1/15/2008~~1/14/2008~~
PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

EP.08.48

Proposal to Modify the Master of Science Degree in Statistics

Sponsor

Department of Statistics
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Brief description

The Department of Statistics wishes to modify its MS degree to achieve greater flexibility for students, especially concerning applied and interdisciplinary study, as well as to update the list of choices to include several new courses the department has created in the past several years.

The Appendix to this proposal compares the current and proposed requirements in detail. The most notable changes are

1. The current MS requires both parts of the Mathematical Statistics sequence, STAT 510 and 511. The proposed MS requires just STAT 510.

2. The current MS has no option for taking courses outside of the Statistics Department. The proposed MS allows three outside courses.

The proposed new requirements for the MS follow:

Prerequisites:

MATH 415 – Applied Linear Algebra
MATH 241 -- Calculus III (Calculus through vector calculus)
STAT 400 -- Statistics and Probability I

Course Requirements:

A total of 32 or 36 hours (8 or 9 courses), subject to these conditions:

a) Required courses:

(i) STAT 410 -- Statistics and Probability II. This requirement can be waived if student has already taken the course, or a course equivalent to it at another institution. (4 hours)

(ii) STAT 425 -- Applied Regression and Design (4 hours)

(iii) One of the following (4 hours):

STAT 424 -- Analysis of Variance
STAT 426 -- Sampling and Categorical Data
STAT 429 -- Time Series Analysis
STAT 430 -- Topics in Applied Statistics
STAT 578 -- Topics in Statistics

(iv) STAT 510 -- Mathematical Statistics I (4 hours)

b) Five elective courses (20 hours total). At least 8 hours must be from the following list, and any course used to satisfy a (iii) may not also be used to satisfy b. Up to 12 hours may be from other units on campus, subject to the approval of the Graduate Advisor. All courses below are four hours except STAT 590 and STAT 593, which have a variable number of hours.

STAT 424 -- Analysis of Variance
STAT 426 -- Sampling and Categorical Data
STAT 427 -- Statistical Consulting
STAT 428 -- Statistical Computing
STAT 429 -- Time Series Analysis
STAT 430 -- Topics in Applied Statistics
STAT 432 -- Topics in Biostatistics
STAT 440 -- Data Management
STAT 448 -- Advanced Data Analysis
STAT 458 -- Math Modeling in Life Sciences
STAT 466 -- Image Analysis
STAT 511 -- Mathematical Statistics II
STAT 525 -- Computational Statistics
STAT 530 -- Bioinformatics
STAT 542 -- Statistical Learning
STAT 553 -- Probability and Measure I
STAT 554 -- Probability and Measure II
STAT 555 -- Applied Stochastic Processes
STAT 563 -- Information Theory
STAT 571 -- Multivariate Analysis
STAT 575 -- Large Sample Theory
STAT 578 -- Topics in Statistics
STAT 587 -- Hierarchical Linear Models
STAT 588 -- Covariance Structures and Factor Models
STAT 590 -- Reading Course (at most four hours total for this course)
STAT 593 – Internship (at most four hours total for this course)

c) Experience in applying statistics. Can be satisfied by one of the following:

(i) Completing STAT 427 – Statistical Consulting; or
(ii) Completing an approved internship (STAT 593—Internship); or
(iii) For students previously or concurrently admitted to another graduate program at the University of Illinois that uses statistics, completing at least 12 graduate hours (3 courses) in that program. The 12 hours would not count toward the M.S. degree in Statistics.

If STAT 427 or STAT 593 is taken to meet this requirement, those hours can count toward the 20 described in section b.

d) At least 12 hours (3 courses) must be taken at the 500 level.

Justification

When the Department of Statistics was created in 1985, it offered the MS degree in Statistics, which consisted of eight courses from the Statistics Department. This program has remained essentially unchanged until now. Many new applied courses have been added to the Statistics curriculum, including Advanced Data Analysis (STAT 440), Data Management (STAT 448), Image Analysis (STAT 466), Bioinformatics (STAT 530), and Statistical Learning (STAT 542). It is important for Statistics MS students to have the opportunity to incorporate these courses and other applied and interdisciplinary courses into their programs.

The proposed MS program provides the student with a solid grounding in the following:

Theoretical foundations: STAT 410 (Statistics and Probability II) and STAT 510 (Mathematical Statistics I).

Linear models: STAT 425 – Applied Regression and Design.

Further methodology: STAT 424 – Analysis of Variance; STAT 426 – Categorical Data; STAT 429 – Time Series; STAT 430 – Topics in Applied Statistics; or STAT 578 – Topics in Statistics.

