

APPLIED COMPUTER SCIENCE

Dr. James Cercone, Chair Data and Computer Science

Mission Statement

The mission of the Applied Computer Science program is to provide students with the knowledge and technical skills needed to pursue successful careers in a number of different computing fields including software development, network administration, mobile computing and web-based applications.

Employment of computer scientists is projected to grow 24 percent from 2016 to 2026, much faster than the average for all occupations. Software developers and computer scientists will be needed to respond to an increased demand for computer software. In addition, the median annual wage for computer scientists who specialize on the application side was \$101,790 in May 2017 and the median annual wage for computer scientists who specialize in systems software was \$107,600 in May 2017 (United States Department of Labor, Bureau of Labor Statistics, 2018). Cybersecurity is an increasingly relevant field in today's world. In her September 2016 remarks, U.S. Commerce Secretary Penny Pritzker indicated that employers nationwide face a shortfall of over 200,000 cybersecurity specialists (United States Department of Commerce, U.S. Census Bureau).

Program Description

Applied Computer Science emphasizes the application of algorithms for addressing, processing, storing, and transmitting information. The core curriculum in Applied Computer Science, involving a blend of theory and practice, offers opportunities for problem solving in many areas and provides experience with a variety of computer languages and software packages which apply to both networks and mobile platforms. The program features a truly distinctive two semester professional work experience comprised of a 10 credit Co-op and a 12 credit capstone Co-op both of which provide students with the opportunity to gain practical experience through placements with technology companies and educational providers specializing in program development.

An optional Cyber Security concentration is available within the Applied Computer Science Program that offers the student additional course work in the practical aspects of writing and analyzing secure code.

Program Outcomes

The graduate will:

1. Apply knowledge of mathematics and computational theory to analyze problems in computer science and identify and define the resources and requirements needed for their solution.
2. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.

3. Recognize and distinguish the mechanisms, components, and architecture of computing systems.
4. Employ current techniques, skills, and tools necessary for computing practice, and recognize the need for continuing professional development.
5. Identify professional, ethical, legal, and security issues and responsibilities, and the impact of computing on individuals, organizations, and society.
6. Perform successfully on teams to accomplish a common goal and communicate computer science concepts effectively in written and oral form.

What You Will Study

The Applied Computer Science degree program requires a minimum of 121 credits, including 76 credits of academic work, including 7 credits of mathematics, and 24 credits of co-op and capstone experiences.

Standard Four-Year Path

FRESHMAN YEAR			
FALL SEMESTER		SPRING SEMESTER	
COMM 101 Freshman Writing I	3	COMM 102 Freshman Writing II	3
Humanities Flex Course	3	MATH 201 Calculus 1 (STEM Flex)	4
COSC 110 Computer Science 1 (STEM Flex)	3	COSC 120 Computer Science 2	3
COSC 110L Computer Science 1 Lab	1	COSC 120L Computer Sci. 2 Lab	1
Elective *	3	SPCH 103 Speech (embedded)	3
UNIV 104 College Motivation & Success	3	UNIV 105 Foundations of Character & Leadership	3
TOTAL CREDITS	16	TOTAL CREDITS	17

* Math 123 (if needed)

SOPHOMORE YEAR

FALL SEMESTER		SPRING SEMESTER	
MATH 225 Discrete Math (Elective Flex)	3	MATH 230 Linear Algebra	3
COSC 280 Data Structures	3	MATH 240 Prob and Stat	3
COSC 240 Digital Logic	3	COSC 315 Database Systems	3
COSC 240L Digital Logic Lab	1	COSC 250 Comp Arch & Org	3
Humanities Flex Course	3	Soc. Sci. Flex Course	3
Restricted Flex Elective **	3		
TOTAL CREDITS	16	TOTAL CREDITS	15

JUNIOR YEAR

FALL SEMESTER		SPRING SEMESTER	
COCS 390 CS Workshop 1	1	COSC 391 CS Workshop 2	1
COSC 310 Software Engineering	3	COSC 355 Mobile Computing	3
COSC 360 Web App Development	3	COSC 340 Operating Systems	3
COSC 330 Embedded Systems	3	COSC 420 Adv CS Math	3
COSC 345 Computer Networks	3	Restricted Elective **	3
Restricted Elective **	3	Restricted Elective **	3
TOTAL CREDITS	16	TOTAL CREDITS	16

SENIOR YEAR

FALL SEMESTER		SPRING SEMESTER	
COSC 440 Co-op Experience	10	COSC 450 Capstone	12
Soc. Sci. Flex Course	3		
TOTAL CREDITS	13	TOTAL CREDITS	12

** Restricted electives are pre-approved from any COSC, DASC, or CYBER offerings. Other restricted electives require departmental approval.

121 Credit Hours Total

Admission Requirements

Students must gain general admission to the University of Charleston. A visit to campus to meet with Admissions personnel and program faculty is strongly encouraged.

- Students must have a 27 ACT math score, or they must have completed MATH 123 before they are able to enroll in MATH 201.
- In order to graduate, a student must receive a minimum grade of “C” for each of the program courses.
- Applied Computer Science majors must meet all University of Charleston graduation requirements and successfully complete the Applied Computer Science Capstone course.

CYBER SECURITY CONCENTRATION IN APPLIED COMPUTER SCIENCE

Cybersecurity programs typically provide a firm background in the detection, protection, policies and procedures surrounding computer software and communications. The Cybersecurity Concentration within the BS Applied Computer Science has chosen an alternate path with a more “nuts and bolts” approach. The program concentrates on the "mechanics" of software in terms of security as a complement to more traditional Cyber Security programs.

