PROPOSED CHANGES TO DEGREE PROGRAMS IN THE UNDERGRADUATE CATALOG 2014-2016

Type of Change

___ Nonacademic Change
X  Academic Change
___ Degree Program Change

1. NAME OF DEGREE PROGRAM: B.S. Computer Science

2. IF THE ANSWER TO ANY OF THE FOLLOWING QUESTIONS IS YES, THE COLLEGE MUST CONSULT NEAL ARMSTRONG WHO WILL DETERMINE WHETHER SACS-COC APPROVAL IS NEEDED.
   • Is this a new degree program? Yes or no? No.
   • Does the program offer courses that will be taught off campus? Yes or no? No.
   • Will courses in this program be delivered electronically? Yes or no? No.

3. EXPLAIN CHANGE TO DEGREE PROGRAM:

1. Option I, II, IV, and V: add in M 362K as an alternative to SSC 321.
2. Options I, II, and IV: remove BIO 325 from the biology science sequence option. Add 3 hours of upper-division Biology to the advanced biology science sequence.
3. Options I and II: remove CS 313K or 313H, 336 or 336H, 337 or 337H, 341 or 341H or 357 or 357H. Add CS 311 or 311H, 331 or 331H.
4. Option III: remove CS 313H and 336H; add CS 311H and 331H.
5. Options I, II, IV, and V: remove CS 345 or 345H.
6. Options I, II, and V: Add 3 additional hours each from 3 lists of approved coursework, in theory, programming, and systems.
7. Option II: Add 12 additional hours of upper-division in Computer Science. Specify the requirements that must be approved by director and requirements that count toward minimum # of honors courses.
8. Special Requirements: Remove CS 313K and add CS 311 or 311H.
9. Option IV: Addition of Master of Science in Information Studies as an alternative to Master of Science in Computer Sciences.
10. Option IV: Addition of Master of Science in Computational Science, Engineering, and Mathematics as an alternative to other two graduate options.

Rationale: The Department of Computer Science and the Institute for Computational Engineering and Sciences (ICES) will select highly motivated students with strong intellectual capacities and character for this integrated program in order to meet a two-fold goal: to prepare students for professional positions that require diverse perspectives on computation, engineering, math and technical depth as well as to prepare students for competitive Ph.D. programs in Computer Science, Engineering and Math.

The CS Department's Bachelor of Arts (BA), Bachelor of Science (BS) and Bachelor of Science and Arts (BSA) programs provide students with general knowledge and skills appropriate for many career paths. However, as computing moves into the mainstream, successful developers and managers must understand the applications of computing to a diverse set of problems, and the underlying algorithms that are the basis for numerical analysis. ICES complements UTCS' focus on data with a strong emphasis on mathematics, scientific computing, and the applications of computing to real world problems. The BSCS/CSEM
Integrated Program will provide these students with a well-rounded education enabling them to not only understand the fundamental science of computing, but how computing is used to tackle challenging problems.

The breadth of topics covered, along with the degrees earned in each of the two disciplines, will enable the students of the BSCS/CSEM Integrated Program to seek admission to the nation's most competitive Ph.D. programs in Computer Science, Applied Mathematics, and Computational Science and Engineering. The BSCS/CSEM Integrated Program will provide students with a strong background in Computer Science Mathematics, and a technical application area. This educational experience will expose students to the frontiers of research. Participating students will have opportunities for theses or projects that blend the knowledge gained from each discipline.

Students who seek professional positions instead of pursuing doctoral studies will also benefit from participation in the proposed BSCS/CSEM Integrated Program. UTCS’ B.A., B.S. and BSA degree plans prepare students to enter the software industry in job profiles that include software developer, systems analyst, database manager, applications engineer, Internet network technician, business analyst, and project manager. Students in the BSCS/CSEM Integrated Program will develop skills to gain employment in an even broader spectrum of job profiles, including numerical analysis, mathematical modeling, scientific computation, and high-performance computing.

UTCS and ICES used several resources in structuring the BSCS/CSEM Integrated Program. The University of Illinois at Urbana-Champaign offers a bachelor’s degree in Mathematics and Computer Science that prepares students to pursue professional or graduate work in mathematics and computer science. Stanford University offers an interdisciplinary bachelor's degree in Mathematical and Computational Science and a Master of Science in Mathematical and Computational Engineering, though neither of these programs is quite the same as what we are proposing here. Harvard University recently began an intensive one-year degree program leading to a Master of Science in Computational Science and Engineering. Central Washington University offers a Master of Science in Computational Science, which targets undergraduate CS majors. Many universities offer similar masters degrees, but not tied directly to an undergraduate program in CS. Furthermore, a number of universities including UT Austin offer certificates in computational science as part of an undergraduate degree program (however, at UT, this does not lead to a master’s degree and does not include graduate level courses).

