Proposed Changes in the BS-CIS Program

1. Background

Under the quarter system, students in the BS-CIS program were required to choose a *technical elective* (TE) option from a specified set, including *software systems*, *information and computation assurance*, etc. Students choosing a given option had to include, among their technical elective courses, a specified set of courses; each option also listed a number of recommended courses that students might choose from for the remaining tech elective hours. In order to meet the needs of students who may have interests that did not fit into any of the specified options, there was an *individualized* option; students in this option were expected to consult with their faculty advisor to come up with an appropriate set of courses for their tech electives, matching their interests.

This approach had two advantages. First, a student interested in a given area, such as software systems, had clear guidance on what courses were most relevant for that area, these being the courses required for the particular TE option. Second, upon graduation, the student's transcript contained a designation, such as *SoftSys*, denoting the TE option that the student completed. And this designation was of value, for example, to potential employers when considering the student for particular employment opportunities.

When we moved to the semester system, it was not clear, for various reasons, how to translate the TE options to the semester system; e.g., the structure of the required ("core") courses was different; the total number of courses a student could take was fewer; and the courses, while they were directly based on corresponding courses under quarters, were themselves new. Hence the idea of TE options was not included when we transitioned to semesters.

2. Summary of changes

1. Now that we have had three years of experience with the semester system and the courses have stabilized, and given the advantages noted above of the TE options, the CSE faculty propose to reintroduce TE options. The TE options being proposed are based on the ones under the quarter system, including the Individualized Option.

One point to note is that any set of courses that meets all the requirements of any of the proposed TE options once this change is in place also meets the current requirements of the BS-CIS program. Moreover, any set of courses that meets the current requirements will also, given the *individualized option*, meet the requirements of the revised program; at the same time, it should be stressed that the *primary* purpose of this option is to provide flexibility to students to tailor, in consultation with their advisor, a suitable set of courses based on their specific interests, rather than to ensure that the current program requirements match the revised requirements.

Thus the main reasons for proposing the change are the two advantages noted above: that students interested in a given area will have clear guidance on which courses to take; and the students' transcripts will contain a designation indicating the area they focused on in their technical elective courses.

2. A second change, unrelated to the TE options, has to do with ECE 2000 (Introduction to the theory and practice of combinational and clocked sequential networks), a 4-credit-hour ECE course that BS-CIS majors are required to take. Based on feedback from BS-CIS majors, BS-CSE majors (who are also required to take this course as well as ECE 2100), and from ECE majors, the ECE Dept. has proposed replacing ECE 2000 and 2100 with a set of new courses. For BS-CIS majors, this would mean replacing the 4 credit hours of ECE 2000 with 3 credit hours of ECE 2060 (Introduction to Digital Logic) and adding 1 credit hour to the technical electives hours which will increase from 15 cr hrs to 16 cr hrs.

3. A third and final change, also unrelated to the TE options, has to do with *CSE 2501*, a 1-credit-hour course on social and ethical issues in computing, that BS-CIS majors are required to take. An important objective of this course is to help students develop oral and written presentation skills. Many BS-CIS students also take Phil 1337 (Ethics in the Professions: Introduction to Computing Ethics) as part of their GE requirement. However, and perhaps not surprisingly, there is considerable overlap between CSE 2501 and Phil 1337. At the same time, the presentation skills that 2501 help develop are important as well. Therefore, after extensive discussions with the CSE faculty, the Philosophy Department has created a new course, Phil 1338 which is 4 credit hours and includes all of the material from 1337 and an additional component devoted to helping students develop presentation skills. Phil 1338 is approved as a GE course in the same category, i.e., Culture and Ideas, as Phil 1337.

Given the development of Phil 1338, any BS-CIS major who takes Phil 1338 as one of the GE courses would not take CSE 2501; a student who does not take Phil 1338 (including those who take Phil 1337 as one of their GE courses) would still be required to take CSE 2501. Students would be advised not to take Phil 1337 as a GE course because then they would have to take CSE 2501 and will find the material duplicative. This change would be neutral with respect to credit hours.

3. Process

The idea of re-introducing technical elective (TE) options was discussed extensively at a number of Undergraduate Studies Committee meetings in Autumn 2014. Toward the end of the fall semester, the CSE faculty as a whole discussed the idea as well as the specific courses to be included in the various options electronically. The idea was strongly endorsed by students, advisors, and faculty. The proposed change was presented at the departmental Annual Undergraduate Forum on March 24. The students at the forum were strongly in favor of the idea. The proposal was discussed at a CSE faculty meeting on Sept. 17, 2015, and approved unanimously.

The problems with the ECE 2000 (and 2100) course(s) had been discussed previously, including at the Annual Forum of March 2014 and the ECE faculty had been informed of the issues. Over Summer and Fall '14, the ECE faculty involved us in discussions of how the courses might be modified to meet the concerns of BS-CIS and BS-CSE majors (as well as concerns expressed by ECE majors). Based on those discussions, the ECE faculty came up with a proposal to replace ECE 2000, 2100 with a set of three new courses; of these, ECE 2060 would be the one that would best meet the needs of BS-CIS majors. The net result would be that BS-CIS majors would be required to take ECE 2060 (3 cr hrs) in place of ECE 2000 (4 cr hrs) and the 1 cr hrs released by this change would be added to the technical elective hours of the BS-CIS program. CSE faculty approved these changes unanimously and the students are very much in favor of them.

