

# BACHELOR OF SCIENCE, MAJOR IN PHYSICS/ENGINEERING DUAL DEGREE\*

**Additional information:** Reference the Program Landing Page (<https://www.shsu.edu/programs/bachelor-of-science-in-physics/>) for additional information, such as cost, delivery format, contact information, or to schedule a visit.

Code	Title	Hours
<b>Bachelor of Science, Major in Physics/Engineering Dual Degree</b>		
<b>Core Curriculum</b> ( <a href="http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/">http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/</a> )		
Component Area I (Communication)		6
Component Area II (Mathematics) <sup>1</sup>		3
Component Area III (Life and Physical Science) <sup>2</sup>		8
Component Area IV (Language, Philosophy, and Culture) <sup>3</sup>		3
Component Area V (Creative Arts)		3
Component Area VI (U.S. History)		6
Component Area VII (Political Science/Government)		6
Component Area VIII (Social and Behavioral Sciences) <sup>4</sup>		3
Component Area IX (Component Area Option) <sup>1,5</sup>		4
<b>Degree Specific Requirements</b>		
CHEM 1411	General Chemistry I <sup>2</sup>	4
CHEM 1412	General Chemistry II <sup>2</sup>	4
COSC 1436	Programming Fundamentals I	4
ENGL 3330	Introduction to Technical Writing	3
ETDD 1361	Engineering Graphics	3
Advanced Elective		3
<b>Major: Foundation</b>		
PHYS 1401	Physics Boot Camp	4
PHYS 1411	Introduction To Physics I	4
PHYS 1422	Introduction To Physics II	4
PHYS 3370 & PHYS 4110	Introduction to Theoretical Physics and Advanced Undergraduate Laboratory I	4
PHYS 3391 & PHYS 3111	Modern Physics I and Modern Physics Laboratory I	4
PHYS 3395 & PHYS 3115	Electronics & Circuit Analysis and Electronics and Circuit Analysis Lab	4
<b>Major: Prescribed Electives</b> <sup>6</sup>		
PHYS Advanced Electives (see list below) <sup>6</sup>		6-8
MATH 1420	Calculus I <sup>1</sup>	4
MATH 1430	Calculus II	4
MATH 2440	Calculus III	4
MATH 3376	Differential Equations	3
MATH 3377	Introduction to Linear Algebra and Matrices	3
<b>Minor: Not Required</b> <sup>7,8</sup>		
<b>Total Hours</b>		<b>99-101</b>

<sup>1</sup> MATH 1420 satisfies the Core Curriculum requirement for Component Area II (Mathematics), one semester credit hour of Component Area IX (Component Area Option), and the Degree Specific requirement.

<sup>2</sup> CHEM 1411 and CHEM 1412 satisfy the Core Curriculum requirement for Component Area III (Life and Physical Science).

<sup>3</sup> Students transferring to UT Tyler should delay taking a credit in Component Area IV at SHSU and instead register for PHIL 2306 (Intro to Ethics) at UT Tyler.

<sup>4</sup> Students transferring to UT Tyler should register for ECON 2301 (Macroeconomics) or ECON 2302 (Microeconomics) at SHSU to fulfill the Core Curriculum requirement for Component Area VIII (Social and Behavioral Sciences).

## 2 Bachelor of Science, Major in Physics/Engineering Dual Degree\*

<sup>5</sup> Students transferring to UT Tyler should register for COMS 1361 (Public Speaking) at SHSU to fulfill the Core Curriculum requirement for Component Area IX (Component Area Option).

<sup>6</sup> See the course listing of PHYS Advanced Electives below. 6-7 hours must be selected from the Prescribed Electives in Physics.

<sup>7</sup> A minor is not required for this degree program; however, a student has the option to add a minor, but to do so additional semester credits hours will be needed above the degree program's stated total semester credit hours.

<sup>8</sup> The following minor cannot be paired with this degree program: Minor in Physics.