This proposal follows the general structure and guidelines of the joint BS CS/MS CS program that UTCS currently offers. The BSCS/CSEM Integrated Program will not require significant new costs, nor will the program cause duplication. No adverse effects on current programs are anticipated.

3. SCOPE OF PROPOSED CHANGE
a. Does this proposal impact other colleges/schools? Yes___X__ No____
   If yes, then how? ICES collaborated in putting together this proposal.

b. Will students in other degree programs be impacted (are the proposed changes to courses commonly taken by students in other colleges)? Yes____ No____X__
   If yes, then how?

c. Will students from your college take courses in other colleges? Yes

If 3 a, b, or c was answered with yes:
   How many students do you expect to be impacted? 5-10 per year

Impacted schools must be contacted and their response(s) included:
Person communicated with: J. Tinsley Oden, Director, Institute of Computational Engineering and Sciences (ICES)
Date of communication: July 31, 2013
Response: Approved

d. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? If yes, explain: No.

If yes, undergraduate studies must be informed of the proposed changes and their response included:
Person communicated with:
Date of communication:
Response:

e. Will this proposal change the number of hours required for degree completion? If yes, explain: No.

4. GIVE A DETAILED RATIONALE FOR CHANGE. INDIVIDUAL CHANGES SHOULD BE LISTED SEPARATELY.

1. With changes in the focus and practice of computer science, probability has become essential to the field. It is the basis for major new developments, including, for example, machine learning and data mining, the processing of big datasets, and the use of probabilistic algorithms.

2. The CS faculty intend for the introductory science sequences to mirror the first year science sequences for students in these fields of study. The faculty intend for the advanced science sequences to reflect the knowledge base achieved by taking 2 advanced courses in a field of study.

3. The CS faculty are reducing the number of courses that students are required to take in order to create more opportunities to select electives. Toward this end, the faculty would like to replace CS 313K (or CS 313H), CS 336 (or CS 336H), CS 337 (or CS 337H), and the requirement to take either CS 341 (or CS 341H) or CS 357 (or CS 357H), with two courses -- CS 311 (or CS 311H) and CS 331 (or CS 331H) – which have been designed to teach the fundamental concepts of computer theory.

4. The Computer Science faculty would like to drop CS 313H and 336H. The faculty would like to add CS 311H and 331H. These courses have significant changes in content from CS 313H and 336H in response to developments in theoretical computer science.

5. The Undergraduate Studies Committee, with full support of the Computer Science faculty, would like to remove CS 345/345H (Programming Languages) as a requirement from all BS degree options because we do not consider the class to be essential for all students. This is part of our larger effort to reduce the "core" to only essential topics. However, we plan to continue offering the class as an upper-division elective.

6. The CS faculty are reducing the number of courses that students are required to take in order to create more opportunities to select electives. Still, the faculty want to insure that CS graduates have a solid foundation in the core areas of programming, systems and theory. By requiring students to take one additional course in these areas, beyond the set of required, core courses, students will obtain the necessary background while still having some flexibility to choose.

7. Option II: 12 additional hours of upper-division in Computer Science were inadvertently deleted from 2010-12 catalog when deleting the phrase “34 upper-division hours in Computer Science.” The 34 hours were made up of 22 hours in required courses, leaving the additional 12 upper-division hours as required but not explicitly stated.

8. The Computer Science faculty will not teach CS 313K and CS 313H again. The requirements have been changed to CS 311 and CS 311H with a significant change in course content in response to developments in theoretical computer science.

9. The Department and the iSchool will select highly motivated students with strong intellectual capacities and character for this integrated program in order to meet a two-fold goal: to prepare students for professional positions that require diverse perspectives on information, leadership, and technical depth as well as to prepare students for competitive Ph.D. programs in Computer Science and Information Studies.

The Department's Bachelor of Arts (BA) and Bachelor of Science (BS) programs provide students with general knowledge and skills appropriate for many career paths. The Department prepares students with a strong foundation in computing. However, as computing moves into the mainstream, successful developers and managers must understand information, interfaces, and interaction from a user’s perspective as well. The iSchool complements the Department’s focus on data with a strong emphasis on information, its social
construction, and its contexts of use. The BSCS/MSIS Integrated Program will provide these students with a well-rounded education and will enable system as well as the user perspectives on systems.

