

Bachelor of Science in Computer Science

The Bachelor of Science in Computer Science at APUS comprises a rigorous, balanced curriculum including topics in both hardware and software, focusing on cyber operations. Students will have a comprehensive program of study in computer science and also be able to take a deep-dive by selecting a concentration in specific areas of interest such as communications and artificial intelligence. Our online computer science degree is designed to enable working professionals to quickly excel in rapidly growing fields within computer science, e.g. software and application developers, computer scientists, system software developers, computer programmers, and more. The Bachelor of Science in Computer Science at APUS can prepare students for challenging professional endeavors or for ongoing graduate work in Computer Science.

This program has specific admission requirements.

Degree Program Objectives

In addition to the institutional and degree level learning objectives, graduates of this program are expected to achieve these learning outcomes:

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the computer science discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

Programmatic Admission Requirements

For admission to the BS of Computer Science, applicants must have completed preparation in mathematics equivalent to pre-calculus or higher. A review of high school or college transcripts showing completion of this requirement will be conducted during the admission process.

Degree at a Glance

Code	Title	Semester Hours
	General Education Requirements	30
	Major Required	68
	Select one of the following concentrations:	18
	Artificial Intelligence (p. 3)	
	Cyber Operations (p. 3)	
	Final Program Requirements	6
	Total Semester Hours	122

Degree Program Requirements

General Education Requirements (30 semester hours)

Code	Title	Semester Hours
Arts and Humanities (6 semester hours)¹		
STEM270	Thinking and Acting Ethically	3
Select 1 courses from the following:		3
ARAB100	Arabic I	
ARAB101	Arabic II	
ARTH200	Art Appreciation	
ARTH241	Film and Literature	
DSIN141	Image Enhancement using Adobe Photoshop	
FREN100	French I	
FREN101	French II	
GERM100	German I	
GERM101	German II	
JAPN100	Introduction to Japanese	
LITR215	Literature of American Encounters, Revolution, and Rebellion	
LITR218	From Abolition to #MeToo: Literature of the American Civil Rights Movement	
LITR222	Pivotal Figures in Early British Literature	
LITR225	British Literature from Wordsworth through the Wasteland	
LITR231	Leadership in World Literature: Antiquity to the Early Modern Period	
LITR233	Literature of the Newly Globalized World: The Individual’s Struggle to Adapt	
MUSI200	Music Appreciation	
MUSI250	World Music and Cultures	
PHIL101	Introduction to Philosophy	

PHIL110	Critical Thinking
PHIL200	Introduction to Ethics
PHIL202	Philosophy of Science
PORT100	Introduction to Brazilian Portuguese
RELS201	Introduction to World Religions
RUSS100	Russian I
SPAN100	Spanish I
SPAN101	Spanish II

Civics, Political and Social Sciences (6 semester hours)

STEM280	Exploring Society and Cultures via Science Fiction	3
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Select 1 courses from the following: 3

ANTH100	Introduction to Anthropology
ANTH202	Introduction to Cultural Anthropology
CHFD220	Human Sexuality
COMM211	Social Media and Society
COMM240	Intercultural Communication
ECON101	Microeconomics
ECON102	Macroeconomics
EDUC200	Humane Education: A Global Interdisciplinary Perspective
GEOG101	Introduction to Geography
HOSP110	Practical Food Safety and Awareness
IRLS210	International Relations I
LITR212	Forgotten America—Under Represented Cultures in American Literature
LITR235	Four Points of the Compass: Culture and Society Around the World
POLS101	Introduction to Political Science
POLS210	American Government I
PSYC101	Introduction to Psychology
SOCI111	Introduction to Sociology
SOCI212	Social Problems
SOCI220	American Popular Culture

Communication: Writing, Oral, and Multimedia (9 semester hours)

COMM120	Information and Digital Literacy	3
ENGL110	Making Writing Relevant	3

Select 1 course from the following: 3

COMM200	Public Speaking
ENGL101	Proficiency in Writing
ENGL115	Argumentation and Rhetoric
ENGL210	Introduction to Literature
ENGL220	Technical Writing
ENGL221	Scientific Writing
ENGL226	Effective Business Communication

HRMT101	Human Relations Communication
IRLS200	Information Literacy and Global Citizenship
ITCC231	Introduction to Information Technology Writing
MGMT100	Human Relations

History (3 semester hours)

STEM185	The History and Context of STEM	3
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Mathematics and Applied Reasoning (3 semester hours)

MATH225	Calculus	3
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Natural Sciences (3 semester hours)

STEM100	Introduction to STEM Disciplines	3
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Total Semester Hours 30

¹ All literature courses require successful completion of ENGL101 - Proficiency in Writing or ENGL110 - Making Writing Relevant.

