



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

DEPARTMENT OF STATISTICS
AND OPERATIONS RESEARCH

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October 12, 2016

James Thompson
Associate Dean for Undergraduate Curricula
3018 Steele Building
Campus Box 3504
Chapel Hill, NC 27599-3504

Dear Dean Thompson:

We are writing to request a number of changes be made in our undergraduate curriculum.

The most important change concerns the names of the only Major and the Minor offered through the Department of Statistics and Operations Research (STOR). Currently, STOR offers a Major and a Minor in Mathematical Decision Sciences (MDS) and we request that their names be changed to *Major in Statistics and Analytics* and *Minor in Statistics and Analytics*, respectively. Consequently, we would also like to replace the current codes for the Mathematical Decision Sciences major with *BSSA* and *BCRSA*.

The MDS program grew out of the Mathematical Sciences undergraduate curriculum, which started in 1970s. The curriculum was operated and staffed by the Mathematics department but it was an interdisciplinary curriculum with five individual tracks and involved four separate departments: Mathematics, Computer Science, Statistics, and Operations Research. (STOR was two separate departments until July 2003.) With the separation of Computer Science and Mathematics departments from the curriculum in the late 1990s and early 2000s, a renaming of the curriculum became necessary, and partially owing to the curriculum's origins in Mathematical Sciences, it has been renamed as "Mathematical Decision Sciences." The new name of the program was the result of the two remaining departments' (Operations Research and Statistics) efforts at the time to come up with a name that not only described the set of skills the students of this program would be trained in but was also acceptable by each department involved. "MDS" was not (and still is not) a name that many outside UNC used but one on which there was consensus.

Since the start of the program, there has been a number of important developments, which led us to rethink the program's name. Within the last decade, thanks to the

increased prominence of data literacy and data informed decision making in many areas, the methodologies that are taught under the MDS program, which are almost exclusively rooted in Statistics and Operations Research disciplines, have become increasingly more popular. This increased popularity led to a transformation in the curricula of the programs where these subjects are taught and introduced new terms to our lexicon. The STOR department has been keeping up with these developments by both offering new courses and revising the existing ones. However, the name “MDS”, fails to convey to our prospective students, the companies which are potential employers of our graduates, and the graduate programs at other universities what exactly we teach our students. We believe that renaming the program as *Statistics and Analytics* will effectively address this problem.

While the reason for including *Statistics* in the new name might be obvious, an explanation might be warranted as to why *Analytics* is chosen over *Operations Research*. The Institute for Operations Research and Management Sciences (INFORMS), the largest professional organization in the world for operations research, defines operations research as “a discipline that deals with the application of advanced analytical methods to help make better decisions.” Despite the fact that operations research has been around since World War II and the methods that the discipline uses have become increasingly more prominent, the name itself has a serious name-recognition problem. For those outside the field, the name is understandably opaque. Over the years, the field has struggled with this problem and considered various alternatives to the name “operations research” but no viable alternative has emerged. Within the last decade, however, it has been increasingly common to use the word “analytics,” to refer to the collection of methodologies operations research embodies. In fact, given the way the word “analytics” is typically used, it would not be entirely correct to claim that “operations research” and “analytics” are synonyms. INFORMS defines analytics as “the scientific process of transforming data into insight for making better decisions.” Thus, “analytics” and “operations research” are not exactly the same. They are, however, very closely related as analytics as a discipline can be seen as dealing with the applications of operations research methods in a way that is informed by the available data. Because of analytics’ emphasis on data, it would be premature or simply incorrect to claim that analytics is the new name for operations research but considering our undergraduate program’s clear strength in and focus on statistics and data analysis, the name “analytics” perfectly captures the set of skills our students are trained in. In short, the proposed name *Statistics and Analytics* has the advantage of being a more fitting and contemporary description of our program and the potential to increase the program’s visibility by better highlighting its prominence.

The second requested change concerns STOR 465, one of the Group A courses for the Major and the Minor. The current prerequisite for this course is STOR 445. We would like to ask that STOR 445 be removed as a prerequisite and STOR 155 and

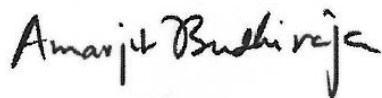
STOR 435 both be added as prerequisites instead. A review of the topics covered in STOR 465, STOR 445, and STOR 435 revealed that STOR 435 provides sufficient probability background for students to take STOR 465 but that students should also have a basic statistics background (at the level of STOR 155), a requirement that is almost always satisfied by students who are interested in taking the class, but is nevertheless not guaranteed.

