Bachelor of Science (BS) Degree with a Major in Chemical Physics

Program Learning Outcomes for the BS Degree with a Major in Chemical Physics

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

1. Demonstrate a solid foundation of knowledge in chemistry as applicable to chemical physics.
2. Demonstrate a solid foundation of knowledge in physics as applicable to chemical physics.
3. Solve challenging scientific and technical problems as encountered in chemical physics.
4. Read basic scientific literature and communicate scientific results orally and in writing for scientists and the general public.

Requirements for the BS Degree with a Major in Chemical Physics

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

• A minimum of 73 credit hours to satisfy major requirements.
• A minimum of 120 credit hours to satisfy degree requirements.
• A minimum of 33-35 credit hours, depending on course selection, taken at the 300-level or above.

The Chemical Physics major is offered jointly by the Department of Chemistry and the Department of Physics and Astronomy. Students take upper-level courses in both chemistry and physics, focusing on the applications of physics to chemical systems. Students may obtain credit for some courses by advanced placement, and the program'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 major's academic advisor, or where applicable, the department's Director of Undergraduate Studies. (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>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Credit Hours Required for Major in Chemical Physics</td>
<td>73</td>
<td></td>
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<tr>
<td>Total Credit Hours Required for the BS Degree with a Major in Chemical Physics</td>
<td>120</td>
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Degree Requirements

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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Core Requirements

General Chemistry

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 121 &amp; CHEM 123</td>
<td>GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I</td>
<td>4</td>
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Select 1 from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 122 &amp; CHEM 124</td>
<td>GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II</td>
<td>4</td>
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CHEM 201 & CHEM 205 | ADVANCED TOPICS IN GENERAL CHEMISTRY and ADVANCED TOPICS IN GENERAL CHEMISTRY LABORATORY |

CHEM 211 & CHEM 213 or CHEM 319 | ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION I or ORGANIC CHEMISTRY I |

CHEM 215 or CHEM 365 | ORGANIC CHEMISTRY LAB or ORGANIC CHEMISTRY LAB |

CHEM 301 | PHYSICAL CHEMISTRY I |

CHEM 302 | PHYSICAL CHEMISTRY II |

Physics

Select 1 from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 101 &amp; PHYS 103</td>
<td>MECHANICS (WITH LAB) and MECHANICS DISCUSSION</td>
<td></td>
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</table>

PHYS 111 | HONORS MECHANICS (WITH LAB) |

Select 1 from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<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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</tbody>
</table>

PHYS 112 | HONORS ELECTRICITY & MAGNETISM (WITH LAB) |

PHYS 201 | WAVES, LIGHT, AND HEAT |

PHYS 202 | MODERN PHYSICS |

PHYS 231 | ELEMENTARY PHYSICS LAB |

PHYS 301 | INTERMEDIATE MECHANICS |

PHYS 302 | INTERMEDIATE ELECTRODYNAMICS |

Mathematics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 100 &amp; MATH 105</td>
<td>SINGLE VARIABLE CALCULUS I or AP/OTH CREDIT IN CALCULUS I</td>
<td></td>
</tr>
</tbody>
</table>

MATH 102 & MATH 106 | SINGLE VARIABLE CALCULUS II or AP/OTH CREDIT IN CALCULUS II |

MATH 211 | ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA |

or MATH 220 & MATH 221 | HONORS ORDINARY DIFFERENTIAL EQUATIONS or HONORS CALCULUS III |

MATH 212 or MATH 222 | MULTIVARIABLE CALCULUS or HONORS CALCULUS IV |

Elective Requirements

Advanced Coursework in Physics and Chemistry

Select 3 courses from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PHYS 311</td>
<td>INTRODUCTION TO QUANTUM PHYSICS I</td>
<td></td>
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</table>

PHYS 312 | INTRODUCTION TO QUANTUM PHYSICS II |

or CHEM 43 (QUANTUM CHEMISTRY) |
Bachelor of Science (BS) Degree with a Major in Chemical Physics

Program Restrictions and Exclusions

Students pursuing the BS Degree with a Major in Chemical Physics should be aware of the following program restrictions:

- Students pursuing the major in Chemical Physics may not declare the minor in Physics.

Transfer Credit

For Rice University’s policy regarding transfer credit, see Transfer Credit (https://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 (https://oaa.rice.edu/advising-network/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.

Program Transfer Credit Guidelines

Students pursuing the major in Chemical Physics should be aware of the following program-specific 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. Please see https://chemistry.rice.edu/transfer-credit (https://chemistry.rice.edu/transfer-credit/) for more information.

Additional Information

For additional information, please see the following department websites:

- Chemistry: https://chemistry.rice.edu (https://chemistry.rice.edu)
- Physics and Astronomy: https://physics.rice.edu (https://physics.rice.edu)

Opportunities for the BS Degree with a Major in Chemical 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 (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

Additional Information

For additional information, please see the following department websites:

- Chemistry: https://chemistry.rice.edu (https://chemistry.rice.edu)
- Physics and Astronomy: https://physics.rice.edu (https://physics.rice.edu)

Policies for the BS Degree with a Major in Chemical Physics

Footnotes and Additional Information

* Note: University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student’s declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1. CHEM 111 may be substituted for CHEM 121; CHEM 113 may be substituted for CHEM 123; CHEM 112 may be substituted for CHEM 122; CHEM 114 may be substituted for CHEM 124.

2. The Chemistry and Physics departments have determined that credit awarded for PHYS 141 CONCEPTS IN PHYSICS I is not eligible for meeting the requirements of the Chemical Physics major.

3. The Chemistry and Physics departments have determined that credit awarded for PHYS 142 CONCEPTS IN PHYSICS II is not eligible for meeting the requirements of the Chemical Physics major.

4. A limit of 2 credit hours from CHEM 491 or PHYS 461 may count toward the Advanced Laboratories requirement.

CHEM 360 INORGANIC CHEMISTRY
CHEM 415 CHEMICAL KINETICS AND DYNAMICS
CHEM 420 CLASSICAL AND STATISTICAL THERMODYNAMICS

or PHYS 425 STATISTICAL & THERMAL PHYSICS

Advanced Laboratories

Select 2 courses from the following: 4

CHEM 366 INORGANIC CHEMISTRY LAB
CHEM 367 MATERIALS CHEMISTRY LAB
CHEM 368 CHEMICAL MEASUREMENT LAB
CHEM 491 RESEARCH FOR UNDERGRADUATES

or PHYS 461 INDEPENDENT RESEARCH

PHYS 332 JUNIOR PHYSICS LAB II

Advanced Coursework in Mathematics (MATH) or Computational and Applied Math (CAAM)

Select 2 courses from MATH or CAAM course offerings at the 300-level or above 6

Total Credit Hours Required for the Major in Chemical Physics 73
Additional Credit Hours to Complete Degree Requirements 16
University Graduation Requirements 31

Additional Information

For additional information, please see the following department websites:

- Chemistry: https://chemistry.rice.edu (https://chemistry.rice.edu)
- Physics and Astronomy: https://physics.rice.edu (https://physics.rice.edu)