Major Required (68 semester hours)

Code	Title	Semester Hours
SCIN233	Physics I with Lab	4
MATH210	Discrete Mathematics	3
MATH226	Calculus II	3
MATH220	Linear Algebra	3
SCIN234	Physics II with Lab	4
CSCI140	Introduction to Programming	3
CSCI150	Digital Systems I	3
CSCI210	Introduction to Networking	3
CSCI240	Algorithms and Data Structures I	3
CSCI230	Machine Architecture and Organization	3
CSCI220	Operating Systems I	3
MATH302	Statistics	3
CSCI350	Digital Systems II	3
CSCI340	Program Design and Development	3
CSCI345	Algorithms and Data Structures II	3
CSCI320	Operating Systems II	3
CSCI360	Introduction to Database Systems	3
CSCI311	Network Security Fundamentals	3
CSCI471	Software Engineering	3
CSCI452	Cybersecurity/Cyber Defense	3
CSCI445	Formal Languages and Automata Theory	3
CSCI440	Principles of Programming Languages	3
Total Semester Hours		68

Students must choose a concentration for this degree program and may select from a Concentrations in Artificial Intelligence or Concentration in Cyber Operations.

Concentration in Artificial Intelligence (18 semester hours)

The Artificial Intelligence concentration for the BS in Computer Science teaches students to design and execute computational systems that interpret and understand. Students can research and apply machine-learning methods and develop problem-solving models applicable to a variety of domains. Furthermore, students can learn how to build systems that collect and respond to various sensors and measurements, and develop networks that communicate and respond to environmental signals. Self-taught intelligent systems play a significant role in this domain. This concentration of Artificial Intelligence utilizes the basics of computer science and applies advanced methods needed for effective knowledge modeling.

Objectives

Upon successful completion of this concentration, the student will be able to:

- Understand principles of machine learning and artificial intelligence.
- Gain hands-on experience with a variety of machine learning models under different constraints (supervised, unsupervised, semi-supervised, environment feedback).
- Become proficient in handling different types of data including structured and unstructured, using traditional and advanced machine learning techniques.
- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- Demonstrate awareness and a fundamental understanding of various applications of AI and machine learning techniques.

Concentration Requirements (18 semester hours)

Code	Title	Semester Hours
CSCI381	Machine Learning	3
CSCI386	Advanced Topics in Machine Learning	3
CSCI484	Introduction to Artificial Intelligence	3
CSCI486	Deep and Reinforcement Learning	3
CSCI480	Introduction to Artificial Life	3
STEM471	Analytics, Algorithms, AI, and Humanity	3
Total Semester Hours		18

Concentration in Cyber Operations (18 semester hours)

The Cyber Operations concentration provides students with skills and in-depth expertise to protect and build safe software systems. Students

obtain a thorough understanding of the technical needs, risks, and vulnerabilities of computer systems as they learn how to use tools and techniques to investigate, analyze, and respond to cyber-attacks. The concentration examines various aspects of society and focuses on both theoretical and practical dimensions. Students learn about a wide variety of computer security-related subjects, such as networks, mobile technologies, and cloud computing. Students will also have the ability to discuss the social implications of cybersecurity through courses such as STEM470 Cybersecurity, Surveillance, Privacy and Ethics.

Objectives

Upon successful completion of this concentration, the student will be able to:

- Have a firm understanding of the System Development Life Cycle (SDLC) and be able to apply concepts for a secure system development.
- Understand cyber threat environment, and be able to monitor, detect, analyze, and expel threats from information system.
- Secure systems to ensure Confidentiality, Integrity and Availability (CIA) of the information and protect data and networks from intrusions and malicious actors.
- Design networks utilizing Risk Management Framework (RMF) methodology, risk analysis, security policies, and monetary damages assessment.
- Plan and implement security strategies, policies, disaster recovery plans, continuity of operation plans, and audits in a broad range of local and wide area networks.

Concentration Requirements (18 semester hours)

Code	Title	Semester Hours
CSCI370	Software Reverse Engineering	3
CSCI390	Cellular and Mobile Technologies	3
CSCI475	Development of Secure Software Systems	3
ISSC326	Cloud Computing	3
CSCI431	Embedded Systems	3
STEM470	Cybersecurity, Surveillance, Privacy and Ethics	3
Total Semester Hours		18

Final Program Requirements (6 semester hours)

Code	Title	Semester Hours
CSCI498	Senior Project Design	3
CSCI499	Senior Project Implementation	3
Total Semester Hours		6