B.S. in Software Engineering

The Bachelor of Science degree in Software Engineering is designed to prepare students for an entry-level software engineering position in industry that supports the design and implementation of software systems with the focus on real-time, embedded, and safety-critical applications. Such systems are critical in aviation, space, medicine, and other disciplines that rely on high-quality, dependable software.

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

- Have established themselves in successful engineering 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 curriculum is designed to facilitate accomplishment of these objectives by program graduates. It provides a broad education, including fundamental knowledge about computer software and hardware. It also allows graduates to work in a team environment and to recognize the value of collaborative effort. The program lays a foundation for lifelong learning, professional growth, and ethical and responsible behavior in society. The Software Engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

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, EGR and SE courses that fulfill any degree requirement.

Students entering this program should have demonstrated a competence in mathematics and science (preferably physics). They should be prepared to enter Calculus I, having demonstrated proficiency in algebra and trigonometry. Students can prepare for the program by taking MA 143 before taking MA 241. For those students who have not taken physics in high school, it is recommended that PS 113 be taken prior to PS 150.

The Software Engineering program is designed to prepare students to work as part of a team on the development of software systems. Software engineering concepts, methods, and techniques are integrated through the curriculum. The curriculum includes courses in general education, math and science, and computing. The latter is divided into computing fundamentals, advanced concepts, applied computing, and software engineering. In addition, a student can acquire a minor or a 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 at the back of this catalog before registering for classes to ensure requisite sequencing.

Students will:

- Have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Have an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Have an ability to communicate effectively with a range of audiences.
- Have an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Have an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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**

Professional Preparation		
EGR 101	Introduction to Engineering	2
UNIV 101	College Success	1
Mathematics		
MA 412	Probability and Statistics	3
Math 300/400 [2]		3
Math 300/400 or Science 200/300/400 level elective [3]		3
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 450	Real-Time Embedded Systems	3
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 315	Data Structures and Analysis of Algorithms	3
CS 317	Files and Database Systems	3
CS 332	Organization of Programming Languages	3
CS 362	Computing Theory	3
CS 420	Operating Systems	3
CS 432	Information and Computer Security	3
Software Engineering		
SE 300	Software Engineering Practices	3
SE 310	Analysis and Design of Software Systems	3
SE 320	Software Construction	3
SE 420	Software Quality Assurance	3
SE 450	Software Team Project I	3
SE 451	Software Team Project II	3
Required Electives		
Specified Electives [4]		9

Technical Elective [5]		3
Total Credits		**81**
Total Degree Credits		**120**

[1] To satisfy the 7 credit hours requirement, choose one course from the following list (3 credits):
- CHM 111, GEO 215, WX 201, PS 150, PS 227

And one lecture course from the following plus its corresponding lab (4 credits):
- BIO 120 and BIO 120L, or CHM 110 and CHM 110L, or PS 224 and PS 224L, or PS 226 and PS 226L, or PS 250 and PS 253

[2] To be selected from an approved list of courses maintained by the Program Coordinator.

[3] Not MA 305, or PS 226, or PS 227.

[4] Must be approved by Program Coordinator.

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

Suggested Plan of Study

Students should be aware that several courses in each academic year may have prerequisites and/or corequisites. Please check the course descriptions at the back of this catalog before registering for classes to ensure requisite sequencing.

See the Common Year One outline in the Engineering Fundamentals Program Introduction. CS 223 is a required course for this degree program.

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
	Math 300/400 Level Elective [1]	3
COM 219	Speech	3
SE 300	Software Engineering Practices	3
	HU/SS Lower- or Upper-Level Elective	3
CEC 320	Microprocessor Systems	3
CEC 322	Microprocessor Systems Laboratory	1
COM 221	Technical Report Writing	3
MA 412	Probability and Statistics	3
	PS Elective [2]	3
	PS Laboratory [2]	1
	Credits Subtotal	**30.0**
Year Three		
CEC 470	Computer Architecture	3
CS 332	Organization of Programming Languages	3
CS 315	Data Structures and Analysis of Algorithms	3
SE 320	Software Construction	3
CS 420	Operating Systems	3
CS 362	Computing Theory	3
	Specified Elective [3]	3
CS 317	Files and Database Systems	3
SE 310	Analysis and Design of Software Systems	3
	HU/SS Upper-Level Elective	3
	Credits Subtotal	**30.0**
Year Four		
	Technical Elective [4]	3

	Specified Electives [3]	6
	Math 300/400 or Science 200/300/400 Level Elective [5]	3
SE 450	Software Team Project I (2 credits lecture, 1 credit lab)	3
CS 432	Information and Computer Security	3
CEC 450	Real-Time Embedded Systems	3
SE 451	Software Team Project II (1 credit lecture, 2 credits lab)	3
SE 420	Software Quality Assurance	3
	Credits Subtotal	**27.0**
	Credits Total:	**120.0**

[1] To be selected from an approved list of courses maintained by the Program Coordinator.

[2] To satisfy the 7 credit hours requirement, choose one course from the following list (3 credits):
- CHM 111, GEO 215, WX 201, PS 150, PS 227

And one lecture course from the following plus its corresponding lab (4 credits):
- BIO 120 and BIO 120L, or CHM 110 and CHM 110L, or PS 224 and PS 224L, or PS 226 and PS 226L, or PS 250 and PS 253

[3] Must be approved by Program Coordinator.

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

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