The breadth of topics covered as well as degrees in two disciplines will enable the students of this BSCS/MSIS integrated program to seek admission to the nation's most competitive Ph.D. programs in Computer Science as well as Information Studies. The BSCS/MSIS Integrated Program will provide these students with a strong background in areas of Computer Science as well as Information Studies that are on the frontiers of research, as well as opportunities for theses or projects that blend the knowledge gained from each discipline.

Students who seek professional positions will also benefit from the proposed BSCS/MSIS Integrated Program. The Department’s BA and BS programs prepare students for entering the software industry in job profiles that include application development and testing. Students enrolling in the BSCS/MSIS Integrated Program will develop skills in human-computer interaction design, user experience design, information architecture, and the design, development, and management of digital services in governmental, academic, or corporate institutions. Appendix A lists job titles that are advertised for graduates from programs similar to the MSIS program in the iSchool.

The Department and the iSchool looked at several resources for guidance in structuring the BSCS/MSIS Integrated Program. Most integrated programs provide a fast track to a master’s degree within a single department or a program. The Fifth Year Master’s Program at Carnegie Mellon University, offered within the Computer Science Department, equips its graduates with a skill set similar to that envisioned by the proposed BSCS/MSIS Integrated Program. The only program across our two disciplines that we have been able to locate is the 3+1 program at Simmons College, which awards the BS-CS and MLIS degrees to a candidate in a span of four years.

The current proposal follows the general structure and guidelines of the joint BS CS/MS CS program that the Department currently offers. The BSCS/MSIS Integrated Program will not require significant new costs, nor will the program cause duplication or adverse effects on current programs.

5. SCOPE OF PROPOSED CHANGE

5a. Does this proposal impact other colleges/schools? If yes, then how? Yes. The School of Information Studies collaborated in putting together this proposal. The School of Information Studies will propose to alter its Master of Science in Information Studies to 31 hours (down from 40 hours). The School of Information Studies will present the proposal to the Graduate School for inclusion in the 2013-15 Graduate School catalog.

If yes, impacted schools must be contacted and their response(s) included:
Person communicated with: (1) School of Information Graduate Studies Committee (no individual name provided by the Department of Computer Science).
Date of communication: (1) April 24, 2012
Response: (1) approved.

5b. Does this proposal involve changes to the core curriculum or other basic education requirements (42-hour core, signature courses, flags)? If yes, explain: No.

If yes, undergraduate studies must be informed of the proposed changes and their response included:
Person communicated with:
Date of communication:
Response:
5c. Will this proposal change the number of hours required for degree completion? If yes, explain: No.

6. COLLEGE/SCHOOL APPROVAL PROCESS
Department approval date: (1) May 2, 2012;
College approval date:
Dean approval date:

Include proposed catalog copy below. The proposed text should be based on the text of the current catalog available at [http://www.utexas.edu/faculty/council/pages/catalog_chgs/catcopy.html](http://www.utexas.edu/faculty/council/pages/catalog_chgs/catcopy.html). Strike through and replace only the specific language to be changed. For questions on completing this section, please contact Anita Ahmadi, fc@austin.utexas.edu, 471-5936 or Brenda Schumann, brenda.schumann@austin.utexas.edu, 475-7654.

Bachelor of Science in Computer Science

The Bachelor of Science in Computer Science degree program provides a strong technical background for students planning to begin careers upon graduation and for those interested in graduate study in computer science. This program allows students to take more coursework in computer science and related technical areas than does the Bachelor of Arts degree program. In addition to three options leading to the Bachelor of Science in Computer Science, students may apply to option IV, the Integrated Program, which leads to simultaneous completion of the Bachelor of Science in Computer Science and the Master of Science in Computer Science or the Master of Science in Information Studies, or the Master of Science in Computational Science, Engineering, and Mathematics. The requirements for the Bachelor of Science in Computer Science, option IV, are given below. The requirements for the Master of Science in Computer Science and the Master of Science in Information Studies, and the Master of Science in Computational Science, Engineering, and Mathematics are described in the Graduate Catalog at [http://registrar.utexas.edu/catalogs/](http://registrar.utexas.edu/catalogs/). In brief, the requirements for the Master of Science in Computer Science are nine semester hours of graduate-level diversity coursework in computer science, consisting of three hours in each of three areas; fifteen additional hours of graduate coursework in computer science; and six hours of approved graduate coursework in a supporting area. The requirements for the Master of Science in Information Studies are nine semester hours of the School of Information master’s core courses; four hours representing a capstone and electronic portfolio; and eighteen hours of elective coursework (fifteen hours if fulfilling the thesis option), which can include six hours of graduate coursework at the University of Texas at Austin outside of the School of Information and in an area related to information studies with approval from the student’s School of Information faculty adviser. The requirements for the Master of Science in Computational Science, Engineering, and Mathematics are twenty-four hours of approved graduate-level coursework in area A (applicable mathematics), B (numerical analysis and computational science), and C (mathematical modeling and applications).
minimum of six hours of graded work must be taken in each area, plus six additional hours in any area. The student must complete two semesters in residence in the Graduate School. Students who would like to pursue any of the following options must first be admitted to the degree program. The admission processes for options I, II, and IV are described in *The Major in Computer Science*; the admission process for option III is described in the section *Dean’s Scholars Honors Program*.