**Note:** Fourth Year at university with recognized accredited degree program.

Code	Title	Hours
<b>Major: Prescribed Electives</b> <sup>6</sup>		
PHYS Advanced Electives <sup>6</sup>		
PHYS 3360	Statics And Dynamics	3
PHYS 4333 & PHYS 4113	Light And Optics and Light And Optics	4
PHYS 4366	Introduction to Quantum Mechanics	3
PHYS 4368	Electricity And Magnetism	3
PHYS 4370	Classical Mechanics	3
PHYS 4371	Thermodynamics and Statistical Mechanics	3

### Notes

While SHSU does not offer a major in Engineering, the Department of Physics and Astronomy does provide the Dual Degree (3+2) Physics plus Engineering program, as well as several options for Pre-Engineering (2+2). Physics and Engineering go together very well, because so much of Engineering is built upon the underlying foundation of Physics. Physicists seek to discover the first principles of Nature, and Engineers seek to use those principles for designing practical solutions to problems.

\*In the Dual Degree, or "3+2" program, students earn two degrees, in both Physics and Engineering. This starts with three years at SHSU, completing the Core Curriculum, the Calculus and Physics introductory sequence, and a portion of the upper division Physics Curriculum. Students then transfer to an accredited Engineering program (such as UT Tyler) for the last two years of degree work. Any accredited engineering discipline is acceptable, including (but not limited to) Civil, Mechanical, and Electrical Engineering. After completion of the Engineering Degree, credits are retroactively transferred back to SHSU so that the Physics Degree can be awarded simultaneously.

Alternatively, the "2+2" Pre-Engineering tracks in Civil (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/physics-and-astronomy/bs-physics-civil-engineering/>), Mechanical (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/physics-and-astronomy/bs-physics-mechanical-engineering/>), and Electrical (<http://catalog.shsu.edu/undergraduate/colleges-academic-departments/science-and-engineering-technology/physics-and-astronomy/bs-physics-electrical-engineering/>) Engineering result in a single degree. Students begin these programs in residence at Sam Houston State University, focusing on the Core Curriculum and developing a firm foundation in math and the hard sciences. Subsequently, they transfer to an accredited Engineering Program (such as UT Tyler) after completing two years at SHSU in order to complete their degree in Engineering at the second institution.

Our transfer articulation agreement with the University of Texas at Tyler (UT Tyler) makes matching credits a seamless process and guarantees acceptance for students meeting GPA requirements. This agreement holds for the main campus in Tyler and also for the new Houston Engineering Center branch campus. However, students are also free to continue their study at any institution with an accredited Engineering program.

For students considering Pre-Engineering vs. Engineering Technology, it is very important to understand the similarities and differences between these programs. Engineering tracks include significantly more Math (especially Calculus) than Technology tracks do, leading to very different careers. The Accreditation Board for Engineering and Technology (ABET) says that Engineering programs often focus on theory and conceptual design, while Technology programs usually focus on application and implementation. Engineers often do work involving original research and development, and many continue on to Masters or Doctoral programs in Engineering. Technologists are most likely to work in construction, manufacturing, product design, testing, or technical services and sales. Students interested in Engineering are supervised by the Department of Physics and Astronomy. Students interested in Technology are supervised by the Department of Engineering Technology.

All students interested in Physics or Pre-Engineering enroll in the Physics Bootcamp (PHYS 1401 (<http://catalog.shsu.edu/search/?P=PHYS%201401>)) during their first semester on campus. This lets interested students see what physics is all about as early as possible, with no prerequisites. It ensures that they have math skills required in the next two years and helps them understand what those skills are good for in Physics and Engineering. It develops confidence, teamwork, camaraderie, and a sense of belonging in the department. A weekly group-based problem-solving practice session is integrated. The Bootcamp is typically offered each Fall and Spring term.

Students must earn a 2.0 minimum overall GPA in all coursework.

Students must meet a 2.0 minimum overall major GPA in all major coursework.

