

## MaCS Assessment Plan

27 March 2018

### Learning Outcomes

At program graduation, students will

- LO1. have demonstrated proficiency in the main areas of computer science, including data structures and algorithms, computer systems, programming languages, and software development;
- LO2. be able to draw on broad knowledge of computer science to design, implement, and test software solutions to problems in a variety of areas;
- LO3. have demonstrated in-depth understanding of some area of computer science (theoretical foundations, computer systems, software development);
- LO4. have demonstrated proficiency with the calculational techniques and applications of calculus and linear algebra;
- LO5. be able to read and write mathematical proofs, producing arguments that are logically and syntactically correct;
- LO6. have demonstrated an in-depth understanding of some area of mathematics;
- LO7. be able to communicate and collaborate with others, and express ideas orally and in writing.

### Background

The MaCS degree requires that students complete the following core courses:

- CIS 210 – Computer Science I (Computational Thinking)
- CIS 211 – Computer Science II (Object-oriented Programming)
- CIS 212 – Computer Science III (Introductory Data Structures)
- MATH 231, 232 – Elements of Discrete Mathematics I & II
- MATH 251-253 (or 261-263) – Calculus I, II, III (Calculus with Theory I, II, III)
- CIS 313 – Intermediate Data Structures
- CIS 314 – Computer Organization
- CIS 315 – Intermediate Algorithms
- CIS 425 – Principles of Programming Languages
- MATH 341, 342 – Elementary Linear Algebra I & II

There are also a number of courses in both MATH and CIS for which the student chooses one course/sequence from a set of courses. Since this is up to student choice, it is very difficult to use any information from these individual choices in assessing learning outcomes.

### Assessment Methods

The assessment methods will differ for each learning outcome. We will develop and refine the assessment methods over time and with experience, but here is our first estimate of measures, nature of assessment, collection and sources of data, and the nature of sampling.

- LO1. Successful completion of the CIS core courses listed above is required to meet this learning objective. We will track the GPA for graduating students in these courses, looking for improvement in the average GPA from year to year. This will be assessed annually.
- LO2. The two primary courses where students demonstrate their ability to solve large problems using a variety of techniques are CIS 212 and CIS 313. In both cases, the ability to achieve 75% or greater on the assessed programming projects is an indication that students have met this particular learning outcome. Two sections, of approximately equal size, of each

course are taught each year; we will sample the results of student performance in one section of each, CIS 212 and CIS 313 in the Spring quarter and Winter quarter, respectively, guaranteeing that we are not assessing any students twice (CIS 212 is a pre-requisite for CIS 313).

- LO3. Each student has to specialize in a particular track with their CIS elective courses. We are in the process of determining from the faculty in charge of each track how best to assess the student performance in each track. This will be done prior to the start of the 18-19 academic year, so the results can be reported in the fall of 2019.
- LO4. Each student must successfully negotiate the calculus and linear algebra courses. We are in the process of determining from those faculty who deliver these course how best to assess this particular learning outcome. This will be done prior to the start of the 20-21 academic year, so the results can be reported in the fall of 2021.
- LO5. Students have a choice of MATH 317, 347, and 391, where this learning outcome is developed. We will audit selected problems from the final exams in these courses, grading them by an independent committee to see whether the students leaving the courses have actually developed the desired proof skills. This will be assessed biennially.
- LO6. Many of the MATH courses required for the degree are at the discretion of the student. We are in the process of determining from the MATH faculty how best to assess this particular learning outcome. This will be done prior to the start of the 18-19 academic year, so the results can be reported in the fall of 2019.
- LO7. All students are required to complete either WR 320 (Scientific and Technical Writing) or WR 321 (Business Communications). We are in the process of determining from the instructors who deliver those courses how best to address the performance on this learning objective. This will be done prior to the start of the 20-21 academic year, so the results can be reported in the fall of 2021.

### Assessment Processes

Our initial plan for assessing each outcome is shown in the table below; this shows a 4-year cycle for assessing outcomes LO2-LO7, with an annual cycle for LO1, and a biennial cycle for LO5. If a particular outcome assessment indicates a need for a change in the curriculum or particular course syllabi to address an issue, we will revisit that particular outcome 2 years hence.

| Learning Outcome               | AY 17-18 | AY 18-19 | AY 19-20 | AY 20-21 |
|--------------------------------|----------|----------|----------|----------|
| LO1 – technical mastery        | X        | X        | X        | X        |
| LO2 – software development     | X        |          |          |          |
| LO3 – area proficiency         |          | X        |          |          |
| LO4 – calculational techniques |          |          |          | X        |
| LO5 – proof proficiency        | X        |          | X        |          |
| LO6 – math area proficiency    |          | X        |          |          |
| LO7 – communication skills     |          |          |          | X        |

### Status, Outcomes and Results

Over the summer, the CIS Head of Department and Chair of the Undergraduate Education Committee will generate a preliminary report of the assessments of LO1 and the other CIS LO that is to be assessed

in the preceding academic year. This report is distributed to the department faculty in advance of our annual retreat prior to the start of the new academic year, and the report will be discussed by the faculty at the retreat. If action is required, a sub-committee of faculty will be formed to investigate and to report back to the faculty for discussion at our regularly-scheduled faculty meeting in October. Any resulting changes will be factored into curriculum and syllabi as necessary; syllabi changes can be implemented by the time of the next delivery of the affected course, whereas curriculum changes may require that they be introduced in the next academic year.

A similar approach will be taken by the MATH Head of Department and faculty for the MATH-related learning outcomes.

The results of MATH's assessment and any actions triggered will be delivered to the CIS Head of Department by 1 October. These results will be combined with CIS's results to produce a final report that will be delivered to the College of Arts and Sciences in the fall quarter.