Institutional Effectiveness Report

Name of the Program/Department: BS in Computer Science

Year: 2017/2018

Name of the Preparer: M. Padmaja Rao

Mission

The Computer Science Department aims to instill in our students a sound knowledge of all key domains of the computing sciences while encouraging critical thinking, teamwork, innovation, and a lifelong love for learning. We have a vision of graduating engineers, who are ethical, creative in problem solving, effective communicators, respectful of their peers, and have a desire to serve their community. Our internship program and placement efforts actively assist students in finding computing jobs.

Program Learning Outcomes

1. Computer Science students at FMU will DEVELOP AND DEMONSTRATE critical thinking skills along with creativity to ANALYZE and solve software engineering and computational problems.
2. Computer Science students at FMU will DEVELOP AND DEMONSTRATE the ability to effectively communicate technical knowledge through presentations and writings.
3. Computer Science students at FMU will DEMONSTRATE an understanding of ethical challenges that may arise in the field of software engineering and be guided by high ethical standards.
4. Computer Science students at FMU will DEMONSTRATE that they know the core concepts within each computer science discipline: programming, computer architecture, software engineering, algorithms, operating systems, compiler theory, theory of computation, and database management.

Executive Summary

During the 2017-2018 academic year, the Computer Science program assessed five Student Learning Outcomes (SLOs). The SLOs covered areas such as ethics, written and oral communication skills, critical thinking ability, and creative problem solving.
The CS program employed department-developed rubrics and holistic evaluations in assessing the five SLOs. We measured two of the five SLOs by presenting eleven juniors in CS 340, Software Design and Development, with an ethics module that consisted of a series of readings, case studies, and discussion questions that engaged the student in ethical reflection. All the

1

eleven students were evaluated by two faculty members using ethics and written communication rubrics. The other three SLOs were measured in CS 480 (Capstone I)/CS 482 (Capstone II) through the capstone projects of graduating seniors who presented their projects at the annual Computer Science Symposium. All ten graduating seniors were evaluated by two faculty members using critical thinking, creative problem solving, and oral communication rubrics. We aimed to have 80% of student meet or exceed expectations for each SLO; therefore, we achieved our target for each of the five SLOs as 82%-100% of students met or exceeded expectations in their demonstration of ethical reasoning, written and oral communication, critical thinking ability, and creative problem-solving skills.

Based on these findings, the Computer Science program will continue to implement some strategies to increase student involvement and interdisciplinary thinking and anticipate seeing improved markers in the Class of 2019.

Student Learning Outcomes

SLO 1.0 – ETHICS: Eighty percent (80%) of students in CS 340 (2015-2016 baseline:100%) will meet or exceed the expectations when identifying elements and dilemma, relationships among direct and indirect stakeholders, positive and negative issue consequences and DEMONSTRATE the ability to recommend a response that balances the positive and negative consequences for the stakeholders in ethics case study modules.

SLO 2.0 – WRITTEN COMMUNICATION: Eighty percent (80%) of students in CS 340 (2015-2016 baseline = 93.75%) will meet or exceed the expectations when DEMONSTRATING the proper use of vocabulary, organized presentation of information, thoughtful presentation of well-reasoned arguments, and written reports which are free of grammatical and spelling errors in their response to ethics case study modules.

SLO 3.0 – ORAL COMMUNICATION: Eighty percent (80%) of students in CS 480/CS 482 (2015-2016 baseline: 100%) will meet or exceed the expectations when demonstrating the proper use of vocabulary, organized presentation of information, appropriate amount of eye contact with audience, effective use of body language, minimal use of written notes, and understandable projection of voice in their presentation of their final capstone project.

SLO 4.0 – CRITICAL THINKING: Eighty percent (80%) of students in CS 480/CS 482 (2015-2016 baseline: 100%) will meet or exceed expectations when identifying and understanding the information systems problem at their heart of their project, gathering and managing functional and non-functional requirements, implementing risk management, implementing project timeline and team management, and implementing a viable solution that meets functional and non-functional requirements for their self-assigned projects.

SLO 5.0 – CREATIVITY: Eighty percent (80%) of students in CS 480/CS 482 (2015-2016 baseline: 100%) will meet or exceed expectations in their approach to solving business problems by demonstrating creative ability, elaborate on the problem in ways to show insights beyond the stated situation, identifying components of the situation that are beyond the given information, identifying unanswered questions that are of consequence to the solution, and developing a

solution that transforms the assumptions of the situation and can be feasibly implemented in the context of their self-assigned projects.

