

PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

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TITLE OF THE PROPOSAL:

Modifications to the Statistics and Computer Science curriculum in the College of Liberal Arts and Sciences

SPONSOR:

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BRIEF DESCRIPTION:

We are proposing to add two required courses at the 200 level to the graduation requirements for this major: CS 241 (Systems Programming) and CS 242 (Programming Studio). The six hours added in this way are to be taken from free electives. In addition, the current Stats 100 requirement is to be changed to require Stats 200. Finally, MATH 415 (Linear Algebra) is to be required instead of being grouped as an option with MATH 418 (was Advanced Linear Algebra; now Intro to Abstract Algebra II).

JUSTIFICATION:

The major degree programs for students in Computer Science is the Computer Science degree in the College of Engineering; about 80% of undergraduates advised by CS are in that program. The remaining 20% are in two LAS majors: Math/CS and Stats/CS, of which Math/CS is by far the larger.

As the name implies, the Stats/CS degree is a mixed program, with a large number of upper-level Statistics courses. By contrast, the Computer Science degree requires many more upper-level CS courses. The CS department is concerned that the strength of the Stats/CS curriculum, in its Computer Science component, not be too much lower than that of the Computer Science degree. One way we have maintained that is to keep the 100- and 200-level requirements identical for the two programs. However, a recent change in the Computer Science curriculum added the two above-named courses – CS 241 and 242 – as requirements. We are proposing to restore the traditional parity between the two majors in lower-level courses.

We believe these two courses are important for several reasons. The first is that they will build students skills in programming at an early stage in their careers. The Programming Studio (CS 242) is a unique course with very small classes in which students can work intensively on their programming skills. This is important to the students because it can enable them to more fully participate in projects in the department and also gives them a greater ability to find internships. More important, though, is its impact on the higher-level courses in CS: having the strong foundation provided by the entire set of 100- and 200-level courses both allows the student to learn more conceptual material in the higher-level courses, and allows the instructor to assign deeper homeworks. Needless to say, we do not wish to have these benefits confined to CS students. Hence, this proposal

The change from Stat 100 to Stat 200 reflects the creation of the new course, Stat 200, with the express purpose of being a stronger introduction to statistics than Stat 100. Stat 200 is already required of Statistics majors.

The proposal to make MATH 415 a requirement reflects the lack of a suitable alternative; formerly students chose between MATH 415 and MATH 418 Advanced Linear Algebra to satisfy Group I of the 400-level Stats, CS and Math electives. As Intro to Advanced Algebra II, however, MATH 418 is no longer related in content or equivalent in prerequisites.

BUDGETARY AND STAFF IMPLICATIONS:

Statistics and Computer Science is a very small major, with fewer than 20 students at this time. The two new courses are already required of a much larger group of students, namely those in Computer Science. Adding the Stats/CS students will have no measurable impact on resources.

This change should have no effect on enrollment in any other department's courses, nor any impact on resources, such as computer labs, outside of the CS Department itself.

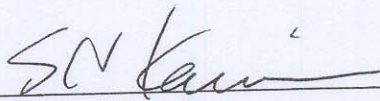
We have discussed the changes with the Statistics department, and they have approved them.

GUIDELINES FOR UNDERGRADUATE EDUCATION:

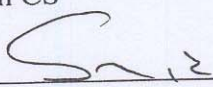
The revised curriculum better meets the guidelines for undergraduate education than the current curriculum, in several ways:

- The new required courses will help students build basic skills in speaking, listening, and creatively engaging problems in computation. In particular, the second of these courses (CS 242, Programming Studio) includes a large component of oral presentation and group interaction currently lacking in the Stats/CS curriculum.
- The new courses will crucially improve our student's professional education, making them much better programmers. At the same time, these are not narrowly focused courses. CS 241 (Systems Programming) covers material that has been in our curriculum, at a higher level, for many years. (We join most of our peer institutions in requiring this earlier in the curriculum.) CS 242 (Programming Studio) will help students to build programming skills by emphasizing the need to *reflect on*, and *explain*, their own practice in programming.
- By building students' skills in programming, these courses will enable our upper-level courses to proceed at a higher, more abstract, level, freed from the need to teach our students low-level skills. (Indeed, the initial impetus for developing these courses was the common complaint from instructors that, in higher-level, conceptually-oriented courses, our students' weak programming skills became a barrier to their learning high-level concepts.)

