APPROVED BY SENATE
03/07/2016

EP.16.60 Final

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Proposal to the Senate Educational Policy Committee

PROPOSAL TITLE: Proposal to revise the Mathematics and Computer Science BSLAS in the College of Liberal Arts and Sciences.

SPONSOR: Lenny Pitt, Professor and Director of Undergraduate Programs, Computer Science Tel: 333-7505, Email: pitt@illinois.edu. Scott Ahlgren, Professor and Associate Chair, Mathematics, sahlgren@illinois.edu

COLLEGE CONTACT: Karen Carney, Associate Dean for Courses and Degree Programs, College of Liberal Arts & Sciences, 333-6622, kmcarney@illinois.edu.

BRIEF DESCRIPTION:

This is a major revision that includes a variety of changes:

1. Replace and discontinue CS 242 with new course CS 126
2. Replace CS 231 + CS 232 requirement with CS 233
3. Replace CS 373 + CS 473 requirement with new course CS 374
4. Add new course CS 361 as a recommended alternative to the choice of MATH 461 or MATH 463/STAT 400
5. Add courses to the Group V list (from which students choose one) Additional courses are: CS 476, CS 477, CS 481, and CS 482.
6. Elimination of the option of taking CS 423 instead of CS 421.
7. Explicitly recommend CS 100 Freshman Orientation (1hour)

JUSTIFICATION:

The CS undergraduate degree in the College of Engineering is proposing a new curriculum, and the above changes will bring the foundational CS coursework in the Math & CS degree program in LAS in line with that in the CS degree program in ENGR. Specific reasons for the above changes:

1. CS 242 is taken too late in the current curriculum to allow students to benefit from the instruction on good coding practice. Also, CS 126 will introduce a number of topics that are currently not covered in the curriculum Finally, CS 126, placed between software/programming courses CS 125 and CS 225, will engage students in the practice of programming during their second semester, where there is currently a hole in the curriculum resulting in students going eight months or more without programming following their initial exposure.
2. CS 233 combines material from both CS 231 and CS 232, while eliminating an undue focus on digital logic more relevant to computer engineering. CS 233 also includes

deeper coverage of important topics such as parallel architectures. The reduction of two credit hours (3+3 to 4) will also allow students to take more advanced technical electives.

3. CS 373 contained dated material that was of dubious value for current CS students. CS 473 was taken too late in the curriculum for other courses to benefit, because CS 373 was a prerequisite. The new four-hour CS 374 blends together topics from these two computer science theory courses, presenting them in a more unified manner, and accessible earlier in the curriculum. The reduction of two credit hours (from 3+3 to 4) will also allow students to take more technical electives.
4. Modern computer science practice increasingly relies on probabilistic and statistical methods to deal with large amounts of data. It has become a sufficiently important topic that it is desirable to introduce this material earlier in the curriculum than MATH 461 or STAT 400 could (since the latter two require MATH 241 instead of just MATH 221 and 225). It is also important to focus on the particular topics that are relevant to CS, and to have students solve real-world problems via programming applied statistical and probabilistic methods.
5. The addition of these courses allows students to take an alternative upper-level CS course that has a strong mathematics component as an alternative to MATH 414 (logic), CS 473 (Algorithms) and CS 475 (Formal Models of Computation)
6. Requiring CS 421 (Programming Languages and Compilers), and not CS 423 (Operating Systems Design) as an alternative, was a change in the CS/Engineering curriculum from a number of years ago, and this change was overlooked and unimplemented in the Math & CS curriculum. Much of the material that was important from CS 423 at that time migrated to (the then new) CS 241, which is now required of all students, obviating the need for CS 423, and making it less pressing as an alternative to CS 421. Material from CS 421 is viewed as more central/essential than that from CS 423, especially since students now take CS 241.
7. Students have been advised to take the optional CS 100. We are simply listing this recommendation explicitly in the Academic Catalog.

BUDGETARY AND STAFF IMPLICATIONS:

1) Resources

   a. How does the unit intend to financially support this proposal?

