

**Form E-1-A for Boston College Core Curriculum  
May, 2021**

**Department/Program: Computer Science**

**Note:** The presence of Computer Science courses in the Core is relatively new. Two of our courses satisfy the Mathematics Core requirement---CSCI1101/1103 Computer Science 1, which has many sections and hundreds of students every semester, and an Enduring Questions course CSCI1701 on privacy, which has been taught just once, in coordination with faculty from the School of Law, to a group of 17 students in Fall, 2019. I will include information on the latter here. Unfortunately, staffing issues prevent us from offering CSCI1701 again in the near future. The approaches to formulating and assessing learning outcomes are quite different for the two different courses.

- 1) **Have formal learning outcomes for the department's Core courses been developed? What are they?** (What specific sets of skills and knowledge does the department expect students completing its Core courses to have acquired?)

For Computer Science 1, the group of instructors meets at the beginning of each semester and reviews a list of specific skills to be mastered. We submitted this document as an attachment to last year's report.

Higher-level learning goals for CS1 are formulated in several places (see Section 2 below). The following, taken from several CS1 syllabi, gives the general flavor:

This is an introductory course in computer programming, using the programming language Python. By the end you should be able to design and write complex programs that do interesting and useful things.

More generally, this is an introductory course in *Computer Science*. Although almost all of the work you do for the course involves writing programs, the subject is wider than just coding, much less coding in a particular language. You will learn something about the special approach Computer Science takes to representing and manipulating information, and to solving problems.

For the Enduring Questions course, the goal was to show how two very different disciplines approached a similar problem, of obvious importance and current relevance, and also to convey something about the deep historical roots of these ideas. The following is taken from the syllabus for the Computer Science component:

From computer science we will bring in some basics of coding, how computers represent information, ideas about algorithmic efficiency, the workings of the internet, the structure of databases and machine learning. We will also draw on more mathematical topics concerning exponential growth, positional number systems, prime numbers, and the quantitative evaluation of accuracy. All of these things, of course, have very wide

applications, not just to our motivating issue of privacy. And despite our focus on technology and societal issues that have sprung up only during your lifetimes, many of the underlying ideas that we study have been around for centuries, a fact that will be emphasized in some of the readings.

- 2) **Where are these learning outcomes published? Be specific.** (Where are the department's expected learning outcomes for its Core courses accessible: on the web, in the catalog, or in your department handouts?)

General goals for CS1 appear on both the department website and in the Course Information and Schedule

<https://www.bc.edu/content/bc-web/schools/mcas/departments/computer-science/academics/courses.html>

<https://services.bc.edu/courseinfosched/main/courseinfoschedResults!displayOneCourseMethod.action?courseKey=2021F+CSCI110104&presentTerm=2021F&registrationTerm=2021F&authenticated=true&personResponse=&googleSiteKey=6LdV2EYUAAAAACy8ROcSIHHznHJ64bn87jvDqwaf>

The detailed list of goals for CS1 appeared (in a number of different forms, depending on the instructor, but with essentially the same content).

Goals for Enduring Questions appeared on the course syllabus distributed to the students.

- 3) **Other than GPA, what data/evidence is used to determine whether students have achieved the stated outcomes for the Core requirement?** (What evidence and analytical approaches do you use to assess which of the student learning outcomes have been achieved more or less well?)

As CS1 is the gateway course for the computer science major, there is regular feedback from instructors of later courses in our program as to how well prepared the CS1 students are for advanced work—that is, how well they have acquired the concepts and mastered the skills laid out in the documents referred to above.

For the Enduring Questions course, as this is a new course, there is as yet no process in place. The instructor for the course studied the quality of the student work (more project than exam-based) and the feedback from the student evaluations. This was discussed with the instructor of the partner course in the School of Law, with an eye to an eventual repeat.

- 4) **Who interprets the evidence? What is the process?** (Who in the department is responsible for interpreting the data and making recommendations for curriculum or assignment changes if appropriate? When does this occur?)

Every few years, the department undertakes a top-to-bottom review of our program, and how we do CS1 has always been an important part of this review. In the past, when the department was considerably smaller, this has been conducted by meetings of the faculty in the department as a whole. As we have

grown, it has become less convenient to do things in such a large group, and we will designate different groups within the department (e.g., the group of instructors principally responsible for doing CS1) to study different aspects of the program and formulate recommendations.

We intended to conduct such a review this Spring, but the changed teaching circumstances pushed us into emergency mode, and derailed a number of ongoing curricular projects. We will take up this review again in the AY2020-21.

- 5) **What were the assessment results and what changes have been made as a result of using this data/evidence?** (What were the major assessment findings? Have there been any recent changes to your curriculum or program? How did the assessment data contribute to those changes?)

We are planning a significant overhaul of the introductory course, and this will have an impact on our Core offerings.

We have seen a rapid increase in two distinct populations of students. One consists of our majors: taken together, Computer Science has been the fastest-growing major in the college for the past several years. The other is the growing group of non-majors who want to acquire computing and coding skills as an adjunct to their work in their principal fields of interest. These two groups of students have very different needs. Up until now, we have lumped the two together in our introductory course CSCI1101, but it has become increasingly obvious that this is not an ideal arrangement for either group: Too many CS majors were emerging from CSCI1101 deficient in some of the core skills that are critical for continued study in the subject; but many of these same skills are not particularly relevant or useful -- and often too challenging -- for the other group.

Accordingly, we intend to split the introductory course into two different courses, one aimed primarily at majors who will pursue further study in Computer Science, and the other a new course aimed at non-majors. We currently have a subcommittee within the department aimed at developing the new course, which we expect to introduce in Spring, 2022. At the same time, we are implementing some changes in CSCI1101, to ensure that new majors have the appropriate knowledge and skills for further study in the subject. The non-major course may take the form of an updated version of CSCI1074-The Digital World, which, when it was taught, could be used to satisfy the Mathematics Core requirement.

- 6) **Date of the most recent program review.** (Your latest comprehensive departmental self-study and external review.)

AY2018-2019.