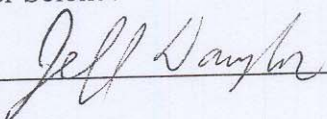
CLEARANCES: (Clearances should include signatures [sponsor, department head, dean] and dates of approval)

Samuel N. Kamin 
Director of Undergraduate Programs in CS

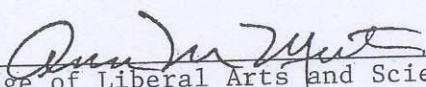
Date 3/31/06

Marc Snir 
Head, Department of Computer Science

Date 3/17/06

Department of Statistics 

Date 10/20/06


College of Liberal Arts and Sciences

Date 11/27/06

Office of the Provost

Date _____

Programs of Study - see attached
Proposed effective date: Fall 2007

Statistics and Computer Science

www.stat.uiuc.edu or www.cs.uiuc.edu

This major is sponsored jointly by the Departments of Statistics and Computer Science. It is designed to prepare students for professional or graduate work in statistics and computer science. See also Computer Science, Mathematics, Mathematics and Computer Science, and Statistics.

Major in Sciences and Letters Curriculum

E-mail: stat@uiuc.edu or academic@cs.uiuc.edu

Degree title: Bachelor of Science in Liberal Arts and Sciences

Minimum required major and supporting course work normally equates to 71-72 hours

General education: The LAS General Education requirements are set up so students automatically complete the Campus General Education requirements.

Minimum hours required for graduation: 120 hours

Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science, Statistics, and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction.

Hours	Requirements
11-12	Calculus through MATH 241–Calculus III
3	MATH 415–Linear Algebra
29	Required Computer Science Courses:
	CS 125–Intro to Computer Science
	CS 173–Discrete Structures
	CS 225–Data Structure & Softw Prin
	CS 231–Computer Architecture I
	CS 232– Computer Architecture II
	CS 241–Systems Programming
	CS 242– Programming Studio
	CS 257–Numerical Methods
	CS 273–Intro to Theory of Computation
10	Required Statistics courses:
	STAT 400–Statistics and Probability I

	STAT 410–Statistics and Probability II
	STAT 428–Statistical Computing
18	Other Specified Requirements: At least six other statistics, computer science, and mathematics courses, with at least one chosen from each of the following groups:
	Group I: Analysis and Differential Equations
	MATH 347–Fundamental Mathematics
	MATH 441–Differential Equations
	MATH 444–Elementary Real Analysis
	MATH 447–Real Variables
	Group II: Foundations
	CS 473–Algorithms
	CS 475–Formal Models of Computation
	Group III: Software
	CS 421–Programming Lang and Compilers
	CS 423–Operating Systems Design
	Group IV: Application software
	CS 411–Database Systems
	CS 418–Computer Graphics
	CS 446–Machine Learning & Pattern Rec
	Group V: Applied statistics
	STAT 420–Methods of Applied Statistics
	STAT 424–Analysis of Variance
	STAT 425–Applied Regression and Design
	Group VI:
	STAT 200 ¹ –Statistics or 300 or 400-level statistics course, with STAT 426 recommended

1. Taken during the first 60 hours of course work (to provide the student with an early introduction to statistical concepts). The latter option is designed for students who wish to take STAT 400 before the junior year.

Twelve hours of 300 and 400-level courses must be taken on this campus.

All foreign language requirements must be satisfied.

Typical Schedule for Statistics & Computer Science

The following is an example of a schedule taken by students in the statistics and computer science program in the College of Liberal Arts and Sciences.

Hours	Requirements
16	First Year - First Semester
1	CS 100 Freshman Orientation
3	CS 173 Discrete Structures
4	MATH 221 Calculus I
4	Foreign language I
4	Composition I
14	First Year - Second Semester
3	STAT 200 Statistical Analysis
3	MATH 231 Calculus II
4	CS 125 Intro to Computer Science
4	Foreign language II
16	Second Year - First Semester
3	CS 231 Computer Architecture I
4	CS 225 Data Structure & Softw Prin
4	MATH 241 Calculus III
4	Foreign language III
1	Elective
14	Second Year - Second Semester
3	CS 232 Computer Architecture II
3	CS 241 Systems Programming
4	STAT 400 Statistics and Probability I
4	Foreign language IV
15	Third Year - First Semester
3	CS 242 Programming Studio
3	STAT 410 Statistics and Probability II
3	MATH 415 Linear Algebra
3	General education elective

3	Elective
15	Third Year - Second Semester
3	CS 257 Numerical Methods
3	CS 273 Intro to Theory of Computation
3	STAT 428 Statistical Computing
3	Group III elective
3	General education elective
15	Fourth Year - First Semester
3	Group I elective
3	Group II elective
3	Group V elective
6	General education electives
15	Fourth Year - Second Semester
3	Group IV elective
12	General education electives
120	Total