      The proposal is not for a new program, but for revenue-neutral modification of an existing one, so it will be supported in the future as it has been in the past.

   b. How will the unit create capacity or surplus to appropriately resource this program? If applicable, what functions or programs will the unit no longer support to create capacity?

      There is no net gain in the number of courses required, and teaching resources will be shifted from previously taught discontinued courses to the new ones proposed. No other additional resources are required other than those associated with our natural growth.

   c. Will the unit need to seek campus or other external resources? If so, please provide a summary of the sources and an indication of the approved support.

No campus or external resources will be needed due to the revision in program

d. Please provide a letter of acknowledgment from the college that outlines the financial arrangements for the proposed program.

2) Resource Implications

a. Please address the impact on faculty resources including the changes in numbers of faculty, class size, teaching loads, student-faculty ratios, etc.

No additional faculty resources will be needed due to this revision.

b. Please address the impact on course enrollment in other units and provide an explanation of discussions with representatives of those units. *(A letter of acknowledgement from units impacted should be included.)*

There may be a drop in Math & CS majors electing MATH 461 or STAT 400, as some will elect the recommended CS 361. (No more than 20 per semester.) The math and statistics departments are aware of these changes.

c. Please address the impact on the University Library *(A letter of estimated impact from the University Librarian must be included for all new program proposals. If the impact is above and beyond normal library business practices, describe provisions for how this will be resourced.)*

None anticipated

d. Please address the impact on technology and space (e.g. computer use, laboratory use, equipment, etc.)

None anticipated

DESIRED EFFECTIVE DATE:

Fall, 2016

STATEMENT FOR ACADEMIC CATALOG:

Mathematics

http://www.math.illinois.edu Department Chair:
Matthew Ando
Department Office: 273 Altgeld Hall, 1409 West Green, Urbana, (217) 333-3350

Computer Science

http://www.cs.illinois.edu
Interim Head of Department: Rob A. Rutenbar

Department Office: 2232 Siebel Center, 201 N. Goodwin Avenue, Urbana, (217) 333-3373

Mathematics and Computer Science

www.math.illinois.edu or www.cs.illinois.edu
This major is sponsored jointly by the Departments of Mathematics and Computer Science. Also see Computer Science, Mathematics, and Statistics and Computer Science. The Mathematics and Computer Science major is designed for students who would like a strong foundation in computer science, coupled with significant advanced coursework in mathematics. The major prepares students for professional or graduate work in mathematics and computer science, and for applications of computing in the sciences that involve mathematics.

Major in Sciences and Letters Curriculum

E-mail: academic@cs.illinois.edu or math@illinois.edu Degree title:

Bachelor of Science in Liberal Arts and Sciences

Minimum required major and supporting course work normally equates to 70 hours.

General education: Students must complete the Campus General Education requirements including the campus general education language requirement.
NOTE: A student taking a cross-listed course in this major may designate it as either mathematics or computer science.

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

Minimum hours required for graduation: 120 hours.

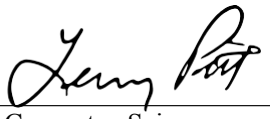
Departmental distinction: To graduate with distinction requires a specified minimum grade point average in all Computer Science and Mathematics courses listed below. A GPA of 3.25 is required for Distinction, 3.5 for High Distinction, and 3.75 for Highest Distinction. In addition, students must complete at least three semester hours of additional Computer Science or Mathematics courses selected from the following: CS 196, 296, 397, 492, 493, 499; any CS course numbered 411 or higher; MATH 412, 414, 417, 418, 423, 432, 448, 482, 484, 496.

