Bachelor of Science (BS) Degree with a Major in Physics and a Major Concentration in General Physics

Program Learning Outcomes for the BS Degree with a Major in Physics and a Major Concentration in General Physics

Upon completing the BS degree with a major in Physics and a major concentration in General Physics, students will be able to:

1. Demonstrate an understanding of fundamental concepts in Mechanics.
2. Demonstrate an understanding of fundamental concepts in Electromagnetism.
3. Demonstrate an understanding of fundamental concepts in Quantum Mechanics.
4. Demonstrate an understanding of a variety of fundamental physics topics taken from: statistical and thermal physics, biological physics, nuclear and particle physics, solid state physics, computational physics, and/or plasma physics.
5. Demonstrate proficiency in research techniques and methodology under guidance of a faculty member.
6. Communicate scientific results both in writing and oral presentations.

Requirements for the BS Degree with a Major in Physics and a Major Concentration in General Physics

For general university requirements, see Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements). Students pursuing the BS degree with a major in Physics and a major concentration in General Physics must complete:

- A minimum of 64 credit hours to satisfy major requirements.
- A minimum of 124 credit hours to satisfy degree requirements.
- A minimum of 60 credit hours outside of major requirements.
- A minimum of 37 credit hours taken at the 300-level or above.
- Core courses common to all major concentrations.
- The requirements for the major concentration in General Physics. When students declare the major, they must additionally identify and clearly document the courses to be taken.

Because of the common core requirements, it is possible for students to change their major concentration at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (registrar@rice.edu).

Students may obtain credit for some courses by advanced placement, and the department's undergraduate committee can modify requirements to meet the needs of students with special backgrounds.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the department's undergraduate committee. (Course substitutions must be formally applied and entered into Degree Works by the major's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours for the Major in Physics and a Major Concentration in General Physics</td>
<td>64</td>
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<tr>
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<td>Total Credit Hours for the BS Degree with a Major in Physics and a Major Concentration in General Physics</td>
<td>124</td>
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Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Core Requirements</td>
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<td></td>
<td>Select 1 from the following:</td>
<td>4</td>
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<tr>
<td>PHYS 101 &amp; PHYS 103</td>
<td>MECHANICS (WITH LAB) and MECHANICS DISCUSSION</td>
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<tr>
<td>PHYS 111</td>
<td>HONORS MECHANICS (WITH LAB)</td>
<td></td>
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<td></td>
<td>Select 1 from the following:</td>
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<tr>
<td>PHYS 102 &amp; PHYS 104</td>
<td>ELECTRICITY &amp; MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION</td>
<td></td>
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<tr>
<td>PHYS 112</td>
<td>HONORS ELECTRICITY &amp; MAGNETISM (WITH LAB)</td>
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<tr>
<td>PHYS 201</td>
<td>WAVES, LIGHT, AND HEAT</td>
<td>3</td>
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<tr>
<td>PHYS 202</td>
<td>MODERN PHYSICS</td>
<td>3</td>
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<td>PHYS 231</td>
<td>ELEMENTARY PHYSICS LAB</td>
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<td>PHYS 301</td>
<td>INTERMEDIATE MECHANICS</td>
<td>4</td>
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<tr>
<td>PHYS 311</td>
<td>INTRODUCTION TO QUANTUM PHYSICS I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 491 &amp; PHYS 493</td>
<td>UNDERGRADUATE RESEARCH and UNDERGRADUATE RESEARCH SEMINAR 1</td>
<td>3</td>
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<tr>
<td>PHYS 492 &amp; PHYS 494</td>
<td>UNDERGRADUATE RESEARCH and UNDERGRADUATE RESEARCH SEMINAR 2</td>
<td>3</td>
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<tr>
<td>MATH 101 or MATH 105</td>
<td>AP/OTH CREDIT IN CALCULUS I</td>
<td>3</td>
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</table>

- Computational Physics (ga.rice.edu/programs-study/departments-programs/natural-sciences/physics-astronomy/computational-physics-bs/#requirementstext), or
- General Physics (p. 1)
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MATH 102 SINGLE VARIABLE CALCULUS II 3
or MATH 106 AP/OTH CREDIT IN CALCULUS II
MATH 211 ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA 3
or MATH 220 HONORS ORDINARY DIFFERENTIAL EQUATIONS
or MATH 221 HONORS CALCULUS III
MATH 212 MULTIVARIABLE CALCULUS 3
or MATH 222 HONORS CALCULUS IV

Major Concentration in General Physics 3
PHYS 302 INTERMEDIATE ELECTRODYNAMICS 4
PHYS 312 INTRODUCTION TO QUANTUM PHYSICS II 3
PHYS 332 JUNIOR PHYSICS LAB II 2
PHYS 425 STATISTICAL & THERMAL PHYSICS 3

Select 2 from the following: 6
PHYS 355 INTRODUCTION TO BIOLOGICAL PHYSICS
PHYS 411 INTRODUCTION TO NUCLEAR & PARTICLE PHYSICS
PHYS 412 SOLID STATE PHYSICS
PHYS 416 COMPUTATIONAL PHYSICS
PHYS 480 INTRODUCTION TO PLASMA PHYSICS

Select 1 from the following: 6
MATH 381 & MATH 382 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS and COMPUTATIONAL COMPLEX ANALYSIS
CAAM 335 & CAAM 336 MATRIX ANALYSIS and DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING

Total Credit Hours Required for the Major in Physics and a Major Concentration in General Physics 64

University Graduation Requirements (ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements) 60

Total Credit Hours 124

Footnotes and Additional Information

* Includes coursework completed as distribution credit, FWIS, LPAR, upper-level, residency (hours taken at Rice), 60 hours outside of the major (if applicable), and any additional academic program requirements. The “hours outside of the major” requirement may include all of the above university requirements.

1 PHYS 491 and PHYS 493 must be taken concurrently.
2 PHYS 492 and PHYS 494 must be taken concurrently.
3 Because of common core requirements, it is possible to change major concentrations even after declaring the major. See the Undergraduate tab of the Physics and Astronomy department listing for the requirements for each major concentration for the BS degree in Physics.

Transfer Credit
For Rice University’s policy regarding transfer credit, see Transfer Credit (ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines
Students pursuing the major in Physics should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information
For additional information, please see the Physics and Astronomy website: http://physics.rice.edu/

Opportunities for the BS Degree with a Major in Physics and a Major Concentration in General Physics

Academic Honors
The university recognizes academic excellence achieved over an undergraduate’s academic history at Rice. For information on university honors, please see Latin Honors (ga.rice.edu/undergraduate-students/honors-distinctions/university) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (ga.rice.edu/undergraduate-students/honors-distinctions/university). Some departments have department-specific Honors awards or designations.

Research in the Department of Physics and Astronomy
The Physics and Astronomy Department encourages undergraduate participation in research, both within the department and through extramural programs. For current opportunities, please visit the Department’s website and click on the Undergraduate Study link, at: http://www.physics.rice.edu/.

Additional Information
For additional information, please see the Physics and Astronomy website: http://physics.rice.edu/