**Prescribed Work Common to All Options**

All students pursuing an undergraduate degree must complete the University’s [Core Curriculum](http://www.utexas.edu/rights/degrees/honors/). The core includes courses in language, literature, social sciences, natural sciences, and fine arts. In addition, students seeking the Bachelor of Science in Computer Science must complete the following degree-level requirements. In some cases, courses that fulfill degree-level requirements also meet the requirements of the core.

1. Two courses with a writing flag. One of these courses must be upper-division. Courses with a writing flag are identified in the *Course Schedule* at [http://registrar.utexas.edu/schedules](http://registrar.utexas.edu/schedules). They may be used simultaneously to fulfill other requirements, unless otherwise specified.

2. Options I, II, and IV: One of the following foreign language/culture choices. Students in option III and V are exempt from this requirement.
   a. Second-semester-level proficiency, or the equivalent, in a foreign language.
   b. First-semester-level proficiency, or the equivalent, in a foreign language and a three-semester-hour course in the culture of the same language area.
   c. Two three-semester-hour courses in one foreign culture area. The courses must be chosen from an approved list available in the dean’s office and the college advising centers.

3. At least forty-two semester hours of upper-division coursework.

4. At least twenty-one semester hours of upper-division coursework in computer science must be completed in residence at the University.

**Additional Prescribed Work for Each Option**

**Option IV: Integrated Program**

5. Mathematics 408C and 408D, or 408N, 408S, and 408M; either 340L or 341 or Statistics and Scientific Computation 329C; Statistics and Data Sciences 329C; and Mathematics 362K or Statistics and Scientific Computation 321 Statistics and Data Sciences 321.

6. One of the following sequences of coursework:
   a. Either Biology 311C, 311D, and 325 or Biology 315H and 325H; and Biology 206L or 208L.
   b. Chemistry 301 or 301H, 302 or 302H, and 204.
c. Geological Sciences 401 and either 404C or 405.
d. Physics 303K, 303L, 103M, and 103N.

7. An additional sequence chosen from those in requirement 6 above, or one of the following:
   a. At least three six hours of upper-division coursework in biology approved by the undergraduate adviser.
   b. Chemistry 128K, 128L, 328M, and 328N, or Chemistry 220C, 320M, and 320N, or at least six hours of upper-division coursework in chemistry approved by the undergraduate adviser.
   c. Geological Sciences 416K and 426P, or at least six hours of upper-division coursework in geological sciences approved by the undergraduate adviser.
   d. Physics 315 and at least three hours of upper-division coursework in physics approved by the undergraduate adviser.
   e. At least six hours of upper-division coursework in mathematics approved by the undergraduate adviser. A course may not be counted toward both requirement 5 and requirement 7.
   f. Electrical Engineering 313 and 331.

8. The following courses in Computer Science:
   a. Theory: Computer Science 311 or 311H, 331 or 331H, and three additional hours from an approved list available in the department.
   b. Programming: Computer Science 312 or 312H, 314 or 314H, and three additional hours from an approved list available in the department.
   c. Systems: Computer Science 429 or 429H, 439 or 439H, and three additional hours from an approved list available in the department.
   d. Computer Science 353 or 357 or 357H.
   e. Nine additional hours of upper-division courses in Computer Science.

9. Enough additional coursework to make a total of 120 semester hours

Special Requirements

Students in all options must fulfill both the University's General Requirements for graduation and the college requirements. They must also earn a grade of at least C- in each mathematics and science course required for the degree, and a grade point average in these courses of at least 2.00. More information about grades and the grade point average is given in General Information. To graduate and be recommended for certification students who follow the teaching option must have a University grade point average of at least 2.50. They must earn a grade of at least C- in the supporting course in requirement 5, and in each of the professional development courses listed in requirement 10 and must pass the final teaching portfolio review. For information about the portfolio review and additional teacher certification requirements, students should consult the UTeach-Natural Sciences academic adviser.
With the exception of Computer Science 312 or 312H, 313K or 313H 311 or 311H, and 314 or 314H, all computer science courses that may be counted toward a degree in computer science are restricted to students who have been admitted to the computer science major or have the consent of the undergraduate faculty adviser.

