

Department of Computer Science

Assessment Plan

September 29, 2020

1. Student Outcomes

The following ABET Computing Accreditation Commission (CAC) student outcomes are used for program assessment:

- 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- 2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- 3) Communicate effectively in a variety of professional contexts.
- 4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- 5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- 6) **[CS]** Apply computer science theory and software development fundamentals to produce computing-based solutions.
- 6) **[IS]** Support the delivery, use, and management of information systems within an information systems environment.

2. Curriculum Map – Computer Science

Core Courses	Student Outcomes					
	1	2	3	4	5	6cs
Area B3 (of General Education) Course, Science Course with a Lab	I				I	
<i>CSCI 111, Programming and Algorithms I</i>	I	I		I		I
MATH 120, <i>Analytic Geometry and Calculus</i>	I	I				I
MATH 121, <i>Analytic Geometry and Calculus</i>	I	I				I
<i>CSCI 211, Programming and Algorithms II</i>	P	P		P		P
PHYS 204A, <i>Mechanics</i>	I	I				
PHYS 204B, <i>Electricity and Magnetism</i>	I	I				
<i>CSCI/MATH 217, Discrete Mathematics</i>	P	P				P
EECE 237, <i>Embedded System Programming</i>	P	P				P
<i>CSCI 301, Computer's Impact on Society</i>		P	A	A		P
<i>CSCI 311, Algorithms and Data Structures</i>	P	A				A
MATH 314, <i>Probability and Statistics for Science and Technology</i>	P	P	P	P		
EECE 320, <i>Computer Architecture</i>	P	P	P	P		P
CSCI 340, <i>Operating Systems Programming</i>	P	A		P		A
<i>CINS 370, Introduction to Databases</i>	P	A	P	P	A	A
CSCI 430, <i>Software Engineering</i>	P	A		P	A	P
<i>CSCI 446, Introduction to Computer Networks and Network Management</i>	P	P		P	A	P
<i>CINS 448, Survey of Computer Security</i>	P	P		A	A	P
<i>CINS 465, Web Programming Fundamentals</i>	P	A	P	P		A
<i>CSCI 490, Senior Capstone</i>	A	A	A	P		P
CSCI 515, <i>Compiler Design</i>	A	P	P	P		A
CSCI 550, <i>Design and Analysis of Algorithms</i>	A	A	P	P		A
CSCI 551, <i>Numerical Methods and Parallel Programming</i>	A	P				A
CSCI 580, <i>Artificial Intelligence</i>	A	P	P	P		A

Note: Courses in red are common with the CINS program.

I=Introduced, P=Practiced, A=Assessed

3. Curriculum Map – Computer Information Systems

Core Courses	Student Outcomes					
	1	2	3	4	5	6s
ECON 103, <i>Principles of Microeconomics</i>	I	I				I
MATH 105, <i>Statistics</i>	I	I				
MATH 109, <i>Survey of Calculus</i>	I	I				
<i>CSCI 111, Programming and Algorithms I</i>	I	I		I		I
ACCT 201, <i>Introduction to Financial Accounting</i>	I	I		I		I
ACCT 202, <i>Introduction to Managerial Accounting</i>	I	I		I		I
<i>CSCI 211, Programming and Algorithms II</i>	P	P		P		P
<i>CSCI/MATH 217, Discrete Mathematics</i>	P	P				
CINS 220, <i>PCs and Peripherals</i>	P	P			I	I
CINS 242, <i>Information Systems Design</i>	P	P	P		P	P
<i>CSCI 301, Computers Impact on Society</i>		P	A	A		P
MINS 301, <i>Computer Technology Integration</i>		P		P	P	P
BLAW 302, <i>Managing the Legal Environment</i>		P		P	P	P
MGMT 303, <i>Survey of Management</i>		P			P	P
MKTG 305, <i>Survey of Marketing</i>		P			P	P
FINA 307, <i>Survey of Finance</i>	P	P				P
<i>CSCI 311, Algorithms and Data Structures</i>	A	A				P
<i>CINS 370, Introduction to Databases</i>	P	A	P	P	A	A
<i>CSCI 446, Introduction to Computer Networks and Network Management</i>	P	P		P	A	P
<i>CINS 448, Survey of Computer Security</i>	P	P		A	A	P
<i>CINS 465, Web Programming Fundamentals</i>	P	A	P	P		A
<i>CINS 490, Senior Capstone</i>	A	A	A	P		P

Note: Courses in red are common with the CSCI program.