Students must earn a 2.0 minimum SHSU GPA in all coursework.

Students must meet a 2.0 minimum SHSU major GPA in all major coursework.

For more information on the Pre-Engineering programs at SHSU contact:

Department Chair  
Physics and Astronomy (<http://www.shsu.edu/academics/physics/>)  
Sam Houston State University  
Huntsville, Texas 77341-2267  
(936) 294-1601

#### First Year

Fall	Hours	Spring	Hours
CHEM 1411 <sup>1</sup>		4 CHEM 1412 <sup>1</sup>	4
ENGL 1301 <sup>2</sup>		3 ENGL 1302 <sup>2</sup>	3
HSTY 1301 <sup>3</sup>		3 HSTY 1302 <sup>3</sup>	3
MATH 1420 <sup>4</sup>		4 MATH 1430	4
PHYS 1401		4 PHYS 1411	4
		<b>18</b>	<b>18</b>

#### Second Year

Fall	Hours	Spring	Hours
Component Area IV ( <a href="http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaiiv">http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaiiv</a> ) <sup>5</sup>		3 Component Area IX ( <a href="http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaix">http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaix</a> ) <sup>7</sup>	3
ETDD 1361		3 COSC 1436	4
MATH 2440		4 ENGL 3330	3
PHYS 1422		4 PHYS 3370 & PHYS 4110	4
POLS 2305 <sup>6</sup>		3 POLS 2306 <sup>6</sup>	3
		<b>17</b>	<b>17</b>

#### Third Year

Fall	Hours	Spring	Hours
Component Area VIII ( <a href="http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaviii">http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareaviii</a> ) <sup>8</sup>		3 Component Area V ( <a href="http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareav">http://catalog.shsu.edu/undergraduate/academic-policies-procedures/degree-requirements-academic-guidelines/core-curriculum/#componentareav</a> )	3
PHYS 3111		1 MATH 3377	3
PHYS 3391		3 PHYS 3115	1
MATH 3376		3 PHYS 3395	3
Advanced Elective		3 PHYS Advanced Electives <sup>9</sup>	3-4
PHYS Advanced Electives <sup>9</sup>		3-4	
		<b>16-17</b>	<b>13-14</b>

#### Fourth Year

Fall	Hours	Spring	Hours
University with Accredited Degree Program		0 University with Accredited Degree Program	0
		<b>0</b>	<b>0</b>

**Total Hours: 99-101**

<sup>1</sup> Satisfies Core Curriculum requirement for Component Area III (Life and Physical Science).

<sup>2</sup> Satisfies Core Curriculum requirement for Component Area I (Communications).

<sup>3</sup> Satisfies Core Curriculum requirement for Component Area VI (U.S. History).

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6 Satisfies Core Curriculum requirement for Component Area VII (Political Science/Government).

7 Students transferring to UT Tyler should register for COMS 1361 (Public Speaking) at SHSU to fulfill the Core Curriculum requirement for Component Area IX (Component Area Option).

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9 See the course listing of PHYS Advanced Electives below. 6-7 hours must be selected from the Prescribed Electives in Physics.

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Advanced PHYS Electives <sup>9</sup>		
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Sam Houston State University  
Huntsville, Texas 77341-2267  
(936) 294-1601

The Texas Higher Education Coordinating Board (THECB) marketable skills initiative is part of the state's **60x30TX plan** and was designed to help students articulate their skills to employers. Marketable skills are those skills valued by employers and/or graduate programs that can be applied in a variety of work or education settings and may include interpersonal, cognitive, and applied skill areas.

The BS in Physics/Engineering Dual Degree is designed to provide graduates with the following marketable skills:

- Ability to creatively solve real-world problems.
- Sophisticated understanding of applied mathematics.
- Capacity to analyze and interpret complex data.
- Quantitative understanding of mechanical, electrical, and thermal systems.
- Model complex interactions with computer programming and technology.