability of funds? N/A</td>
</tr>
<tr>
<td>v.</td>
<td>When will the construction be completed and ready for occupancy? (Indicate semester and year). N/A</td>
</tr>
<tr>
<td>vi.</td>
<td>How will the construction be funded for the new space/facility? N/A</td>
</tr>
<tr>
<td>vii.</td>
<td>Indicate the status of the Project Concept N/A</td>
</tr>
</tbody>
</table>
Proposal submitted for consideration of project authorization to the Office of Facilities at the BOR. Has the project been authorized by the BOR or appropriate approving authority?

If existing space will be used, provide information in the space below.

Provide the building name(s) and floor(s) that will house or support the program. Indicate the campus, if this is part of a multi-campus institution and not physically located on the main campus. Please do not simply list all possible space that could be used for the program. We are interested in the actual space that will be used for the program and its availability for use.

Boyd Graduate Studies building (home of Computer Science) and Brooks Hall (4th and 5th Floor; home of Statistics) will house and support the program. Classroom spaces on south campus will be used for computer science classes, whereas classrooms in Caldwell Hall, Sanford Hall, and Park Hall will be used for Statistics classes.

List the specific type(s) and number of spaces that will be utilized (e.g. classrooms, labs, offices, etc.)

<table>
<thead>
<tr>
<th>No. of Spaces</th>
<th>Type of Space</th>
<th>Number of Seats</th>
<th>Assignable Square Feet (ASF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Classrooms</td>
<td>40</td>
<td>37,500</td>
</tr>
<tr>
<td>2</td>
<td>Labs (dry)</td>
<td>50</td>
<td>6,250</td>
</tr>
<tr>
<td></td>
<td>Labs (wet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meeting/Seminar Rooms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Assignable Square Feet (ASF) 43,750

If the program will be housed at a temporary location, please provide the information above for both the temporary space and the permanent space. Include a time frame for having the program in its permanent location.

Chief Business Officer or Chief Facilities Officer Name & Title | Phone No. | Email Address
|---------------------|-----------|------------------------|

Signature
| Note: A Program Manager from the Office of Facilities at the System Office may contact you with further questions separate from the review of the new academic program. |
### Appendix A: Sample Program of Study

<table>
<thead>
<tr>
<th>Corse Number</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>CSCI 1360</td>
<td>Foundations for Informatics and Data Analytics</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 1101</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>FYOS 1000</td>
<td>First Year Odyssey Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MATH 2250</td>
<td>Calculus I for Science and Engineering</td>
<td>4</td>
</tr>
<tr>
<td>HIST 2111 or</td>
<td>American History to 1865</td>
<td>3</td>
</tr>
<tr>
<td>HIST 2112</td>
<td>American History since 1865</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>15</td>
</tr>
<tr>
<td><strong>First Year</strong></td>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td>CSCI 1302</td>
<td>Software Development</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 1102</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2260</td>
<td>Calculus II for Science Engineering</td>
<td>4</td>
</tr>
<tr>
<td>PEDB</td>
<td>Physical Education</td>
<td>1</td>
</tr>
<tr>
<td>STAT 2010</td>
<td>Statistical Methods – NEW</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>15</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>Area II</td>
<td>Life Science with Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>General Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>POLS 1101</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>STAT 4230</td>
<td>Applied Regression Analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>13</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td><strong>Spring</strong></td>
<td></td>
</tr>
<tr>
<td>Area II</td>
<td>Physical Science without Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 2150-2150L</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>CSCI 2720</td>
<td>Introduction to Computational Science</td>
<td></td>
</tr>
<tr>
<td>MATH 3300</td>
<td>Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>STAT 4220</td>
<td>Applied Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Applied Experimental Designs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours</td>
<td>17</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>Area IV</td>
<td>World Language and Culture</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 3360</td>
<td>Data Science</td>
<td>4</td>
</tr>
<tr>
<td>STAT 4250 or</td>
<td>Applied Multivariate Analysis and Statistical Learning or Data Mining</td>
<td>3 or 4</td>
</tr>
<tr>
<td>CSCI 4380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT 4510</td>
<td>Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total Credits</td>
<td>13</td>
</tr>
</tbody>
</table>
Appendix B: Course Titles, Credits, Descriptions

BINF (PBIO) 4040/6040
Credits: 3
Course Title: Essential Biology for Quantitative Scientists
Course Description: The essential elements of biology necessary for a scientist with a background in the quantitative sciences to begin working in the biological sciences. Core biological concepts will be presented with the goal of getting computer scientists, physicists, and mathematicians started in understanding biology and finding productive areas of research inquiry.
Prerequisites: CHEM 1211 or CHEM 1411 or CHEM 1311H or permission of department