The Cybersecurity Concentration extends the Applied Computer Science offerings through study of the actual means of developing safe secure code, how to do a deep dive (assembly language) into existing code development, how to examine "infected" code (computer forensics), broaden students’ background with a second widely used operating system on the server side (Linux), how to control remote systems and push out patches (computer scripting), and generally concentrate on code related security matters as opposed to management issues.

Standard Four-Year Path

FRESHMAN YEAR					
FALL SEMESTER			SPRING SEMESTER		
COMM 101	Freshman Writing I	3	COMM 102	Freshman Writing II*	3
HUM Course	Humanities Flex	3	MATH 201	Calculus 1 STEM Flex	4
COSC 110	Computer Science 1	3	COSC 120	Computer Science 2	3
COSC 110L	Computer Science 1 Lab	1	COSC 120L	Computer Sci. 2 Lab	1
	Flex Elective *	3	SPCH 103	Speech (embedded)	3
UNIV 104	College Motivation	3	UNIV 105	Foundations	3
TOTAL CREDITS		16	TOTAL CREDITS		17

* Math 123 (if needed)

**SOPHOMORE
YEAR**

FALL SEMESTER			SPRING SEMESTER		
MATH 225 Discrete Math STEM Flex	3		COSC 220 Assembly Language		3
COSC 280 Data Structures	3		MATH 240 Prob and Stat		3
COSC 240 Digital Logic	1		COSC 315 Database Systems		3
COSC 240L Digital Logic Lab	3		COSC 250 Comp Arch & Org		3
COSC 230. Linux	3		SSCI Soc. Sci. Flex Course		3
HUMN Humanities Flex Course	3				
TOTAL CREDITS	16		TOTAL CREDITS		15

JUNIOR YEAR

FALL SEMESTER			SPRING SEMESTER		
COCS 395 CS Workshop 1	1		COSC 396 CS Workshop 2		1
COSC 310 Software Engineering	3		COSC 355 Mobile Computing		3
COSC 360 Web App Development	3		COSC 340 Operating Systems		3
COSC 330 Embedded Systems	3		COSC 325. Computer Scripting		3
COSC 345 Computer Networks	3		COSC 460. Secure Code		3
Restricted Flex Elective **	3		COCS 470. Computer Forensics		3
TOTAL CREDITS	16		TOTAL CREDITS		16

SENIOR YEAR

FALL SEMESTER			SPRING SEMESTER		
COSC 440 Co-op Experience	10		COSC 450. Capstone		12
SSCI Soc. Sci. Flex Course	3				
TOTAL CREDITS	13		TOTAL CREDITS		12

** Restricted electives are pre-approved from any COSC, DASC, or CYBER offerings. Other restricted electives require departmental approval.

121 Credit Hours Total

Applied Computer Science Workshop and Co-op Experience

Students gain valuable “applied” knowledge through a series of work experiences. Entering the junior year, students are required to complete a two semester on campus workshop followed by an extensive senior year off campus experience.

CS Workshop 1 (1 hr) on campus

CS Workshop 2 (1 hr) on campus

CS Co-op 1 (10 hrs)

CS Capstone Co-op 2 (12 hrs)

This scheme is designed for flexibility. **Normally Co-op 1 and Co-op 2 will be a two-semester sequence during the senior year.**

Student athletes who participate in fall or spring sports can request a variance such that the Co-op sessions can be split to accommodate their participation in sports. Students should be aware that degree completion may require one additional semester of enrollment if they chose that option.

Transfer students or students with unusual situations may also consider an alternate Co-op schedule, again recognizing the potential need for an additional semester for degree completion.

	Jr. Fall	Jr. Spring	Jr/Sr Summ	Sr Fall	Sr Spring
Main	CS W1	CS W2		Co-op 1	Co-op 2
Alt 1	CS W1	CS W2	Co-op 1	Co-op 2	<i>(Spring Sport</i>
Alt 2	CS W1	CS W2	Co-op 1	<i>(Fall Sports ?</i>	Co-op 2

Possible Co-op Schedules Computer Science Workshop 1 & 2

The students will complete two “CS Workshops” on campus would during the sophomore/ junior year. The student will serve in one of several different capacities (all under department supervision) as part of these workshops. Possible assignments include:

1. Provide lab support to become familiar with typical problems and issues dealing with our “student” customers.
2. Be assigned to work with UCs IT departments to provide additional IT support.
3. Assigned to specific projects housed in other academic units.

Co-op 1

The Co-op 1 is mainly intended for the fall semester and requires students to work full time at an offsite location. Note, this represents a 10 to 14-week session. Students will additionally be expected to complete a 3 hours general core course on-line. A 12-hour version of Co-op 1 is available for the exceptional student. Students can arrange with their Co-op employers for mutually agreed upon additional work hours.

Ideally, Co-op 1 will be connected to a Spring Co-op 2 (the Capstone Internship) so that a 28-week connected project can be completed.

Co-op 1 can be a standalone experience allowing for students with unusual circumstances, the occasional campus-based co-op, or transfer considerations to be accommodated.

Co-op 2 Capstone Internship

This is an off campus required industry/government supported Co-op. It is intended to be a 14-week session coupled with weekly skype evening class meetings. Students will be paired with external agencies to work on a well-defined project that can be documented and publicly presented.

The capstone Co-op 2 experience will normally be a continuation of Co-op 1. In some cases, the Co-op 1 and Co-op 2 experiences may not be coupled.

APPLIED COMPUTER SCIENCE MINOR

Students pursuing other academic majors may complete a 20 hour Applied Computer Science Minor.

COSC 110/110L	Computer Science I & Lab	4
COSC 120/120L	Computer Science 2 & Lab	4
COSC 280	Data Structures	3
COSC 315	Intro to Database Systems	3
COSC 340	Operating Systems	3
COSC 345	Computer Networks	3
Total Credits		20