## B.S. IN PHYSICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 260</td>
<td>Careers in Engineering and Physics Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHY 292</td>
<td>General Physics I and General Physics I Lab 292D</td>
<td>4</td>
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<tr>
<td>PHY 296</td>
<td>General Physics II and General Physics II Lab</td>
<td>4</td>
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<tr>
<td>PHY 302</td>
<td>Electronics and Electronics Lab</td>
<td>4</td>
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<tr>
<td>PHY 312</td>
<td>Modern Physics and Modern Physics Lab</td>
<td>4</td>
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<tr>
<td>PHY 320</td>
<td>Mathematical Methods in Physics and Engineering</td>
<td>4</td>
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Choose one of the following Optical Science courses:

| PHY 332  | Optics and Optics Lab                             | 1       |
| PHY 333  |                                                   |         |
| PHY 432  | Topics in Contemporary Optics and Topics in Contemporary Optics Lab | 4       |

| COS 205 | Scientific Computing                             | 3       |
| MAT 124M| Calculus 1                                       | 4       |
| MAT 125 | Calculus 2                                       | 4       |
| MAT 222 | Differential Equations                           | 3       |
| MAT 223 | Multivariable Calculus                           | 3       |
| PHY 340 | Mechanics                                       | 4       |
| PHY 365 | Physics Research Seminar                         | 1       |
| PHY 400 | Electricity and Magnetism                        | 4       |
| PHY 410 | Thermodynamics                                   | 4       |
| PHY 440 | Quantum Mechanics                                | 4       |
| PHY 490 | Research                                         | 3       |

Choose one of the following Computation courses:

| MAT 344 | Numerical Methods                               | 3-4     |
| PHY 352  | Computer Methods in Physics and Engineering      |         |
| PHY 353  | and Computer Methods in Physics and Engineering Lab |       |

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<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>Major</td>
<td>65-66</td>
<td></td>
</tr>
<tr>
<td>General Education</td>
<td>49-50</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>7</td>
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</table>

**Total Credits**: 122

Courses whose number is followed by a letter fulfill a General Education requirement.

**PHY 102 • Physics of Everyday Life** 3 Credits.
Explores how physics concepts can be used to understand everyday phenomena in the world around us. Topics include mechanics, waves (including sound and light), thermodynamics, and atomic and nuclear physics. Lecture demonstrations and laboratories stress a clear understanding of observed phenomena.
Corequisites: Concurrent registration in PHY 102D is required. Offered: Interim.

**PHY 102D • Physics of Everyday Life-Lab** 1 Credit.
Laboratory experience accompanying PHY 102.
Corequisites: Concurrent registration in PHY 102 is required. Offered: Interim.

**PHY 112 • Introduction to Astronomy** 3 Credits.
The concepts, techniques, and tools of astronomy and astrophysics for nonscience students. Includes historical overview; identification of constellations; telescopes; the nature of light, atomic spectra, and structure; the nuclear physics of stars; the life cycle of stars; and current theories of the fate of the universe.
Corequisites: Concurrent registration in PHY 112D is required. Offered: Fall.

**PHY 112D • Introduction to Astronomy Lab** 1 Credit.
Laboratory experience accompanying PHY 112.
Corequisites: Concurrent registration in PHY 112 is required. Offered: Fall.

**PHY 202 • Introductory Physics I** 3 Credits.
Mechanics, thermal properties of matter and mechanical waves.
Prerequisites: MAT 123M, MAT 124M, or solid understanding and competency in high school mathematics as demonstrated by at least one of the following: a Math ACT score of at least 23, 519 on the Math portion of the SAT, a Math Placement Test score of at least 3. Corequisites: Concurrent registration in PHY 202D is required. Offered: Fall.
B.S. in Physics  2

PHY 202D • Introductory Physics I Lab 1 Credit.
Laboratory experience accompanying PHY 202.
Corequisites: Concurrent registration in PHY 202 is required. Offered: Fall.

PHY 206 • Introductory Physics II 3 Credits.
Electricity and magnetism, sound waves, optical phenomena, and modern physics.
Prerequisites: PHY 202/202D. Corequisites: Concurrent registration in PHY 207 is required.
Offered: Spring.

PHY 207 • Introductory Physics II Lab 1 Credit.
Laboratory experience accompanying PHY 206.
Corequisites: Concurrent registration in PHY 206 is required. Offered: Spring.

