Proposition for New Instructional Program

University of Maryland at College Park, Maryland

Addition of Secondary Education-Computer Science Teacher Preparation Program

College of Computer, Mathematical, and Physical Science

Program Rationale

Currently there is no degree program which enables one to get certified to teach computer science in Maryland. This has created a situation where there aren’t enough qualified computer science teachers. Schools have one of two choices: not offer Computer Science or have a teacher from another discipline teach computer science. Often high schools will retrain mathematics, business or technology teachers to teach computer science. This leads to teachers with little to no experience in the field teaching computer science.

To remedy this situation, College of Education and the College of CMPS have jointly developed two programs to prepare students for teaching careers. The requirements for the programs have been reviewed by current teachers and representatives from MSDE.

In order to be certified in a disciple, students must obtain a content based degree. This content based degree would then be complemented with the Secondary Education-Computer Science Major or with a Master’s Certification program. This new program was modeled after the other disciplines in the college of CMPS that have education tracks such as Physics, Mathematics, and Geology.

The two options proposed are:

1) Four year Double major in Computer Science and Secondary Education-Computer Science and
2) Five Year-Integrated Program, with a Bachelor’s Degree in Computer Science-Education Track, and a Master’s in Curriculum and Instruction.

Both of these tracks will lead to teacher certification in Computer Science (grades 7-12).

This proposal addresses the major requirements for the Computer Science-Education Track.

Computer Science-Education Track Requirements

The course of study for a Computer Science-Education Track must include all of the following requirements with a grade of C or higher in each of the following courses:

1. Computer Science Courses
   a. CMSC 131 or a score of 5 on A version of the JAVA Advanced Placement exam or a score of 4 or 5 on the AB version of the JAVA Advanced Placement exam or an acceptable score on the appropriate Department exemption examination, which is to be taken at the time of entry into the program.
b. CMSC 132 or acceptable score on the appropriate Department exemption examination, which is to be taken at the time of entry into the program.

c. CMSC 250 or acceptable score on the appropriate Department exemption examination, which is to be taken at the time of entry into the program.

d. CMSC 216, CMSC 351, CMSC 330, and CMSC 420

e. CMSC 4XX-Project Management for Secondary Education

f. CMSC 4XY-Society, Ethics and Emerging Issues in Computer Science

2. Supporting Education Courses
   a. EDPL 210 or EDPL 301: Issues in Education
   b. EDHD 413: Adolescent Development
   c. EDHD 426: Cognition and Motivation in Reading: Reading in Content Area I or EDCI 488L: Embracing Diversity in the Classroom Communities
   d. EDCI 463: Reading in the Secondary School
   e. EDXX XXX-Methods I

**note that students pursuing the double major in Education should take EDHD 426. Students pursuing the Master’s Certification program should take EDCI 488L.

3. Supporting Math Courses:
   a. MATH 140 and 141.
   b. A STAT course which has MATH 141 (or a more advanced mathematics course) as a prerequisite. Most commonly this would be STAT400.

4. Supporting Science Sequence-One of the following two course science sequences
   a. ASTR 120 and ASTR 121
   b. BIOL 105 and one of (BSCI 106, BSCI 201, BSCI 205, BSCI 223)
   c. CHEM 131/132 and CHEM 231/232
   d. CHEM 146/147 and CHEM 237
   e. PHYS141 and PHYS 142
   f. PHYS 161 and PHYS 260/261
   g. GEOL 100/110 and one of (GEOL 124, GEOL 212, GEOL 322, GEOL 340, GEOL341, and GEOL 375)

**Additional GPA Requirement**

Students choosing to complete the Computer Science-Education Track must maintain a GPA of 3.0 overall. This is to ensure that students will be able to enter the master’s certification program in Education. Exceptions can be made for students wishing to enter the double major in Secondary Education-Computer Science and Computer Science-Education Track. Since the College of Education is a selective admission program, no students with a GPA lower than 2.5 will be able to remain in the Computer Science-Education Track.
Learning Outcomes

1. Graduates will be able to create, augment, debug and test computer software. These skills will be built progressively through the courses in the introductory sequence of courses.
2. Graduates of this program will develop mathematical and analytical reasoning skills.
3. Graduates will experience design and implementation of programming projects that are more similar to those that would be seen in a real world environment.
4. Graduates will be exposed to working closely with other people. This human interaction is manifested in several ways: design of software/hardware based on user input and feedback, working as a member of a programming team, and making presentations to groups about what has been designed and/or implemented;
5. Graduates will obtain a high level of skill in mathematical reasoning about algorithms and data structures and other objects in computer science.
6. Demonstrate skills and understanding relative to social aspects of computing that are appropriate for specialists and non-specialists.
7. Insert Education Learning Outcomes

New Courses
This proposal is part of a multi-faceted program which will give students multiple paths to certification including:

   b. 5 year Masters Certification Program

Implementing all of these programs will require the following new courses:

1. CMSC 4XX-Project Management for Secondary Education
   This course will cover the writing and communication skills necessary to write projects specification for students. Students will work in groups much like in a software engineering course. The course will cover the software development cycle, testing and debugging. It is meant not only to give teachers experience in writing project specification, but also experience working in a real world environment, team software projects and project management. This course will include development of written and oral communication skills in computer science.

2. CMSC 4XY-Society, Ethics and Emerging Issues in Computer Science
   This course will introduce students to the history of computer science (including theory, hardware and software), address the nature of the field and its relationship with other disciplines. It will also cover the ethics of computer science, including- intellectual property, IPO’s, security issues. It will also cover topics that have an interdisciplinary nature such as Computer Forensics, Computational Biology, and Robotics. These topics will vary from semester to semester, but will serve as a way for students to explore the relationship between computer science and other fields.
3. and 4. EDXX 4XX and EDXX 4XX-Methods I and Methods II

This two course sequence will cover teaching methodology in computer science. Topics will include:

- Details of various computer science curricula and study programs in high school and college/university level.
- Curriculum planning and implementation.
- Specific problems common to teaching of programming and the use of tools and aids in teaching computer science.
- Classroom and laboratory management skills.
- Evaluation Methods-general and specific to computer science.
- Problem solving strategies.
- Submission of a paper that describes a current topic of research in the field of computer science education. Due to the dynamic nature of computer science, there is a continual need for research and innovative educational models and pedagogy in the classroom. Teacher candidates should be aware of these current models.
- Technology Resources for the classroom.