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**

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Division of Engineering

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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**
- ENG 3306 Technical Writing (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.