

# Computer Science Assessment Plan 2017

June 1, 2017

## **Mission Statement**

The mission of the Wells College computer science major is to produce graduates with both a theoretical and practical foundation in computer science and information technologies. Students' theoretical foundation should be strong enough that they can effectively learn new skills and solve unfamiliar problems outside an academic setting. Students' practical foundation should be strong enough that they can immediately compete for exciting opportunities (academic or professional) upon graduation.

## **Learning Goals and Outcomes**

In accordance with our mission statement, our learning goals fall into categories: theoretical (goals 1 and 2) and practical (goals 3 and 4).

## **Learning Goals**

### **Goal 1. Mathematics and Algorithm Theory**

#### **Objective 1**

Develop the ability to write logical algorithms and mathematical proofs.

#### **Outcome 1**

Students will be able to write and read formal mathematical statements. If such a statement is true, the student will be able to write a proof of it.

## **Measurement**

In both MA212 and CS322, the writing of logical arguments is assessed in graded homework, quizzes, and exams.

## **Objective 2**

Develop the ability to design algorithms that solve abstract problems.

## **Outcome 2**

When given a precise task such as sorting a collection of numbers from greatest to least, students will be able to design and describe (on paper) the structure of an algorithm to perform the task.

## **Measurement**

This outcome is the focus of CS131 and CS132. It is featured prominently in the grading rubric of every graded homework assignment in those classes. Additionally, this outcome is measured in face-to-face discussions between students and the instructor of CS131 and CS132.

## **Goal 2. Algorithm Implementation**

### **Objective 3**

Students will be able transform a description of an algorithm design into functional code that implements the algorithm.

### **Outcome 3**

Students will write code for various projects and assignments. The code will be based on their own algorithm designs, and will effectively perform various functions specified in the project or assignment.

### **Measurement**

This outcome is measured by running the students' code on a set of test inputs to verify that it is syntactically correct and that it performs its required functions.

### **Objective 4**

Students will be able to write code in an organized, well structured manner.

## **Outcome 4**

The code written by students must not only be correct, but be sufficiently organized and comprehensible to be read and used by their peers.

## **Measurement**

This is measured by adherence to proper conventions of organizing and commenting code. Specific guidelines for these conventions will be provided, and students grades will be determined in part by whether their code adheres to these guidelines. Both the students' professors and their peers will provide feedback on this outcome.

## **Goal 3: Technical Expertise**

### **Objective 5**

Develop working knowledge of multiple programming languages.

### **Outcome 5**

Students will develop mastery of the syntax and capabilities of at least two programming languages. At least one of these languages will be an object-oriented language. They will also develop the ability to independently learn any new features of the languages.

## **Measurement**

CS131 and CS132 will be structured in such a way that completing assignments is impossible without a steadily increasing mastery of the languages being taught. Higher level classes will assign projects requiring techniques and approaches that have not been explicitly taught in previous classes. These will force students to learn the critical skill of independently educating themselves in search of solutions to the assignments.

### **Objective 6**

Develop a working knowledge of modern IT tools.

## **Outcome 6**

Students will develop a competitive skill set related to contemporary tools in the areas of databases, operating systems, and the Microsoft office suite.

### **Measurement**

These skills are a necessary prerequisite for completing the projects, group work and exams in CS325, as well as in the pending Data Analytics and Microsoft Office courses. Additionally, these skills will be necessary in order to get and complete the two required summer internships.

## **Goal 4: Professional Standards**

### **Objective 7**

Students will understand the quality of work required for professional projects, and be able to produce work that meets that level of quality.

## **Outcome 7**

The quality and presentation of assignments and projects will be up to the standards that would be expected in a professional environment.

### **Measurement**

The measurement of this outcome will vary according to what year a student is in. First and second year students will not necessarily be expected to produce work of the same professional standard as third and fourth year students. For the more senior students, this outcome will be measured both professors' subjective estimation of the professional quality of their work. We will use the students' ability to successfully apply for and succeed at internships to measure this outcome as well.

## **Outcomes Assessment**

The computer science program at Wells is currently in the first year of a complete overhaul. We are in the process of re-writing the curriculum from top to bottom. The assessment means for the outcomes listed above are not yet fully developed. This is because many of the courses in which these assessments are to take place are still under development and/or haven't yet been taught in their current form. Our plan moving forward is to customize assessment methods for the above

outcomes by looking at a combination of graded events, course evaluations, and students' ability to compete for internships and (after they graduate) jobs.

## **Periodic Evaluation of the Computer Science Assessment Plan**

This assessment plan is a work in progress. As mentioned above, the computer science program is being completely overhauled. The new classes we are designing and the old classes we are updating have not yet been taught in their final versions. Thus the current assessment plan is largely speculative: we are not yet sure what the optimal assessment strategy will be in the framework of the new major. The computer science assessment strategy will be updated annually. It is expected to be in a stable form when all the new courses have been taught at least once. This will take 3-4 years.