CSCI 1302
Credits: 4
Course Title: Software Development
Course Description: Software development techniques in an object-oriented computer language. An intermediate programming course emphasizing systems methods, top-down
ONE-STEP ACADEMIC PROGRAM PROPOSAL

design, testing, modularity, and structured techniques. Applications from areas of numeric and non-numeric processing and data structures.
Prerequisite: CSCI 1301-1301L

CSCI 1360
Credits: 4
Course Title: Foundations for Informatics and Data Analytics
Course Description: An introduction to concepts in scientific programming and Data Science using the Python language. Students are given hands-on opportunities to learn techniques applicable to quantitative analyses across a broad range of fields. Core programming concepts are taught in tandem with real-world applications.
Prerequisites: MATH 1113 or MATH 1113E

CSCI 2150-2150L
Credits: 4
Course Title: Introduction to Computational Science
Course Description: Basic topics of scientific computing that are necessary for science and engineering students. Solving mathematical problems by different numerical methods. Quantitative reasoning concepts will be emphasized in comparing and verification of the correctness of the solutions. Mathematical software packages will be used. This course is intended for freshman and sophomore students.
Prerequisites: MATH 1113 or permission of department

CSCI 2720
Credits: 4
Course Title: Data Structures
Description: The design, analysis, implementation, and evaluation of the fundamental structures for representing and manipulating data: lists, arrays, trees, tables, heaps, graphs, and their memory management.
Prerequisites: CSCI 1730 and [CSCI (MATH) 2610 or CSCI 2611]

CSCI 3030
Credits: 3
Course Title: Computing, Ethics, and Society
Course Description: Introduction to social and ethical issues relating to computer science and information technology. Topics include intellectual property, open source software, the digital divide, globalization, and professional ethics. Students should have a working knowledge of personal computing.
Prerequisites: ENGL 1050H or ENGL 1102

CSCI 3360
Credits: 4
Course Title: Data Science I
Course Description: A rigorous overview of methods for text mining, image processing, and scientific computing. Core concepts in supervised and unsupervised analytics, dimensionality reduction, and data visualization will be explored in depth.
Prerequisites: (CSCI 1301-1301L or CSCI 1360 or CSCI 1360E) and (MATH 2250 or MATH 2250E or CSCI 2150-2150L)

CSCI 4260 (NEW)
Credits: 4
Course Title: Data Security and Privacy
Course Description: This course will examine security and privacy issues related to protecting personal data in various environments (for examples: cloud computing, smart grid, and internet of things), cover the fundamentals and principles of data security and privacy, and explore computational and statistical techniques for constructing secure and private systems.
Prerequisites: CSCI 1302

CSCI 4360/6360
Credits: 4
Course Title: Data Science II
Course Description: An introduction to advanced analytics techniques in Data Science, including random forests, semi-supervised learning, spectral analytics, randomized algorithms, and just-in-time compilers. Distributed and out-of-core processing
Prerequisites: CSCI 3360

CSCI 4370/6370
Credits: 4
Course Title: Data Base Management
Course Description: The theory and practice of database management. Topics to be covered include efficient file access techniques, the relational data model as well as other data models, query languages, database design using entity-relationship diagrams and normalization theory, query optimization, and transaction processing.
Prerequisites: CSCI 2720

CSCI 4380/6380
Credits: 4
Course Title: Data Mining
Course Description: A broad introduction to data mining methods and an exploration of research problems in data mining and its applications in complex real-world domains. Approaches include association and classification rule learning, tree learning, neural network and Bayesian methods, support vector machines, clustering, and ensemble learning.
Prerequisites: CSCI 2720

CSCI 4050/6050
Credits: 4
Course Title: Software Engineering
Course Description: Full cycle of a software system development effort, including requirements definition, system analysis, design, implementation, and testing. Special emphasis is placed on system analysis and design. The design phase includes
development of a user interface. A large term project incorporates the full software life
cycle.
Prerequisites: CSCI 2720

CSCI 4150/6150
Credits: 4
Course Title: Numerical Simulations in Science and Engineering
Course Description: Computationally oriented, covering a wide range of topics that are
necessary for numerical simulation in science and engineering. Sequential and parallel
numerical methods will be introduced. Available symbolic and numerical software
packages (e.g., Matlab, Maple and MPI) and visualization tools will be used in the
mathematical simulations.
Prerequisites: (MATH 2250 and CSCI 1301-1301L) or permission of department

