

**Division of Engineering**  
**Division of Engineering**  
**Chair: Martin Mintchev, Ph.D., P.E., FAIMBE**

**Engineering Science Program**  
**B.S. in Engineering Science**

FACULTY: **Philips Agboola, Ph.D.**

The Engineering Science B.S. degree program offers students a series of multidisciplinary courses which emphasize both understanding and integrated applications of science, technology engineering and mathematical (STEM) concepts. The program is designed to prepare students either for immediate entry into the workforce or for pursuit of graduate degrees in specific engineering disciplines of their choice. 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 engineering principles of statics, dynamics, mechanics of materials, thermodynamics, electrical circuit analysis, and microelectronic 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 engineering.

Since it is necessary for potential engineering science 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 the 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 Engineering Science**

The Howard Payne University Engineering Science Program prepares liberal arts 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 an engineering profession.

**Program Goal**

Engineering Science 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 Engineering Science 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 Engineering Science Program**

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

1. An ability to identify, formulate, and solve engineering problems by applying principles of science, technology, engineering, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret 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*

*HIS 1310 or HIS 1320 should be chosen for the History requirement*

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

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

**TECHNOLOGY COMPONENT..... 3 hours**

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<b>MAJOR - Engineering Science .....</b>	<b>70 hours</b>
<b>Total Hours in Degree Program .....</b>	<b>130 hours</b>
<b>GENERAL EDUCATION Requirements .....</b>	<b>43 hours</b>
<b>ADDITIONAL DEGREE REQUIREMENTS .....</b>	<b>14 hours</b>
MAT 2461 Calculus II .....	4 hours
MAT 3361 Calculus III (Fall) .....	3 hours
PHY 2439 University Physics I (Fall).....	4 hours
MAT 3302 Linear Algebra (Fall) .....	3 hours
<b>TECHNOLOGY COMPONENT.....</b>	<b>3 hours</b>
CIS 1339 Introduction to Information Technology .....	3 hours
<b>MAJOR - Engineering Science.....</b>	<b>70 hours</b>
<b>Core STEM Requirements.....</b>	<b>15 hours</b>
PHY 2449 University Physics II (Spring).....	4 hours
MAT 3451 Differential Equations (Spring).....	4 hours
MAT 4441 Applied Probability and Statistics (Spring).....	4 hours
MAT 4371 Numerical Analysis (Fall, odd years).....	3 hours
<b>Additional Miscellaneous Requirements.....</b>	<b>3 hours</b>
ENS 3306 Technical Writing for Engineering (Spring, even years).....	3 hours
<b>Core Engineering Science Course Requirements.....</b>	<b>38 hours</b>
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
ENS 2301 Statics (Spring).....	3 hours
ENS 2302 Dynamics (Fall).....	3 hours
ENS 3339 Mechanics of Materials (Fall).....	3 hours
ENS 2334 Engineering Economic Analysis (Fall, odd years).....	3 hours
ENS 3331 Thermodynamics (Fall).....	3 hours
ENS 3351 Engineering Ethics (Fall, even years).....	3 hours
ENS 4109 Engineering Design Project Lab Proposal (Spring).....	1 hour
ENS 4309 Electrical Circuit Theory (Fall).....	3 hours
ENS 4369 Engineering Design Project Lab I (Fall).....	3 hours
ENS 4379 Engineering Design Project Lab II (Spring).....	3 hours
<b>Directed STEM Elective Requirements.....</b>	<b>14 hours</b>
CIS 2389 Object Oriented Programming I (Fall).....	3 hours
CIS 3309 Object Oriented Programming II (Spring, odd years) OR	
CIS 3329 Visual Programming (Spring, even years).....	3 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 2399 3-D Printing (Spring).....	3 hours
ENS 3104 Special Topics in Engineering Applications.....	1 hour
ENS 4344 Advanced Engineering Research & Development....	3 hours
SEN 2301 Computer Architecture (Spring) .....	3 hours
SEN 3301 Microprocessors (Fall) .....	3 hours
SEN 3302 Embedded Systems (Spring).....	3 hours

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

**Total Hours in Degree Program 130 hours**

The Engineering Science degree contains 48 hours of engineering science courses, which includes 22 hours of advanced engineering science courses described above. The degree also includes a minimum of 35 hours of science and mathematics, which includes a minimum of 10 hours of advanced mathematics.

**All prerequisites must carry a grade of “C” or better, and Engineering Science majors must carry a grade of “C” or better in all ENS courses.**

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### Engineering Science Minor

<b>Engineering Science Minor .....</b>	<b>20 hours</b>
PHY 2439 University Physics I .....	4 hours
PHY 2449 University Physics II .....	4 hours
ENS 1379 Engineering Principles and Practices .....	3 hours
ENS 2301 Statics .....	3 hours
ENS 3339 Mechanics of Materials .....	3 hours
ENS 3311 Thermodynamics. ....	3 hours

<b>Biomedical Engineering Minor.....</b>	<b>22 hours</b>
PHY 2439 University Physics I .....	4 hours
PHY 2449 University Physics II .....	4 hours
ENS 1379 Engineering Principles and Practices .....	3 hours
ENS 2301 Statics .....	3 hours
BIO 1459 General Biology I .....	4 hours
BIO 2489 Human Anatomy and Physiology I .....	4 hours

Students cannot use the same courses for two different minors. Calculus I, II and III (MAT 2451, 2461 and 3361), ENS 1101 and CHE1489 are prerequisites and students must make a "C" or better in these prerequisites.

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