Assessment Methods

SLO 1.0 - ETHICS Eighty percent (80%) of students in CS 340 (2015-2016 baseline:100%) will meet or exceed the expectations when identifying elements and dilemma, relationships among direct and indirect stakeholders, positive and negative issue consequences and DEMONSTRATE the ability to recommend a response that balances the positive and negative consequences for the stakeholders in ethics case study modules. This will be evaluated by two faculty members using a departmentally-developed rubric assessing student responses to a standardized ethics module.

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Assessment Results

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The assessment results are from Spring 2018

	Benchmark	CS 340	CS 480/CS 482
Ethics	80%	91%	
Written Communication	80%	82%	
Oral Communication	80%		90%
Critical Thinking	80%		90%
Creative Problem Solving	80%		100%

Table 4: Assessment results from Spring 2018

SLO 1.0: Ethical reasoning Computer Science students will be aware of ethical issues that they might encounter in the context of practicing software engineering.

- 91% of juniors in CS 340 met or exceeded expectations in ethics.
- **We conclude that the benchmark has been achieved** since over 80% of the student met or exceeded expectations in the Spring of 2018.

SLO 2.0: Computer Science students will be able to demonstrate superior written communication skills

- Written communication skills have been assessed at the junior level. 82% of the students met or exceeded expectations in the Spring 2018.
- **We conclude that the benchmark has been achieved.** Over 80% of the student met or exceeded expectations in Spring 2018.

SLO 3.0: Computer Science students will be able to demonstrate superior oral communications skills

- Graduating seniors were tested in CS 480/CS 482 for oral communication skills. 90% of the seniors met or exceeded expectations in oral communication in their capstone projects in Spring 2018.

5

- **We conclude that the benchmark has been achieved**. Over 80% of the student met or exceeded expectations in Spring 2018.

SLO 4.0: Computer Science graduates will analyze information system problems critically and logically.

- 90% of graduating seniors tested met or exceeded expectations using critical thinking in their capstone projects in Spring 2018.
- **We conclude that the benchmark has been achieved**. Over 80% of the student met or exceeded expectations in Spring 2018.

SLO 5.0: Computer Science graduates will demonstrate creativity in their approach to solving information systems problems.

- 100% of the graduating seniors met or exceeded expectations giving creative solutions in their capstone projects in Spring 2018.
- **We conclude that the benchmark has been achieved**. Over 80% of the student met or exceeded expectations in Spring 2018.

Action Items

The Computer Science faculty would like to aim to have all our students exceed expectations especially in the areas OF oral and written communications and ethics.

1. Oral Communication
   In their junior year, Computer Science students do a presentation in CS 340. Although the course instructor (Rao) does review the presentation with the respective student, the CS faculty concluded that students would benefit more from a review of video-taped presentations and have begun implementing this method with the Class of 2018. As we expected this experience and analysis did have a positive impact on their senior capstone presentations at the Computer Science Symposium in Spring 2018. We will continue to implement this action. We also plan on incorporating an extra practice session with reflection component before the seniors' presentations at the CS Symposium in Spring 2019.
2. Written Communications
   English 318, Technical Writing, is a requirement for Computer Science majors. The CS faculty would like to continue to work closely with the Technical Writing instructor so that the course includes an emphasis of content organization and depth of discussion. We would also like to make it mandatory that students will have to have a minimum of one visit to the writing center before submitting their writings.
3. Ethics
   In their junior year, the CS 340 instructor (Rao) introduced ethics discussions using the ACM/IEEE Software Engineering Code of Ethics. This was followed by giving the students a software engineering module which consists of a series of readings, case studies and discussion questions that engage the student in ethical reflection. Students were given six weeks to complete the assignment. The CS faculty believed that the students should be given one or more examples on how to approach the discussions in the module before

6

beginning the assignment which might result in broader and deeper discussions. This proved to be true with 2017-2018 juniors. Rao will continue to implement this action with the 2018-2019 junior class.

4. Critical Thinking

    In their junior year, in CS 313 (Systems Design and Development) and CS 340 (Software Design and Development), the juniors design and implement an information system. The CS faculty would like there to be a greater emphasis in these courses on the requirement document as an evolving document which is to be updated and evaluated all throughout the design and implementation of their systems. The students' final projects should be even more strictly evaluated for adhering to this document or meeting requirements. This process should be followed again in CS 480/CS 482, with the capstone projects. We believe this will result in the improvement of the students conceptional and analytical skills.