CSCI 4210/6210
Credits: 4
Course Title: Simulation and Modeling
Course Description: The modeling and simulation of existing or planned systems for the
purpose of studying their correctness, reliability, or performance. Topics to be addressed
include discrete-event simulation, continuous simulation, analysis and modeling
methodologies, animation, virtual reality, and Web-based simulation.
Prerequisites: CSCI 2720

CSCI 4470
Credits: 4
Course Title: Algorithms
Course Description: Algorithms, covering basic analysis techniques, basic design
techniques (divide-and-conquer, dynamic programming, greedy, and branch-and-bound),
basic graph algorithms, and NP-completeness.
Prerequisites: CSCI 2720

CSCI 4850/6850
Credits: 4
Course Title: Biomedical Image Analysis
Course Description: Introduction to the standard approaches to biomedical image
analysis, including basic concepts of biomedical imaging, basic algorithms, principles of
software systems, and their applications. Biomedical image analysis software tools will
be used in hands-on projects.
Prerequisites: CSCI 2720 or permission of department

CSCI 5007/7007
Credits: 3 hours. Repeatable for maximum 12 hours credit.
Course Title: Internship in Computer Science Business/Industry
Course Description: Internship in a professional setting allowing the student to integrate
his/her educational experience with real-world situations in software development,
database technology, hardware design, networks, etc.
Prerequisites: Permission of department

FINA 3001
Credits: 3
Course Title: Financial Management
Course Description: The basic concepts and analytical tools of finance in both corporate finance and investments. Topics include risk and return, financial institutions, efficient markets, valuation theory, capital budgeting, portfolio theory, cost of capital, and international finance. For non-Terry College of Business students.
Prerequisites: (ACCT 2101 or ACCT 2101E or ACCT 2101H or ACCT 1160) and (MIST 2090 or MIST 2090E or MIST 2190H or CSCI 1100-1100L)

MARK 3001
Credits: 3
Course Title: Principles of Marketing
Course Description: Examination of the ways organizations satisfy consumer and organizational needs and wants for products and services. Emphasis is placed on how the elements of the marketing mix are used to provide customer satisfaction in the marketing of goods and services, both domestically and internationally. For non-Terry College of Business students.

MARK 4350
Credits: 3
Course Title: Marketing Analytics
Course Description: A practitioner-oriented introduction to the methods of marketing analytics. Class examples and exercises are drawn from real-world applications, and students will be actively engaged in executing the methodologies using relevant software.
Prerequisites: MARK 3000 or MARK 3000E or MARK 3000H or MARK 3001 or MARK 3001H or MARK 3001E

MARK 4650
Credits: 3
Course Title: Integrated Marketing and Brand Communication
Course Description: Examination of how businesses and brands measure the effectiveness of digital marketing strategies. Emphasis is placed on using data to both evaluate a company’s level of digital marketing sophistication and to recommend digital marketing strategies.
Prerequisites: MARK 3000 or MARK 3000E or MARK 3000H or MARK 3001 or MARK 3001H or MARK 3001E

MATH 3300
Credits: 3
Course Title: Applied Linear Algebra
Course Description: Linear algebra from an applied and computational viewpoint. Linear equations, vector spaces, linear transformations; linear independence, basis, dimension;
orthogonality, projections, and least squares solutions; eigenvalues, eigenvectors, singular value decomposition. Applications to science and engineering.
Prerequisites: MATH 2260

MATH 4600/6600
Credits: 3
Course Title: Probability
Course Description: Discrete and continuous random variables, expectation, independence and conditional probability; binomial, Bernoulli, normal, and Poisson distributions; law of large numbers and central limit theorem.
Prerequisites: [(MATH 2270 or MATH 2500) and (MATH 2260 or MATH 3100)] or MATH 3510 or MATH 3510H

MATH (CSCI) 4690/6690
Credits: 3
Course Title: Graph Theory
Course Description: Elementary theory of graphs and digraphs. Topics include connectivity, reconstruction, trees, Euler's problem, hamiltonicity, network flows, planarity, node and edge colorings, tournaments, matchings, and extremal graphs. A number of algorithms and applications are included.
Prerequisites: CSCI(MATH) 2610 or MATH 3200