Applications: STAT 427 – Statistical Consulting; or an internship; or substantial coursework in an area of application in which statistical science plays an important role.

Beyond these basics, the program allows enough flexibility for the student to further concentrate on theory and methods (e.g., for students contemplating eventual enrollment in a Ph. D. program in statistics), or on a wide range of applications, or in a

particular area of application (e.g., psychology, bioinformatics, economics, etc.). In addition to Statistics students, the program will be attractive and valuable as a supplementary degree for students whose primary graduate affiliation is with a Ph. D. program at UIUC in a field that uses statistics.

Budgetary and Staff Implications

We do not expect significant changes in overall enrollment in our courses or in other departments' courses as a result of this proposal.

There will likely be some shifting of enrollment within Statistics courses:

> Now, both STAT 424 and 425 are required of MS students. The proposed program requires that everyone take STAT 425, while STAT 424 is on the list of electives. Thus more people will take STAT 425 and fewer will take STAT 424. We are offering STAT 425 twice a year instead of only once a year starting in the 2007-2008 academic year, which should accommodate the shift in enrollment. [The increase to twice a year was slated to occur anyway, not because of this MS proposal.]
>
> Now, MS students must take both STAT 510 and STAT 511. The new requirements have everyone taking STAT 510, while STAT 511 is on the list of electives. As a result, fewer MS students will take STAT 511 and more will take other electives; these effects should approximately cancel out.
>
> STAT 427 is currently required of all MS students. The new requirements provide students the option of using internships or coursework in another graduate program that uses statistics to place out of STAT 427. The coursework option is for graduate students pursuing degrees in other fields who have been approved to pursue a concurrent MS in Statistics. Thus enrollment in STAT 427 will decrease moderately, while the electives will see a corresponding higher total.

Because the total number of students is not expected to change, there will not be additional strains on the computers, libraries, or other facilities.

Clearances:

Sponsor: Adam T. Martinez Date: 09-17-2007

Department Chair: Douglas G Simpson Date: 9-17-07

Dean of College: [signature] Date: 11-21-07

Graduate College: [signature] Date: 1/28/08

1/15/2008~~1/14/2008~~
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Statement for Programs of Study Catalog:

Retain the current entry, with substitution of the following paragraph.

Master of Science – Degree Requirements

The M.S. in Statistics requires 32 to 36 graduate hours of graduate coursework, covering both theoretical and applied material. STAT 410 is required, but this requirement can be waived if the student has taken an equivalent course at another institution. STAT 425 and STAT 510 are required, and at least one of the following courses is also required: STAT 424, STAT 426, STAT 429, STAT 430, STAT 578. Five additional courses, including at least two from a specified list of Statistics courses numbered 424 and above, are required; up to three of the five may be from other units on campus, subject to the approval of the Graduate Advisor. Experience in applying statistics is also required; this requirement can be satisfied by completing STAT 427—Statistical Consulting, or completing an approved internship, or completing at least 12 graduate hours (3 courses) in a single graduate program (other than Statistics) that uses statistics (these 12 hours do not count toward the M.S. degree in Statistics). At least 12 hours (3 courses) must be at the 500-level. There is no language or thesis requirement, and there are no comprehensive examinations.

Effective Date: Fall 2008

Appendix: Comparison of current and proposed degree requirements

	Current Masters	Proposed Masters
Hours Required	32 (8 courses)	32 to 36
Prerequisites	MATH 415 or 418 (Linear Algebra) MATH 380 (Advanced Calculus) STAT 400-410 (Stat. and Prob. I & II) Knowledge of a computer programming language	MATH 415 or 418 MATH 241 STAT 400
Requirements		STAT 410, or equivalent course taken elsewhere
	STAT 424 (Analysis of Variance) STAT 425 (Applied Regression)	STAT 425
	STAT 510-511 (Mathematical Statistics I and II)	STAT 510
	STAT 427 (Statistical Consulting)	STAT 427 or internship or substantial coursework in a graduate program (other than Statistics) that uses statistics
	STAT 426 (Categorical Data)	At least one of STAT 424, STAT 426, STAT 429 (Time Series), STAT 430 (Topics in Applied Stat.), STAT 578 (Topics in Statistics)
	Two more courses from list of STAT 424+ courses, for total of eight	At least two more from list of STAT424+ courses, for total of five
		Three other courses, not necessarily from STAT
	At least three courses must be 500-level	At least three courses must be 500-level