PHY 260 • Careers in Engineering and Physics Seminar 1 Credit.
Focus on developing careers in high-technology fields such as engineering and physics. Emphasis on exploring some of the wide variety of specific careers possible through methods such as video, lecture, tours, and guest speakers. Development of practical professional skills such as writing resumes and personal statements, building professional networks and experience, and developing techniques for interviewing.
Prerequisites: PHY 296/297. Offered: Fall. Special Notes: Carries cross-credit in engineering.

PHY 292 • General Physics I 3 Credits.
Kinematics, mechanics, oscillations, fluids, and conservation principles.
Prerequisites: MAT 124M (may be taken concurrently). Corequisites: Concurrent registration in PHY 292D is required. Offered: Fall.

PHY 292D • General Physics I Lab 1 Credit.
Laboratory experience accompanying PHY 292.
Corequisites: Concurrent registration in PHY 292 is required. Offered: Fall.

PHY 296 • General Physics II 3 Credits.
Electricity, magnetism, thermodynamics, sound waves, and optics.
Prerequisites: PHY 292/292D (with a grade of C or better); MAT 125 (may be taken concurrently). Corequisites: Concurrent registration in PHY 297 is required. Offered: Spring.

PHY 297 • General Physics II Lab 1 Credit.
Laboratory experience accompanying PHY 296.
Corequisites: Concurrent registration in PHY 296 is required. Offered: Spring.

PHY 302 • Electronics 3 Credits.
Fundamentals of digital and analog electronics intended for scientists and engineers.
Prerequisites: PHY 296/297 (grade of C or better); MAT 124M. Corequisites: Concurrent registration in PHY 303 is required. Offered: Fall.

PHY 303 • Electronics Lab 1 Credit.
Laboratory experience accompanying PHY 302. Extensive laboratory exercises and a choice of projects provide hands-on experience with circuits using transistors, operational amplifiers, logic gates, flip-flops, and other devices.
Corequisites: Concurrent registration in PHY 302 is required. Offered: Fall.

PHY 312 • Modern Physics 3 Credits.
Relativity, quantum theory, introductory wave mechanics, nuclear processes, elementary particles, and cosmology.
Prerequisites: PHY 296/297 (grade of C or better); MAT 223. Corequisites: Concurrent registration in PHY 313 is required. Offered: Spring.

PHY 313 • Modern Physics Lab 1 Credit.
Atomic and nuclear laboratory experiments accompanying PHY 312.
Corequisites: Concurrent registration in PHY 312 is required. Offered: Spring.

PHY 320 • Mathematical Methods in Physics and Engineering 4 Credits.
Development of skill in mathematical techniques useful in the solution of physics and engineering problems. Included are vector analysis; line and surface integrals; Fourier analysis; partial differential equations; and probability and statistics.
Prerequisites: MAT 222 (may be taken concurrently); MAT 223. Offered: Fall. Special Notes: Carries cross-credit in engineering.

PHY 332 • Optics 3 Credits.
Principles of geometrical and physical optics.
Prerequisites: PHY 312/313; MAT 223. Corequisites: Concurrent registration in PHY 333 is required. Offered: Spring, even # years.

PHY 333 • Optics Lab 1 Credit.
Laboratory experience accompanying PHY 332 emphasizing physical optics measurements, laser technology, and holography.
Corequisites: Concurrent registration in PHY 332 is required. Offered: Spring, even # years.
PHY 340 • Mechanics 4 Credits.
Particle dynamics, conservative motion, central forces, accelerated coordinate systems, and Lagrange’s equations of motion.
Prerequisites: PHY 296/297 (grade of C or better); MAT 222; MAT 223. Offered: Fall.

PHY 352 • Computer Methods in Physics and Engineering 3 Credits.
Application of the computer to solving applied problems of interest to physicists and engineers. Computer techniques are developed for numerical methods, simulation models, and data acquisition and control in the laboratory.
Prerequisites: MAT 223; PHY 296/297, and PHY 302/303 (grade of C or better) or consent of instructor. Corequisites: Concurrent registration in PHY 353 is required. Offered: Spring. Special Notes: Carries cross-credit in engineering.

PHY 353 • Computer Methods in Physics and Engineering Lab 1 Credit.
Laboratory experience accompanying PHY 352. Corequisites: Concurrent registration in PHY 352 is required. Offered: Spring. Special Notes: Carries cross-credit in engineering.

