

B.S. in Computer Science

The curriculum for the Bachelor of Science degree in Computer Science includes courses in software development, computer organization, database systems, and software engineering. The program provides a blend of theory and applications that prepare students for a variety of computer science and software engineering positions in scientific and business fields, and lays the foundation for graduate studies in computer science and software engineering. The Computer Science program allows students interested in this area of computing to complement their computing knowledge with one other application area chosen from the different areas of concentration.

In a few years of completing their undergraduate degree, graduates of the Bachelor of Science in Computer Science:

- Have established themselves in successful computing careers in aviation, aerospace, and related fields and/or are pursuing advanced degrees.
- Are serving society and their professions as involved and responsible citizens, leaders, and role models.
- Are problem solvers, systems thinkers, and innovators.

The Bachelor of Science in Computer Science is accredited by the Computing Accreditation Commission of ABET, <http://www.abet.org>.

Students may select The Cybersecurity Engineering Area of Concentration or complete the standard program requirements. The courses in the AOC allow students to broaden their general education or pursue specific interests. Upper-level courses involve students in team projects that emphasize industrial processes and practices.

Standard Program Requirements

The Computer Science degree may be attained without selecting an Area of Concentration. This option is designed to fulfill the requirements of a traditional computer science program while producing graduates who are able to succeed in a wide range of employment situations.

Cybersecurity Engineering Area of Concentration

The Computer Science degree with an Area of Concentration in Cybersecurity Engineering produces graduates who have a solid knowledge of computer science and cybersecurity. The curriculum emphasizes securing and defending networks and communications through secure system design and implementation. Graduates will have a very strong computer science core followed by a strong core in cybersecurity engineering and will be ready to work in a wide range of institutions belonging to government or industry.

Degree Requirements

The Bachelor of Science degree can be earned in eight semesters, assuming appropriate background and full-time enrollment. Successful completion of a minimum of 120 credit hours is required. A minimum cumulative grade point average of 2.0 is needed for all required CEC, CS, EE, SE, and EGR courses that fulfill any degree requirement.

Students entering this program should have demonstrated competence in Mathematics and Science. They should be prepared to enter Calculus I, having demonstrated proficiency in Algebra and Trigonometry. Students can prepare for this program by taking MA 143 before taking MA 241.

The Computer Science program is designed to prepare students to work as part of a team on the development of software systems. Software engineering concepts are integrated through the curriculum. The curriculum includes courses in general education, math, science, and computing. The latter is divided into computing fundamentals, advanced

concepts, applied computing, and software engineering. In addition, a student may select an area of concentration in a domain area of interest.

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites (check the course descriptions before registering for classes to ensure requisite sequencing).

Students will:

- Analyze complex computing problems and apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate computing-based solutions to meet specific computing requirements within their program's discipline.
- Communicate effectively in various professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as members or leaders of teams engaged in activities appropriate to their program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

General Education Requirements

For a full description of Embry-Riddle General Education guidelines, please see the General Education section of this catalog. These minimum requirements are applicable to all degree programs.

Communication Theory & Skills (COM 122, COM 219, COM 221)	9
Lower-Level Humanities	3
Lower-Level Social Sciences	3
Lower or Upper-Level Humanities or Social Sciences	3
Upper-Level Humanities or Social Sciences	3
Computer Science (CS 223)	3
Mathematics (MA 241 & MA 242)	8
Physical and Life Sciences ¹	7
Total Credits	39

Computer Science Core

Professional Preparation

EGR 101	Introduction to Engineering	2
UNIV 101	College Success	1

Mathematics

MA 412	Probability and Statistics	3
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Computer Engineering

CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Design Laboratory	1
CEC 320	Microprocessor Systems	3
CEC 322	Microprocessor Systems Laboratory	1
CEC 470	Computer Architecture	3

Computer Science

CS 222	Introduction to Discrete Structures	3
CS 225	Computer Science II	4
CS 225L	Computer Science II Laboratory	0
CS 303	Cryptography and Network Security	3
CS 315	Data Structures and Analysis of Algorithms	3
CS 317	Files and Database Systems	3
CS 332	Organization of Programming Languages	3
CS 344	C Programming and UNIX	3
CS 362	Computing Theory	3
CS 420	Operating Systems	3
CS 432	Information and Computer Security	3
CS 462	Computer Networks	3
CS 490	Computer Science Capstone Design I	3
CS 491	Computer Science Capstone Design II	3

Software Engineering		
SE 300	Software Engineering Practices	3
Total Credits		60

Standard Track

Computer Science		
CS 455	Artificial Intelligence	3
Required Electives		
Open Elective		9
Specified Electives ²		9
Total Credits		21

Cybersecurity Engineering AOC

Computer Science		
CS 426	Digital Forensics	3
CS 427	System Exploitation and Penetration Testing	3
CS 428	Applied Cryptography	3
Cybersecurity		
CYB 155	Foundations of Information Security	3
CYB 465	Cybercrime and Cyberlaw	3
Required Electives		
Technical Electives ³		6
Total Credits		21
Total Degree Credits		120