Hours	Requirements
0-1	CS 100- Freshman Orientation (recommended)
11-12	Calculus through MATH 241-Calculus III
3	MATH 347 - Fundamental Mathematics or MATH 348 - Fundamental Mathematics-ACP
4	CS 125 - Intro to Computer Science
3	CS 126 – Software Design Studio
3	CS 173 - Discrete Structures
4	CS 225 - Data Structures
4	CS 233 - Computer Architecture
4	CS 241 - System Programming
3	CS/MATH 357 - Numerical Methods I
4	CS 374 – Algorithms and Models of Computation
3	CS 421 – Programming Languages and Compilers
3	CS 457-Numerical Methods II
3	MATH 415-Linear Algebra or MATH 416- Abstract Linear Algebra
18	400-level mathematics and computer science requirements: Students must select at least six 400-level mathematics and computer science courses, including one from each of the following groups:
	GROUP I: CS 361 – Probability and Statistics for Computer Science (recommended) MATH 461/STAT 451 - Probability Theory STAT 400/MATH 463 - Statistics and Probability I
	GROUP II: MATH 412 - Graph Theory MATH 417 - Intro to Abstract Algebra
	GROUP III: MATH 441 - Differential Equations MATH 446 - Applied Complex Variables MATH 484 - Nonlinear Programming
	GROUP IV: MATH 444 - Elementary Real Analysis MATH 447 - Real Variables
	GROUP V: MATH 414 - Mathematical Logic CS/MATH 473 - Algorithms

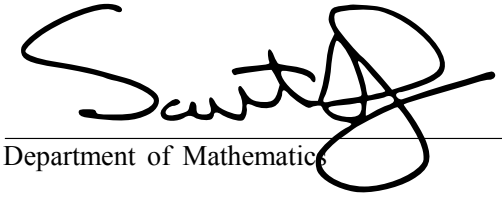
CS/MATH 475 - Formal Models of Computation
CS 476 - Program Verification
CS 477- Formal Software Development Methods
CS 481- Stochastic Processes and Applications
CS 482- Simulation

CLEARANCES:

Signatures:



Department of Computer Science — Date: 2/1/2015



Department of Mathematics — Date: 2/12/2016

College Representative: — Date: 2-12-16

Appendix A:
Curriculum Revisions for BSLAS
Math/CS

Current Requirements:	Current Hours	Proposed Requirements:	Revised Hours
CS Requirements		***CS Requirements***	
		CS 100 (recommended)	**(1)**
CS 125	4	CS 125	4
		CS 126	3
CS 173	3	CS 173	3
CS 225	4	CS 225	4
CS 231	3	**CS 233**	4
CS 232	3		
CS 241	4	CS 241	4
CS 242	3		
CS 357	3	CS 357	3
CS 373	3	**CS 374**	4
CS 473	3		
(used to be a group VI requirement; see below)		CS 421	3
CS 457	3	CS 457 or CS 450	3
Math Requirements		***Math Requirements***	
MATH 220 or 221	4	MATH 220 or 221	4
MATH 231	3	MATH 231	3
MATH 241	4	MATH 241	4
MATH 347 or MATH 348	3	MATH 347 or MATH 348	3
MATH 415 or 416	3	MATH 415 or 416	3
Math Electives		***Math Electives***	
Group I: MATH 461 or 463	3	Group I: MATH 461 or 463 or **CS 361**	3
Group II: MATH 412 or 417	3	Group II: MATH 412 or 417	3
Group III: MATH 441 or 446 or 484	3	Group III: MATH 441 or 446 or 484	3
Group IV: MATH 444 or 447	3	Group IV: MATH 444 or 447	3
Group V: MATH 414 or CS 473 or CS 475	3	Group V: MATH 414 or CS 473 or CS 475 or **CS 476 or CS 477 or CS 481 or CS 482**	3
Group VI: CS 421 or CS 423	3	This group is replaced by the CS 421 requirement above	
One additional choice	3	One additional choice	3

from above groups		from above groups	
Total Major Hours	74	Total MajorHours	70
Electives*	44-46	Electives	48-50
*Includes Rhetoric, adv composition, campus language requirement and General Education requirements			

ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Senate Educational Policy Committee
Proposal Check Sheet

PROPOSAL TITLE (Same as on proposal): revise the Mathematics and Computer Science BSLAS in the College of Liberal Arts and Sciences

PROPOSAL TYPE (select all that apply below)**:**

A. ☒ Proposal for a NEW or REVISED degree program. Please consult the Programs of Study Catalog for official titles of existing degree programs.