PHY 365 • Physics Research Seminar 1 Credit.
An introduction to research in physics and the development of scientific writing skills. Emphasis placed on preparing for departmental research experiences such as PHY 490 and external research experiences such as those found in industry, summer fellowship programs, and graduate schools.
Prerequisites: PHY 260; PHY 312/313; Junior standing; a major in the physics department.
Offered: Spring.

PHY 400 • Electricity and Magnetism 4 Credits.
Electrostatics and magnetostatics, electric and magnetic fields in free space and in materials, electromagnetic waves, and transmission lines.
Prerequisites: PHY 296/297 (grade of C or better); MAT 222; MAT 223. Offered: Fall, odd # years.

PHY 410 • Thermodynamics 4 Credits.
Laws of thermodynamics, conditions for thermodynamic equilibrium, and fundamentals of statistical mechanics.
Prerequisites: PHY 296/297 (grade of C or better); MAT 223. Offered: Spring, odd # years. Special Notes: PHY 312/313 is strongly recommended as a prerequisite.

PHY 422 • Fluid Mechanics 3 Credits.
Laws of statics, kinematics, and dynamics applied to fluid mechanics. Integral and differential conservation laws for mass, momentum, and energy. Dimensional analysis, viscous pipe flow, boundary layers, separated flows, and potential flow.
Prerequisites: PHY 296/297 (grade of C or better); MAT 223. Corequisites: Concurrent registration in PHY 423 is required. Offered: Fall, odd # years. Special Notes: Carries cross-credit in engineering.

PHY 423 • Fluid Mechanics Lab 1 Credit.
Laboratory experience accompanying PHY 422. Corequisites: Concurrent registration in PHY 422 required. Offered: Fall, odd # years. Special Notes: Carries cross-credit in engineering.

PHY 424 • Materials and Devices 3 Credits.
Theory and application of condensed matter and materials. Physical origin of electrical, optical, mechanical, thermal, and magnetic properties. Emphasis on devices such as pn junction diodes, LEDs, piezoelectrics, and sensors. An accompanying lab explores characterization of materials and the design, fabrication, and testing of devices.
Prerequisites: PHY 302/303, PHY 312/313. Corequisites: Concurrent registration in PHY 425 is required. Offered: Fall, even # years. Special Notes: Carries cross-credit in engineering.

PHY 425 • Materials and Devices Lab 1 Credit.
Laboratory component of PHY 424. Corequisites: Concurrent registration in PHY 424 required. Offered: Fall, even # years. Special Notes: Carries cross-credit in engineering.

PHY 432 • Topics in Contemporary Optics 3 Credits.
Fourier optics, theory of coherence, quantum optics, nonlinear optics, and the physics of lasers.
Prerequisites: PHY 312/313; MAT 223. Concurrent registration in PHY 433 is required. Offered: Spring, odd # years.

PHY 433 • Topics in Contemporary Optics Lab 1 Credit.
Laboratory experience accompanying PHY 432. Corequisites: Concurrent registration in PHY 432 is required. Offered: Spring, odd # years.

PHY 440 • Quantum Mechanics 4 Credits.
Concepts and techniques of quantum mechanics.
Prerequisites: PHY 312/313; MAT 222; MAT 223. Offered: Fall, even # years.
PHY 450 • Topics in Applied Physics and Engineering 3-4 Credits.
Topics selected from various fields of engineering and applied physics for the purpose of illustrating the practical application of physical principles. Emphasis on developing the skills and viewpoints commonly used by engineers and industrial physicists. The field of engineering or applied physics is announced prior to registration.
Prerequisites: PHY 302; PHY 352 (may be taken concurrently); MAT 222. Repeatable course Course may be repeated when a different topic is emphasized. Special Notes: Carries cross-credit in Engineering. Offered: Occasionally.

PHY 481 • Internship in Physics 1-4 Credits.
A practical experience in an off-campus professional setting in which the student applies the skills and perspectives of a physicist. Designed by student in consultation with a faculty member.
Prerequisites: Major in applied physics or physics; Junior or senior standing. Offered: Fall, Spring.

PHY 490 • Research 3 Credits.
An opportunity for individual student projects under the supervision of the faculty.
Prerequisites: Senior standing; PHY 365; Major in physics department. Offered: Fall, Spring.