MATH (BINF) 4780/6780
Credits: 3
Course Title: Mathematical Biology
Course Description: Mathematical models in the biological sciences, systems, phase-plane analysis, diffusion, convective transport, bifurcation analysis. Possible applications will include population models, infectious disease and epidemic models, acquired immunity and drug distribution, tumor growth, and analysis of arterial flow dynamics.
Prerequisites: (MATH 2270 or MATH 2500 or MATH 3510 or MATH 3510H) and [(MATH 4700/6700 or MATH 2700) and permission of department]

MGMT 3001
Credits: 3
Course Title: Principles of Management
Course Description: Management functions and processes as applied to organizations and to individuals in organizations. Topics to be covered include strategy, job and organization design, ethics and social responsibility, diversity, global influences, leadership, motivation, human resource management, and organizational change. Other emerging managerial issues may be introduced.
Prerequisites: (ACCT 2101 or ACCT 2101E or ACCT 2101H or ACCT 1160) and (MIST 2090 or MIST 2090E or MIST 2190H or CSCI 1100-1100L)

MIST 5730
Credits: 3
Course Title: Advanced Data Management
ONE-STEP ACADEMIC PROGRAM PROPOSAL

Course Description: SGML, XML and associated technologies, XML implementations, XML tools, XML data management, business uses and applications of XML, data synchronization technologies, and managing data synchronization system.
Prerequisites: MIST 4600 and MIST 4610

PBIO (BINF) 4550/6550
Credits: 3
Course Title: Bioinformatics Applications
Course Description: State-of-the-art computational analyses of genome, DNA, RNA, and protein sequences will be presented, including programs for analyzing these data and the underlying analysis methods. Topics include sequence and structure databases; sequence assembly; sequence alignment; evolutionary analyses; gene function prediction; genome annotation; and applications for medical, agricultural and environmental genomics.
Prerequisites: BCMB 3600 or BCMB 3600H or GENE 3200-3200D

RMIN 4000
Credits: 3
Course Title: Risk Management and Insurance
Course Description: Risk identification, risk evaluation, and risk treatment methods. Consideration is given to both business and personal risks, with an emphasis on insurance as a risk management tool. Designed for non-majors as well as a basis for more advanced courses.
Prerequisites:

Course ID: STAT 2010 (NEW)
Credit Hours: 3
Course Title: Statistical Methods for Data Scientists
Course Description: In-depth introductory statistical methods, focusing on inference, alignment between study design and conclusions, and real-world decision making. Includes parametric and non-parametric approaches to one-and two-sample inference for means and proportions, Type I and II errors, power; chi-squared tests, and simple regression. Course will be implemented in R.
Prerequisite:

Course ID: STAT 4220
Credit Hours: 3
Course Title: Applied Experimental Designs
Course Description: Constructing and analyzing statistical experimental designs; blocking, randomization, replication and interaction; complete and incomplete block designs; factorial experiments; repeated measures; confounding effects; orthogonal arrays; computer experiments and simulations; design and analysis for generalized linear models. (NEW Course Description)
Prerequisite: STAT 4110H or STAT 4210

Course ID: STAT 4230/6230
Credit Hours: 3
Course Title: Applied Regression Analysis  
Course Description: Applied methods in regression analysis with implementation in R. Topics include linear regression with mathematical examination of model assumptions and inferential procedures; multiple regression and model building including collinearity, variable selection and inferential procedures; ANOVA as regression analysis; analysis of covariance; diagnostic checking techniques; generalized linear models including logistic regression. (NEW Course Description)  
Undergraduate Prerequisite: STAT 4210 or STAT 4110H  
Graduate Prerequisite: STAT 6210 or STAT 6310 or STAT 6315 or permission of department  
Course ID: STAT 4240/6240  
Credit Hours: 3  

Course Title: Sampling and Survey Methods  
Course Description: Design of finite population sample surveys. Stratified, systematic, and multistage cluster sampling designs. Sampling with probability proportional to size. Auxiliary variables, ratio and regression estimators, non-response bias.  
Undergraduate Prerequisite: STAT 4210 or STAT 4110H  
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department  
Course ID: STAT 4250/6250 (NEW)  
Credit Hours: 3  

Course Title: Applied Multivariate Analysis and Statistical Learning  
Course Description: An introduction to the methodology of multivariate statistics and machine learning for students specializing in statistics. Topics include inference on multivariate means, multivariate analysis of variance, principal component analysis, linear discriminant analysis, factor analysis, linear discrimination, classification trees, multi-dimensional scaling, canonical correlation analysis, clustering, support vector machines, and ensemble methods.  
Undergraduate Prerequisite: STAT 4230 and (MATH 3000 or MATH 3300)  
Graduate Prerequisite: (A course on linear algebra and either STAT 6420, STAT 6220, or STAT 6315) or permission of the department  
Course ID: STAT 4260/6260  
Credit Hours: 3  