1. Degree program level:

   ☐ Graduate ☐ Professional ☒ Undergraduate

2. ☐ Proposal for a new **degree** (e.g. B.S., M.A. or Ph.D.):

   Degree name, *"e.g., Bachelor of Arts or Master of Science"*: _____

3. ☒ Proposal for a new or revised **major, concentration, or minor**:

   ☐ New or ☒ Revised **Major** in (name of existing or proposed major): Mathematics and Computer Science

   ☐ New or ☐ Revised **Concentration** in (name of existing or proposed concentration): _____

   ☐ New or ☐ Revised **Minor** in (name of existing or proposed minor): _____

4. ☐ Proposal to rename an existing major, concentration, or minor:

   ☐ Major ☐ Concentration ☐ Minor

   Current name: _____

   Proposed new name: _____

5. ☐ Proposal to terminate an existing degree, major, concentration, or minor:

   ☐ Degree ☐ Major ☐ Concentration ☐ Minor

   Name of existing degree, major, or concentration: _____

6. ☐ Proposal involving a multi-institutional degree:

   ☐ New ☐ Revision ☐ Termination

Name of existing Illinois (UIUC) degree: _____

Name of non-Illinois partnering institution: _____

Location of non-Illinois partnering institution:

☐ State of Illinois ☐ US State: _____ ☐ Foreign country: _____

B. ☐ Proposal to create a new academic unit (college, school, department, program or other academic unit):

Name of proposed new unit: _____

C. ☐ Proposal to rename an existing academic unit (college, school, department, or other academic unit):

Current name of unit: _____

Proposed new name of unit: _____

D. ☐ Proposal to reorganize existing units (colleges, schools, departments, or program):

1. ☐ Proposal to change the status of an existing and approved unit (e.g. change from a program to department)

   Name of current unit including status: _____

2. ☐ Proposal to transfer an existing unit:

   Current unit's name and home: _____

   Proposed new home for the unit: _____

3. ☐ Proposal to merge two or more existing units (e.g., merge department A with department B):

   Name and college of unit one to be merged: _____

   Name and college of unit two to be merged: _____

   Proposed name and college of new (merged) unit: _____

4. ☐ Proposal to terminate an existing unit:

   Current unit's name and status: _____

E. ☐ **Other educational policy proposals** (e.g., academic calendar, grading policies, etc.)

Nature of the proposal: _____

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Provost and Vice Chancellor
for Academic Affairs

Swanlund Administration Building
601 East John Street
Champaign, IL 61820

February 15, 2016

Bettina Francis, Chair
Senate Committee on Educational Policy
Office of the Senate
228 English Building, MC-461

Dear Professor Francis:

Enclosed is a copy of a proposal from the College of Liberal Arts and Sciences to revise the Bachelor of Science in Mathematics and Computer Science.

Sincerely,

Kathryn A. Martensen
Assistant Provost

Enclosures

c: A. Elli
K. Carney
S. Ahlgren
L. Pitt

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

College of Liberal Arts and Sciences
Office of the Dean

2090 Lincoln Hall
702 S. Wright Street, MC-448
Urbana, IL 61801

February 12, 2016

Kathryn Martensen
Associate Provost
Office of the Provost and Vice Chancellor for Academic Affairs
207 Swanlund Administration Building
MC-304

Dear Kathy:

The Committee on Courses and Curricula on behalf of the Faculty of the College of Liberal Arts and Sciences has voted to approve the following proposal:

Revise the Mathematics and Computer Science BSLAS in the College of Liberal Arts and Sciences

Please address all correspondence concerning this proposal to me. This proposal is now ready for review by the Senate Educational Policy Committee for proposed implementation in Fall 2016.

Sincerely,

Karen M. Carney
Associate Dean

enclosure
C: Professor Scott Ahlgren
Professor Lenny Pitt