The third requested change concerns the addition of a new course, STOR 320: Introduction to Data Science in our curriculum. This course has been officially submitted for approval and, if approved, will be offered in Spring 2018. At this stage, we do not propose any changes in the MDS requirements associated with this new course. However, plans are under way to make this course a permanent part of the MDS curriculum starting with the 2018-2019 academic year with the proposed changes to be submitted during Fall 2017.

The requested changes are highlighted in the attached text on the requirements for Majoring and Minor in Mathematical Decision Sciences, as the text now appears in the Undergraduate Bulletin. Do not hesitate to contact us at budhiraj@email.unc.edu or ziya@email.unc.edu if you have any questions or need additional information. Thank you for your attention to this matter.

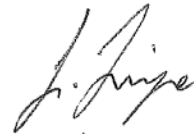
Sincerely,

Amarjit Budhiraja



Chair,
Department of Stat. & O.R.

Serhan Ziya



Director of Undergrad. Studies
Department of Stat. & O.R.

Department of Statistics and Operations Research

- Use this document to submit curriculum changes for the 2017-2018 academic year.

~~Mathematical Decision Sciences Major~~ Statistics and Analytics, B.S.

Core Requirements

- MATH 547
- STOR 415, 435, 445, and 455
- Five courses from Group A and Group B, including at least three courses from Group A
 - Group A: STOR 305, 465, 471, 472, 555, 556, 565
 - Group B: BIOS 511, 664; BUSI 403, 408, 410, 532, 533; COMP 401, 410, 521; ECON 410, 420, 511; INLS 523; MATH 383, 521, 522, 523, 524, 548, 566

Additional Requirements

- COMP 116 (110 may be substituted)
- MATH 231, 232, 233
- STOR 155, and STOR 215 or MATH 381

~~Mathematical decision sciences~~ Statistics and Analytics majors must complete 123 academic hours. They also must attain at least a grade of C (not C-) in 18 hours of the courses listed under Core Requirements.

Course Sequencing

In the first two years, students are required to complete the standard calculus sequence as well as introductory courses in statistics, operations research, and computer science. At the beginning of their third year, students take advanced courses in statistics, probability, and operations research. They have a great deal of flexibility in tailoring their program to meet their individual interests.

First and Second Years

- COMP 116 (110 may be substituted)
- MATH 231, 232, 233

- STOR 155*, and STOR 215* or MATH 381

Third and Fourth Years

- MATH 547
- STOR 415, 435, 445, 455
- Five courses from the following two groups of courses, including at least three from Group A**
 - Group A: STOR 305, 465, 471, 472, 555, 556, 565
 - Group B: BIOS 511, 664; BUSI 403, 408, 410, 532, 533; COMP 401, 410, 521; ECON 410, 420, 511; INLS 523; MATH 383, 521, 522, 523, 524, 548, 566

It is recommended that all ~~mathematical decision sciences~~ [statistics and analytics](#) majors take ECON 101 as a social and behavioral sciences Approaches course. Students interested in the actuarial profession also should take BUSI 101 as a general elective.

*Prospective ~~mathematical decision sciences~~ [statistics and analytics](#) majors are encouraged to take STOR 155, and STOR 215 or MATH 381 as early as possible in their college careers. Each has a prerequisite of MATH 110 or its equivalent and may be taken before, or concurrently with, MATH 231.

**Students wishing to prepare for an actuarial career should include STOR 471, 472, 555, and 556 from Group A in their program and take ECON 410 and 420 and BUSI 408 and 588 as electives. Students who plan to attend graduate school in [statistics, operations research, analytics, or a related field](#), ~~the mathematical decision sciences (e.g., in operations research or statistics)~~ should include in their program COMP 401, STOR 555, 565, and MATH 521.

Dual Bachelor's–Master's Degree Program

The Department of Statistics and Operations Research offers a dual bachelor's–master's degree program. Interested students should consult the program director.

~~Mathematical Decision Sciences~~ [Statistics and Analytics](#) Minor

- STOR 155, and STOR 215 or MATH 381
- Three courses from among STOR 305, 415, 435, 445, 455, 465, 471, 472, 555, 556, and 565