An undergraduate may not enroll in any computer science course more than once without written consent of an undergraduate adviser in computer science. No student may enroll in any computer science course more than twice. No student may take more than three upper-division computer science courses in a semester without written consent of an undergraduate adviser in computer science.

**Additional Requirements for Option IV**

**Satisfactory Progress**

Students are expected to make continuous progress toward the degree by completing required computer science coursework each semester. Those who fail to take program coursework two long-session semesters in a row will be removed from the program and re-enrolled in the Bachelor of Science in Computer Science option (I, II, or III) that they were following before admission to the Integrated Program. Students will be notified before this action is taken; they must meet with their academic adviser upon being notified.

**Probation**

The student is placed on probation if his or her grade point average in required undergraduate computer science courses falls below 3.00. Except with the consent of the undergraduate adviser or the graduate adviser, a student on probation may not take graduate computer science courses.

**Dismissal**

The student is dismissed from the Integrated Program if (1) he or she fails to improve his or her academic performance significantly while on probation, or (2) he or she will not achieve a grade point average of 3.00 even by earning grades of A in all remaining required undergraduate and graduate computer science courses.

Like all students, those in the Integrated Program must know and abide by the academic and disciplinary policies given in this catalog and in *General Information*. Those who fail to do so will be considered for academic dismissal from the program. Under special circumstances and at the discretion of the director, a student may be allowed to continue in the program under academic review. A student who is academically dismissed from the program may enter another computer science program if he or she fulfills the scholastic standards for continuance in the University given in *General Information*. Students in scholastic difficulty should discuss their problems with an academic adviser and the undergraduate faculty adviser.

**Graduation**

To receive the Bachelor of Science in Computer Science and Master of Science in Computer Science, or the Master of Science in Information Studies, or the Master of Science in
Computational Science, Engineering, and Mathematics degrees through the Integrated Program, a student must have a grade point average of at least 3.00 in the coursework in the Master of Science in Computer Science Program of Work. He or she must also have a grade point average in graduate computer science, and information studies, or computational science, engineering, and mathematics coursework of at least 3.00.

[Note: Under the section titled “ADMISSION AND REGISTRATION”]

The Integrated Program in Computer Science

The Integrated Program is a curriculum of undergraduate and graduate coursework that allows the student to earn the Bachelor of Science in Computer Science and the Master of Science in Computer Science or, the Master of Science in Information Studies, or the Master of Science in Computational Science, Engineering, and Mathematics degrees at the same time. The curriculum integrated Master of Science in Computer Science includes the same coursework as the traditional master’s degree program, as well as the opportunity for research. The integrated Master of Science in Information Studies allows students to choose a pathway for completing a capstone and electronic portfolio, comprised of a professional experience project, a master’s report, or a thesis. The integrated Master of Science in Computational Science, Engineering, and Mathematics includes the same coursework as the traditional Computational Sciences, Engineering and Mathematics master’s degree program and also offers opportunity for research. Students in the Integrated Program are expected to become leaders in the profession. Highly motivated students with the personal qualities and intellectual capacity to establish successful careers in higher education and industry are encouraged to apply.

Undergraduates typically follow option I, II, or III for their first three years, then enter the Integrated Program in their fourth year. Admission is granted only for the fall semester; January 2 is the application deadline for those who wish to begin the program the following fall. By the end of the spring semester in which they apply, students must have completed at least sixty semester hours of coursework, including Computer Science 345 or 345H, 429 or 429H, and 353 or 357 or 357H.

Admission is based on the applicant’s grade point average, letters of recommendation, statement of purpose, and SAT Reasoning Test or ACT scores, as well as other relevant examples of academic ability and leadership. An applicant with a University grade point average of less than 3.50 is unlikely to be admitted. Admission may be restricted by the availability of instructional resources. Application materials and information about deadlines are published by the Department of Computer Science, available at http://www.cs.utexas.edu/.

Before beginning the fifth year, students in the Integrated Program must be admitted to the Graduate School and the graduate program in the Department of Computer Science or, the School of Information, or the Institute of Computational Science, Engineering, and Mathematics and the Graduate School. Application forms must be completed by January 2 of the student’s fourth year. Before the application deadline, students must have completed the prescribed work common to all Bachelor of Science in Computer Science options. They must earn an acceptable score on the Graduate Record Examinations General Test (GRE) and must have their test scores reported to the University. Students usually take the GRE in the fall semester of their fourth year.