I=Introduced, P=Practiced, A=Assessed

4. Assessment Schedule

STUDENT OUTCOMES		2019-2020		2020-2021		2021-2022	
		Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022
(1)	Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	C	A	E	C	A	E
(2)	Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	E	C	A	E	C	A
(3)	Communicate effectively in a variety of professional contexts.	C	A	E	C	A	E
(4)	Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	E	C	A	E	C	A
(5)	Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	C	A	E	C	A	E
(6)	Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	E	C	A	E	C	A
	Support the delivery, use, and management of information systems within an information systems environment. [IS]						

Legend: (A)ssess, (E)valuate, (C)hange, if necessary

Additional detail regarding the planned assessment schedule (highlighted names indicate assessment data will be collected from those people):

Semester	Student Outcomes	Direct Assessment Data Sources
Spring 2020	(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	490 (Dixon, Gibson, Henry) 515 (Gibson) 550 (Harris) 551 (Challinger) 580 (Juliano)
	(3) Communicate effectively in a variety of professional contexts.	301 (Hubbard) 490 (Buffardi, Dixon, Gibson, Henry)
	(5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	370 (Raigoza, Renner) 430 (Buffardi) 446 (Kredo, Mamalakis) 448 (Zeichick)
Fall 2020	(2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	311 (Challinger, Harris) 340 (Dixon) 370 (Raigoza, Renner) 430 (Buffardi) 465 (Dixon, Herring) 490 (Buffardi, Dixon, Gibson, Henry, Herring, Renner, Siewert, Tillquist) 411 (Harris, Tillquist)
	(4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	301 (Richter) 448 (Zeichick) 580 (Juliano)
	(6) Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	311 (Challinger, Harris) 340 (Dixon) 370 (Raigoza, Renner) 465 (Dixon, Herring) 515 (Gibson) 551 (Siewert) 580 (Juliano)
	Support the delivery, use, and management of information systems within an information systems environment. [IS]	370 (Raigoza, Renner) 465 (Dixon, Herring)

5. Performance Indicators

The following performance indicators will be used to gather evidence of student attainment of the ABET CAC student outcomes. Select performance indicators based on a course experience (*e.g.* activity, deliverable, exam question, homework problem) you are already having students do or complete.

- 1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.**
 - a) Demonstrate the ability to evaluate algorithms, to select from a range of possible options, to provide justification for that selection, and to implement the algorithm in a particular context.
 - b) Use a divide-and-conquer algorithm to solve an appropriate problem.
 - c) Solve problems using fundamental graph algorithms, including depth-first and breadth-first search.
 - d) Determine an appropriate algorithmic approach to a problem.
 - e) Use a greedy approach to solve an appropriate problem and determine if the greedy rule chosen leads to an optimal solution.
 - f) Use dynamic programming to solve an appropriate problem.
- 2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.**
 - a) Design and implement a large scale project from a set of requirements.
 - b) Use a programming language to implement, test, and debug algorithms for solving problems.
 - c) Design and Implement a simple web application.
 - d) Construct and debug programs using the standard libraries available with a chosen programming language.
 - e) Construct, execute and debug programs using a modern IDE and associated tools such as unit testing tools and visual debuggers.
 - f) Solve problems using graph algorithms, including single-source and all-pairs shortest paths, and at least one minimum spanning tree algorithm.
- 3) Communicate effectively in a variety of professional contexts.**
 - a) Demonstrates organized communication through various modes (*e.g.* oral, written, visual).
 - b) Uses evidence and logic purposefully in communication.
 - c) Listens actively to others; analyzes and responds to the information or viewpoints presented.
 - d) Uses technology purposefully to enhance the communication of ideas and information.
- 4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.**
 - a) Identify ethical issues that arise in software development and determine how to address them technically and ethically.
 - b) Evaluate the professional codes of ethics from the ACM, the IEEE Computer Society, and other organizations.
 - c) Analyze a global computing issue, observing the role of professionals and government officials in managing this problem.
 - d) Describe the mechanisms that typically exist for a professional to keep up-to-date.

5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

- a) Demonstrate through involvement in a team project the central elements of team building and team management.
- b) Contribute to a small-team code review focused on component correctness.
- c) Assess and provide feedback to teams and individuals on their performance in a team setting.
- d) Discuss common behaviors that contribute to the effective functioning of a team.
- e) Create a team by identifying appropriate roles and assigning roles to team members.
- f) Identify and justify necessary roles in a software development team.
- g) Apply a conflict resolution strategy in a team setting.
- h) Understand the sources, hazards, and potential benefits of team conflict.
- i) Create and follow an agenda for a team meeting.

6) [CS] Apply computer science theory and software development fundamentals to produce computing-based solutions.

- a) Implement and host a data-based web application.
- b) Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, and between PDAs and CFGs.
- c) Use a divide-and-conquer algorithm to solve an appropriate problem.
- d) For each of the strategies (brute-force, greedy, divide-and-conquer, recursive backtracking, and dynamic programming), identify a practical example to which it would apply.
- e) Determine a language's place in the Chomsky hierarchy (regular, context-free, recursively enumerable).
- f) Implement context-sensitive, source-level static analyses such as type-checkers or resolving identifiers to identify their binding occurrences.
- g) Discuss the concept of finite state machines.
- h) Student will be able to apply computing principles to identify solutions.
- i) Explain why the halting problem has no algorithmic solution.

6) [IS] Support the delivery, use, and management of information systems within an information systems environment.

- a) Implement and host a data-based web application.
- b) Create a relational database schema in SQL that incorporates key, entity integrity, and referential integrity constraints.
- c) Critique an information application with regard to satisfying user information needs.
- d) Prepare a relational schema from a conceptual model developed using the entity-relationship model.
- e) Explain measures of efficiency (throughput, response time) and effectiveness (recall, precision).
- f) Describe approaches to scale up information systems.
- g) Identify issues of data persistence for an organization.
- h) Compare and contrast information with data and knowledge.
- i) Describe how humans gain access to information and data to support their needs.