

CS MS ASSESSMENTS 19-20

II. SUMMARY OF ASSESSMENT (suggested length of 1-2 pages)

A. Program Learning Outcomes (PLO)

List all your PLO in this box. Indicate for each PLO its alignment with one or more institutional learning outcomes (ILO). For example: "PLO 1. Apply advanced computer science theory to computation problems (ILO 2 & 6)."

PLO1 Apply knowledge of mathematics and computational theory to analyze problems in computer science and assess and determine the resources and requirements needed for their solution.

ILO1: Thinking & Reasoning;

ILO2: Communication

PLO2 Design, develop, and evaluate a computer-based system, process, component, or program to meet desired needs.

ILO1: Thinking & Reasoning; ILO4: Collaboration

PLO3 Classify and explain the mechanisms, components and architecture of computing systems.

ILO1: Thinking & Reasoning

PLO4 Employ current techniques, skills, and tools necessary for computing practice and justify the need for continuing professional development.

ILO1: Thinking & Reasoning

PLO5 Discuss professional, ethical, legal, and security issues and responsibilities, and the impact of computing on individuals, organizations, and society.

ILO1: Thinking & Reasoning;

ILO2: Communication

PLO6 Function successfully on teams to accomplish a common goal and explain computer science concepts effectively in written and oral form.

ILO1: Thinking & Reasoning;

ILO2: Communication;

B. Summary of Assessment Process

Summarize your assessment process briefly using the following sub-headings.

Following our department's 5-year assessment plan, our assessment emphasis was on PLO2 which aligns to the Quantitative Reasoning ILO. The course associated with this PLO and ILO is CS 651 Web Programming.

Other graduate courses assessed were CS 601 Advanced Algorithms, CS 621 Operating Systems, and CS 611 theory of Computation.

Instrument(s): (include if new or old instrument, how developed, description of content)

As part of semester conversion department faculty developed a standard summative assessment for each course. The assessment is in the form of a multiple-choice that is given to each section of each assessed course. These quizzes are deployed through Blackboard during the last two weeks of the course. Department faculty also developed a grading rubric for each assessment. A score of 60% proficiency was chosen to indicate that a student has met expectations for a particular PLO. Prior to semester conversion our department used a similar process; however, assessments were up to each individual instructor meaning multiple sections of the same course would have different assessment tools. Having one standard assessment that all instructors can access improved this process thus allowing comparison between multiple sections of the same course, however,

Sampling Procedure:

As part of semester conversion, our department decided that graduate program assessments would take place in the five courses that all graduate students are required to complete. Elective courses are not assessed. The five required courses include: CS 601 Advanced Algorithms, CS 611 Theory of Computation, CS 621 Operating Systems Design, CS 651 Web Systems, and CS 671 Cybersecurity.

Each assessment has 10 questions. Scores range from 0 – 100.

Each professor is responsible for gathering the assessment results and uploading the results to a shared department Google assessment drive.

Results gathered in the academic 2019-2020 year are for the following courses:

CS 601 Advanced Algorithms, PLO4

CS 611 Theory of Computation, PLO1

CS 621 Advanced Operating Systems, PLO3

CS 651 Web Programming, PLO2 and Quantitative reasoning (per 5 year PLO assessment plan)

Sample Characteristics:

CS 601 Advanced Algorithms, PLO4 - Summary 71.6% Average

CS 611 Theory of Computation, PLO1 – Summary 80% Average

CS 621 Advanced Operating Systems, PLO3 – Summary 93% Average,

CS 651 Web Systems was treated differently this year as it was also included in the university ILO quantitative reasoning assessment. The instructor of this course used the first 5 criteria of the Quantitative Reasoning University Rubric. These criteria include:

- 1) Problem Formulation Translation of the disciplinary/real-world problem into a QR context (e.g., writing a hypothesis, a math model, quantitative instrumentation). Use and interpretation of quantitative data/information to identify or formulate a problem.
- 2) Representation/Visualization Depiction of quantitative information such as visual (e.g., figures, charts, tables, equations) and non-visual (e.g., audio, ADA accessible).
- 3) Quantitative Analysis Selection and use of analytical methods (e.g., data analysis, solution technique).
- 4) Interpretation Description of the meaning of the results in the context of the original problem formulation.

5) Implications Extension of potential application to broader contexts (e.g., predictive values, future directions, ramifications, clinical prognosis, professional and/or civic responsibilities)

For CS 651 Web Systems sixteen questions which were directed at the criteria above were created and given to students through Blackboard. Responses were ranked 1 through 4 with 4 being the highest/best ranking.

There were 25 students assessed in this course. The average of the 25 students' scores for each of the five criteria are listed below:

- 1) 3.333
- 2) 3.518
- 3) 3.148
- 4) 3.925
- 5) 3.851

Data Analysis:

Instructors are asked to evaluate the results of their assessments and to consider adjustments to their lecture topics when a specific PLO or content area is flagged through the assessment as challenging for students. The assessment coordinator also evaluates assessment results and shares them with the graduate committee for areas of concern, curricular adjustments, and general comments.

C. Summary of Assessment Results

Summarize your assessment results briefly using the following sub-headings.

Main Findings:

CS 651 was assessed for PLO2 which states "Design, develop, and evaluate a computer-based system, process, component, or program to meet desired needs." The course was also assessed for quantitative reasoning based on the rubric listed above. The graduate committee was encouraged by the results as they show that the students were very near the highest ranking (4) for each category.

The categories which show need for improvement include problem formulation with interpretation of data and analysis of results using analytic methods.

One of the main changes in our curriculum for semester conversion was to require the course, CS 601 Advanced Algorithms. This course was added to the curriculum because faculty felt improvement in graduate students' programming skills and algorithmic knowledge would help foster success in graduate courses that required advanced programming skills. From the results of the assessment of CS 601, PLO4 is being met, and students are obtaining the skills and knowledge of tools to support their advanced studies, but there is still improvement to be made. We also find that PLO1 is also being met by CS 611 Theory of computation 80th percentile. Results for PLO 3 in CS 621 are excellent being in the 90th percentile. The department is pleased with the results of these assessments, and we do not have plan to change curriculum or prerequisites for these courses at this time.

Recommendations for Program Improvement: (changes in course content, course sequence, student advising)

From our ILO assessment we found that "problem formulation with interpretation of data and analysis of results using analytic methods" could be improved. To address this criterion, we will ask faculty to consider including more examples and training of these processes in their courses. With our new equipment grants we can provide "hands on" equipment-based courses and project-based learning which will include data collection analysis and interpretation of results.

Next Step(s) for Closing the Loop: (recommendations to address findings, how & when)

Our findings will be disseminated to the department graduate committee and then to the department at large. Working to ensure faculty and lecturers remember to complete the assessment process and upload results remains a challenge. We are looking for an easier more automatic way to retrieve and post results.

Other Reflections:

The process of semester conversion was useful in evaluating and addressing curricular and student needs. The process allowed us to create a more uniform method of assessment. We have changed

some of our assessment questions to address the PLOs more clearly. As we move forward, our department will continue to evaluate results and the assessments themselves and adjust accordingly.

D. Assessment Plans for Next Year

Summarize your assessment plans for the next year, including the PLO(s) you plan to assess, any revisions to the program assessment plan presented in your last five-year plan self-study, and any other relevant information.

Based on our department's five-year assessment plan, our emphasis will be on PLO3 which is addressed in CS 621 Operating systems. We will not be assessing an ILO next year as PLO3 is not aligned with a campus ILO.