HOWARD PAYNE UNIVERSITY

SCHOOL OF SCIENCE AND MATHEMATICS

Software Engineering Program

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Introduction.

The Software Engineering 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.

The Software Engineering Program

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) …………………….….......................................**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 ....**69 hours**

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Total Hours in Degree Program   **129 hours**

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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 ………………………………………………………………69 hours

    Core STEM Requirements………………………………………..……………….12 hours

        PHY 2449 University Physics II (Spring) ………………………………..4 hours

        MAT 3451 Differential Equations (Spring) ……………………………4 hours

        MAT 4441 Applied Probability and Statistics (Spring) …………..4 hours

    Additional Miscellaneous Requirements ……………………………..……………..7 hours

        ENG 3306 Technical Writing (Spring, even years) …………………3 hours

        MAT 4471 Numerical Analysis (Fall, odd years) ……………………4 hours

    Core Software Engineering Course Requirements …………………………..44 hours

        ENS 1101 Introduction to Engineering (Fall)……………..…………..1 hour

        ENS 1304 Engineering CAD Systems I (Fall) ……………………………3 hours

        ENS 1305 Engineering CAD Systems II (Spring) ………………..……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……………….………………………………………….6 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

CIS 3319 Project Management (Fall)……………………………………..3 hours

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

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

Total Hours in Degree Program: 129

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.