Course Title: Statistical Quality Assurance  
Course Description: Basic graphical techniques and control charts. Experimentation in quality assurance. Sampling issues. Other topics include process capability studies, error analysis, SPRT, estimation and reliability.  
Undergraduate Prerequisite: STAT 4210 or STAT 4110H  
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department  
Course ID: STAT 4280/6280  
Credit Hours: 3
ONE-STEP ACADEMIC PROGRAM PROPOSAL

Course Title: Applied Time Series Analysis
Course description: Autoregressive, moving average, autoregressive-moving average, and integrated autoregressive-moving average processes, seasonal models, autocorrelation function, estimation, model checking, forecasting, spectrum, spectral estimators.
Undergraduate Prerequisite: STAT 4230/6230 and STAT 4360/6360
Graduate Prerequisite: [STAT 4360/6360 and (STAT 4230/6230 or STAT 6320 or STAT 6420)] or permission of department

Course ID: STAT 4290/6290
Credit Hours: 3
Course Title: Nonparametric Methods
Course description: Techniques and applications of nonparametric statistical methods, estimates, confidence intervals, one sample tests, two sample tests, several sample tests, tests of fit, nonparametric analysis of variance, correlation tests, chi-square test of independence and homogeneity, sample size determination for some nonparametric tests.
Undergraduate Prerequisite: STAT 4210 or STAT 4110H
Graduate Prerequisite: STAT 6220 or STAT 6310 or STAT 6315 or permission of department

Course ID: STAT 4510/6510
Credit Hours: 3
Course Title: Mathematical Statistics I
Course description: Concepts and basic properties of some special probability distributions, independence, moment generating functions, sampling distributions of statistics, limiting distributions.
Prerequisite: MATH 2270 or MATH 2500

Course ID: STAT 4530 / CSCI 4530 (NEW)
Credit Hours: 3
Course Title: Estimation Methods for Data Science
Course description: Mathematical and computational approaches to estimation and inference from frequentist and Bayesian perspectives. Sampling distributions; maximum likelihood estimation; computational maximization of likelihoods, including grid search, Newton-Raphson methods; likelihood ratio tests. Simulations of power and error rates. Introduction to Bayesian inference; prior and posterior distributions; model building; sampling from the posterior distribution; MCMC algorithms.
Prerequisite: CSCI 3360, STAT4510

Course ID: STAT 4620/6620 (NEW)
Credit Hours: 3
Course Title: Applied Categorical Data Analysis
Course description: This is an introduction to the methodology of categorical data analysis and its applications. The course covers descriptive and inferential methods for contingency tables, an introduction to generalized linear models, logistic regression, multinomial response models, regression for counts, and methods for categorical data from matched pairs.
Undergraduate Prerequisite: STAT 4220 and STAT 4230 and STAT 4510
Graduate Prerequisite: STAT 6420 and STAT 6510

Course ID: STAT 4710/6710
Credit Hours: 3
Course Title: Introduction to Probability Theory I
Course description: Probability axioms, combinatorial analysis, random variables, univariate and multivariate distributions, expectations, conditional distributions, independence, and laws of large numbers.
Prerequisite: MATH 2500 or MATH 2270

Course ID: STAT 4720/6720
Credit Hours: 3
Course Title: Introduction to Probability Theory II
Course description: Central limit theorems, random walks, Markov chains and processes, Brownian motion, branching and renewal processes, diffusion processes and queueing processes and applications.
Prerequisite: STAT 4710/6710

Course ID: STAT 4990 / CSCI 4990 (NEW)
Credit Hours: 3
Course Title: Data Science Capstone Course
Course description: Provides students with an exposure to advanced methods and technologies in Data Science including data acquisition, data quality, Big Data management and analytics, data mining, data security and privacy, and introduces the students to Data Science experience to a real-world problem. In addition, effective oral and written communication of technologies, methods and results are emphasized.
Prerequisite: CSCI 4360/6360, CSCI 4370/6370 , STAT4220, STAT4230

STAT 5700/7700
Credit Hours: 3 hours. Repeatable for maximum 15 hours credit
Course Title: Internship in Statistics
Course description: Supervised practicum in a government agency or industry site
Prerequisites: None