

Division of Engineering
Software Engineering Program
B.S. in Software Engineering

Collaborating Departments: Department of Computer Information Systems

The Software Engineering B.S. degree program offers students a series of multidisciplinary courses which emphasize both understanding and integrated applications of programming, engineering, technology and mathematical (STEM) concepts. The program is designed to prepare students either for immediate entry into the workforce as software engineers or for pursuit of master's degrees in specific engineering disciplines in the areas of computer science, software or computer engineering. The curriculum provides a broad foundation for such disciplines along with an education which embraces a Christian worldview. In addition to taking core courses in mathematics, physics, chemistry, computer information systems, and technical writing, students will study the foundational software engineering principles of electrical circuit analysis, and microelectronics, computer architecture, microprocessors and embedded systems, incorporating sound economical standards and ethical responsibility. During their senior year, all students will select a focus area of study and complete a design project that integrates the principles of research, process, and analysis as applied to software engineering. Since it is necessary for potential software engineering students to have adequate high school preparation for this program, it is highly recommended that they take high school physics, chemistry, and four years of mathematics in preparation for pursuit of this degree. Mathematical proficiency is essential to engineering and placement tests are given to all incoming freshmen, and those who do not qualify to begin Calculus I will be required to take additional leveling mathematics courses.

Mission Statement for Software Engineering

The Howard Payne University Software Engineering Program prepares students to serve God and humanity in a Christ-centered manner by producing graduates with the knowledge and skills; personal and professional integrity; and intellectual inquisitiveness to affect the world through a regulated engineering profession.

Program Goal

Software Engineering graduates will be equipped for success in the career path of their choosing and be capable of pursuing an advanced degree and/or a career where they may attain job satisfaction and professional growth while serving God and humanity.

Program Educational Objectives (PEOs)

PEO-1 Professionalism. Graduates will become practicing professionals or pursue a graduate degree in the Software Engineering or a related field.

PEO-2 Continuous Learning. Graduates will demonstrate the importance of maintaining and enhancing their professional skills through life-long learning.

PEO-3 Engagement in Society. Graduates, in service to God and community, will act with economical, ethical and societal awareness expected of practicing engineering professionals.

For the Software Engineering program, the desired student competencies are as follows:

1. An ability to identify, formulate, and solve software engineering problems by applying principles of science, technology, engineering, computer programming, and mathematics.
2. An ability to apply both analysis and synthesis in the software engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, testing, coding, analyzing and interpreting data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. 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.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

GENERAL EDUCATION (Bachelor of Science) see page 46..... 43 hours

MAT 2451 Calculus I or above should be chosen for the mathematics requirement

CHE 1479 should be chosen for the lab science requirement

ADDITIONAL DEGREE REQUIREMENTS (Bachelor of Science)..... 14 hours

Specific courses required are noted below under "Additional Degree Requirements"

TECHNOLOGY COMPONENT.....3 hours

MAJOR - Software Engineering 70 hours

Total Hours in Degree Program

130 hours

Division of Engineering

GENERAL EDUCATION Requirements	43 hours
ADDITIONAL DEGREE REQUIREMENTS	14 hours
PHY 2439 University Physics I (Fall)	4 hours
MAT 2461 Calculus II	4 hours
MAT 3302 Linear Algebra (Fall)	3 hours
MAT 3361 Calculus III (Fall)	3 hours
TECHNOLOGY COMPONENT	3 hours
CIS 1339 Introduction to Information Technology	3 hours
MAJOR - SOFTWARE ENGINEERING	70 hours
Core STEM Requirements	15 hours
PHY 2449 University Physics II (Spring)	4 hours
MAT 2347 Discrete Math	3 hours
MAT 3451 Differential Equations (Spring)	4 hours
MAT 4441 Applied Probability and Statistics (Spring)	4 hours
Additional Miscellaneous Requirements	6 hours
ENS 3306 Technical Writing for Engineering (Spring, even years)	3 hours
MAT 4371 Numerical Analysis (Fall, odd years)	3 hours
Core Software Engineering Course Requirements	41 hours
ENS 1101 Introduction to Engineering (Fall)	1 hour
ENS 1305 Engineering CAD Systems (Fall)	3 hours
CIS 1359 Programming Logic (Fall, Spring)	3 hours
ENS 1379 Engineering Principles and Practice (Spring)	3 hours
SEN 2301 Computer Architecture (Spring)	3 hours
CIS 2389 Object-Oriented Programming I (Fall)	3 hours
ENS 2334 Engineering Economic Analysis (Fall, odd years)	3 hours
SEN 3301 Microprocessors (Fall)	3 hours
SEN 3302 Embedded Systems (Spring)	3 hours
ENS 3351 Engineering Ethics (Fall, even years)	3 hours
CIS 3309 Object Oriented Programming II (Spring, odd years)	3 hours
ENS 4309 Electric Circuits Theory (Fall)	3 hours
ENS 4109 Engineering Design Project Lab Proposal (Spring)	1 hour
ENS 4369 Engineering Design Project + Lab I (Fall)	3 hours
ENS 4379 Engineering Design Project + Lab II (Spring)	3 hours
Directed Elective Requirements	8 hours
ENS 2104 STEM Internship (Fall, Spring, Summer)	1 hour
ENS 2204 STEM Internship (Fall Spring, Summer)	2 hours
ENS 2304 STEM Internship (Fall Spring, Summer)	3 hours
CIS 2348 Internet and Game Programming (Fall)	3 hours
ENS 4344 Advanced Engineering Research & Development	3 hours
ENS 3104 Special Topics in Engineering Applications	1 hour
CIS 3329 Visual Programming (Spring, even years)	3 hours
CIS 3369 Database Management Structures (Fall)	3 hours
CIS 4321 Operating Systems (Spring)	3 hours
CIS 4341 Network Design and Administration (Fall)	3 hours
Total Hours in Degree Program	130 hours

ENS 2104, 2204, or 2304 may be repeated but only six hours of engineering internship may apply toward the engineering degree requirements.

The Software Engineering degree contains 38 to 44 hours of Engineering courses, which includes 22 hours of advanced Engineering courses described above, as well as 12 to 18 hours of Computer Information Systems (CIS) courses, to a total of 56 hours of combined Engineering and CIS courses. The balance between the Engineering courses and the CIS courses in the Software Engineering program (38- 18 vs 44-12) will depend on whether the student will fulfill the elective requirements by maximizing the Engineering internship for a maximal exposure to Software Engineering work environment (equivalent of 6 hours to a total of 44 hours of Engineering courses in the entire program), or will decide to take two of the six listed CIS elective courses instead (3 hours each, to a total of 18 hours of CIS courses in the entire program) for a maximal exposure to CIS concepts. The degree also contains 38 hours of science and mathematics, which includes 22 hours of advanced mathematics.

All prerequisites must carry a grade of "C" or better, and Software Engineering majors must carry a grade of "C" or better in all ENS, SEN and CIS courses.