As noted earlier, the problems encountered by students who take Phil 1337 as a GE course, i.e., the overlap between the material in that course with that in CSE 2501, was brought up both by students in CSE 2501 which were then conveyed to the Curriculum Committee by the course coordinator for CSE 2501 and by student reps on the Undergrad Studies Committee. The problem was discussed in the committees and following discussions with the Philosophy Dept., the idea of creating a 4-credit Phil 1338 that would not only present material related to ethical and professional issues in computing contained in Phil 1337 but also include activities that ensure that students' oral and written communication skills are developed which is the other key ojective of CSE 2501. The proposal that students who take Phil 1338 as one of their GE courses would be considered to have also met the CSE 2501 requirement, was discussed at the Annual Student Forum on March 24, 2015 and was very well received. It was sent to the CSE faculty by email for their approval and was approved unanimously.

A. Current BS-CIS Curriculum

The BS CIS Curriculum consists of the following components:

1. CSE Core (22 hours):
    - CSE 2221, 2231 (Software I, II; 8 hrs)
    - CSE 2321, 2331 (Foundations I, II; 6 hrs)
    - CSE 2421, 2431 (Systems I, II; 7 hrs)
    - CSE 2501 (Professionalism, ethics; 1 hr)*
2. CSE Core Choices (20 hours including 4 hrs of capstone design):
    - CSE 390X Project (4 hrs)
    - CSE 3231 or 3241 (Software Eng or Databases) (3 hrs)
    - CSE 3321 or 3341 (Formal Langs or Prog. Langs) (3 hrs)
    - CSE 3421 or 3461 (Systems: Architecture/Networking) (3 hrs)
    - CSE 3521 or 3541 (Applications: AI/Graphics) (3 hrs)
    - CSE 591X Capstone (4 hrs)
3. Technical Electives (15 hrs)*:
    - At least 8 hrs must be CSE courses at the 3000-level or above; the remaining may be letter-graded non-CSE courses approved by the advisor;
    - At most 1 cr-hr of CSE 425X;
    - At most 2 cr-hrs total of CSE 4193, 4193H, 4998, 4998H, 4999, 4999H;
    - Students are strongly urged to consider choosing a focus area in deciding their tech elective courses.
    - The Advising Office can suggest focus areas based on interest.
4. Math, Science, ECE Requirements (30 hours):
    - Math 1151, 1152 (Calculus I, II) (10 hrs) †
    - Physics 1250 (5 hrs) †
    - ECE 2000 (4 hrs)*
    - Math 3345 (Fnds of Higher Math) (3 hrs) †
    - Stat 3470 (Prob and Stats) (3 hrs) †
    - Science Elective (5 hrs) ‡
5. Other Requirements (37 hours):
    - ASC/NMS Survey 1100.xx (1 hr)
    - English, Writing I (Engl 1110.xx), Writing II (6 hrs) †
    - Literature (3 hrs) †
    - Arts (3 hrs) †
    - Historical Study (3 hrs) †
    - Culture and Ideas* or Historical Study (3 hrs) †
    - Social Science I, II (6 hrs) †
    - Foreign Language (12 hrs) †

The minimum total hours for the BS-CIS degree is 124 credit hours.

* The changes detailed on the next page are related to the items marked with an asterisk (*).

† Together, the courses marked with † satisfy the GE requirements for BS students in ASC.
In particular, the *science elective* (marked with ‡) must include a biological science course with lab component.

B. Proposed Revisions:

1. ECE 2000 (4 hrs) will be replaced by ECE 2060 (3 cr hrs) with the 1 hour being added to the Technical Elective hours which will become 16 credit hours.
2. Ethics course requirement: Students who take the 4-credit hour Phil 1338 as one of their GE (Culture & Ideas) courses will not have to take CSE 2501 since that course is designed to also meet the intended outcomes of 2501.
3. Technical Electives (16 hrs): Must meet the following requirements:
   - At least 9 hrs must be CSE courses at the 3000-level or above; the remaining may be letter-graded non-CSE courses approved by the advisor;
   - At most 1 cr-hr of CSE 425X;
   - At most 2 cr-hrs total of CSE 4193, 4193H, 4998, 4998H, 4999, 4999H;
   - The Advising Office can suggest minor programs with 7 hrs counted toward Tech Electives.

   In addition, the courses chosen under the categories *CSE Core Choices* and *Technical Electives* must meet the requirements of one of the following *options*:

   (a) Artificial Intelligence Option:
   - Required courses: CSE 3521, 5522; one of CSE 5523, 5524, 5525, 5526
   - Recommended courses: CSE 5523, 5524, 5525, 5526, 5914

   (b) Computer Graphics and Game Design Option:
   - Required courses: CSE 3902, 3541; one of: CSE 5542, 5543, 5544, 5545, 5912
   - Recommended courses: CSE 5542, 5543, 5544, 5545, 5912

   (c) Database systems and Data analytics Option:
   - Required courses: CSE 3241, 5242; one of CSE 5243, 5523
   - Recommended courses: CSE 5243, 5523

   (d) Information and Computation Assurance Option:
   - Required courses: CSE 3461, 4471; one of CSE 5472, 5473
   - Recommended courses: CSE 3901, 5351, 5432; relevant courses in business, econ, law.

   (e) Computer Networking Option:
   - Required courses: CSE 3461; two of: CSE 5432, 5462, 5463, 5472, 5473
   - Recommended courses: CSE 3901, 5351, 5432, 5462, 5463, 5472, 5473

   (f) Computer Systems Option:
   - Required courses: CSE 3421; CSE 5433 or 5441; 3 *additional* hours from {CSE 5433, 5441, 3461, 5243}
   - Recommended courses: CSE 5433, 5434, 5441, 6421, 6431, 6441

   (g) Software Engineering Option:
   - Required courses: CSE 3231, 3232; one of: CSE 3341, 5234, 5235, 5236
   - Recommended courses: CSE 3341, 5234, 5235, 5236

   (h) Individualized Option:
   - Recommended courses: Students should consult with their faculty advisors to identify the most reasonable set of courses that would be appropriate, given their specific interests.