¹ To satisfy the seven (7) credit hours requirement, choose one course from the following list:

- CHM 111, GEO 215, WX 201, PS 150, PS 227

And one course from the following courses plus lab combinations:

- BIO 120 and 120L, or CHM 110 and 110L, or PS 224 and PS 224L, or PS 226 and 226L, or PS 250 and PS 253

² Courses to be selected, with the approval of the program coordinator, to support acquiring a minor, an identified concentration of domain knowledge (aerospace, aviation, business, communications, human factors, mathematics, etc.), or further depth in computer science or related disciplines.

³ CEC/CS/EE/SE/SYS Upper-Level Elective, with approval from the Program Coordinator.

B.S in Computer Science – Cybersecurity Engineering AOC

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites (check the course descriptions before registering for classes to ensure requisite sequencing).

See the Common Year One outline in the Engineering Fundamentals Program Introduction.

Suggested Plan of Study

Year One		Credits
	See the Common Year One outline in the College of Engineering introduction.	33
Credits Subtotal		33.0
Year Two		
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Design Laboratory	1
	HU/SS Lower Level	3
COM 219	Speech	3
SE 300	Software Engineering Practices (with Lab)	3

CYB 155	Foundations of Information Security	3
CEC 320	Microprocessor Systems	3
CEC 322	Microprocessor Systems Laboratory	1
COM 221	Technical Report Writing	3
CS 344	C Programming and UNIX	3
	Physical and Life Sciences *	4
Credits Subtotal		30.0

Year Three

CS 362	Computing Theory	3
CS 315	Data Structures and Analysis of Algorithms	3
CS 332	Organization of Programming Languages	3
CS 420	Operating Systems	3
MA 412	Probability and Statistics	3
	Humanities or Social Science Upper Level Elective	3
CS 303	Cryptography and Network Security	3
CS 317	Files and Database Systems	3
CYB 465	Cybercrime and Cyberlaw	3
	Technical Elective **	3
Credits Subtotal		30.0

Year Four

CEC 470	Computer Architecture	3
CS 462	Computer Networks	3
CS 426	Digital Forensics	3
CS 490	Computer Science Capstone Design I	3
CS 432	Information and Computer Security	3
CS 427	System Exploitation and Penetration Testing	3
CS 491	Computer Science Capstone Design II	3
CS 428	Applied Cryptography	3
	Technical Elective **	3
Credits Subtotal		27.0
Credits Total:		120

* Select one lecture course and one lab combination from the following list: BIO 120 and 120L, or CHM 110 and 110L, or PS 224 and PS 224L, or PS 226 and 226L, or PS 250 and PS 253.

** CEC/CS/EE/SE/SYS Upper-Level Elective, with approval from program coordinator.

BS in Computer Science – Standard Program Requirements

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites (check the course descriptions before registering for classes to ensure requisite sequencing).

See the Common Year One outline in the Engineering Fundamentals Program Introduction.

Suggested Plan of Study

Year One		Credits
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Credits Subtotal		33.0
Year Two		
CEC 220	Digital Circuit Design	3
CEC 222	Digital Circuit Design Laboratory	1
	HU/SS Lower Level	3
COM 219	Speech	3
SE 300	Software Engineering Practices (with Lab)	3
MA 412	Probability and Statistics	3

CEC 320	Microprocessor Systems	3
CEC 322	Microprocessor Systems Laboratory	1
COM 221	Technical Report Writing	3
CS 344	C Programming and UNIX	3
	Physical and Life Sciences *	4
Credits Subtotal		30.0
Year Three		
CS 362	Computing Theory	3
CS 315	Data Structures and Analysis of Algorithms	3
CS 332	Organization of Programming Languages	3
CS 420	Operating Systems	3
	HU/SS 300/400 Level	3
	Open Elective	6
CS 303	Cryptography and Network Security	3
CS 317	Files and Database Systems	3
CS 455	Artificial Intelligence	3
Credits Subtotal		30.0
Year Four		
CEC 470	Computer Architecture	3
CS 462	Computer Networks	3
	Specified Electives **	9
CS 490	Computer Science Capstone Design I	3
CS 432	Information and Computer Security	3
	Open Elective	3
CS 491	Computer Science Capstone Design II	3
Credits Subtotal		27.0
Credits Total:		120

* Select one lecture course and one lab combination from the following list: BIO 120 and 120L, or CHM 110 and 110L, or PS 224 and PS 224L, or PS 226 and 226L, or PS 250 and PS 253.

** Courses to be selected, with the approval of the program coordinator, to support acquiring a minor, an identified concentration of domain knowledge (aerospace, aviation, business, communications, human factors, mathematics, etc.), or further depth in computer science or related disciplines.