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 chemical physics and deeper knowledge of subdivisions of the field related to their interests.
2. Identify, formulate, and solve challenging scientific and technical problems as encountered in chemical physics.
3. 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 (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 133 credit hours to satisfy degree requirements.
- A minimum of 60 credit hours outside of major 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/degeworks/officialcertifier).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for Major in Chemical Physics</td>
<td>73</td>
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<tr>
<td></td>
<td>Total Credit Hours Required for the BS Degree with a Major in Chemical Physics</td>
<td>133</td>
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Degree Requirements

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<th>Code</th>
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<th>Credit Hours</th>
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| Core Requirements

- CHEM 121 & CHEM 123 GENERAL CHEMISTRY I and GENERAL CHEMISTRY LABORATORY I
- CHEM 122 & CHEM 124 GENERAL CHEMISTRY II and GENERAL CHEMISTRY LABORATORY II
- CHEM 211 & CHEM 213 ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION
- CHEM 215 ORGANIC CHEMISTRY LAB or CHEM 365 ORGANIC CHEMISTRY LAB
- CHEM 301 PHYSICAL CHEMISTRY I
- CHEM 302 PHYSICAL CHEMISTRY II

Select 1 from the following:

- PHYS 101 & PHYS 103 MECHANICS (WITH LAB) and MECHANICS DISCUSSION
- PHYS 111 HONORS MECHANICS (WITH LAB)

Select 1 from the following:

- PHYS 102 & PHYS 104 ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION
- 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
- MATH 101 SINGLE VARIABLE CALCULUS I or MATH 105 AP/OTH CREDIT IN CALCULUS I
- MATH 102 SINGLE VARIABLE CALCULUS II or MATH 106 AP/OTH CREDIT IN CALCULUS II
- MATH 211 ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA or MATH 220 HONORS ORDINARY DIFFERENTIAL EQUATIONS or MATH 221 HONORS CALCULUS III
- MATH 212 MULTIVARIABLE CALCULUS or MATH 222 HONORS CALCULUS IV

Elective Requirements

Advanced Coursework in Physics and Chemistry

Select 3 from the following:

- PHYS 311 INTRODUCTION TO QUANTUM PHYSICS I
- PHYS 312 INTRODUCTION TO QUANTUM PHYSICS II or CHEM 430 QUANTUM CHEMISTRY
- 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 from the following:

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

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM 366</td>
<td>INORGANIC CHEMISTRY LAB</td>
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<tr>
<td>CHEM 367</td>
<td>MATERIALS CHEMISTRY LAB</td>
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<tr>
<td>CHEM 368</td>
<td>CHEMICAL MEASUREMENT LAB</td>
</tr>
<tr>
<td>CHEM 491</td>
<td>RESEARCH FOR UNDERGRADUATES 2</td>
</tr>
<tr>
<td></td>
<td>or PHYS 461 INDEPENDENT RESEARCH</td>
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<tr>
<td></td>
<td>or PHYS 462 INDEPENDENT RESEARCH</td>
</tr>
<tr>
<td>PHYS 332</td>
<td>JUNIOR PHYSICS LAB II</td>
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</table>

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

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

Total Credit Hours 133

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 (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.

Additional Information

For additional information, please see the following department websites:

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

Policies for the BS Degree with a Major in Chemical 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.

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.

Additional Information

For additional information, please see the following department websites:

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

Footnotes and Additional Information

* Includes coursework completed as distribution credit, FWIS, LPAP, 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 The CHEM 151 and CHEM 153 and CHEM 152 and CHEM 154 Honors sequence is an acceptable substitute for the CHEM 121 and CHEM 123 and CHEM 122 and CHEM 124 General Chemistry sequence.

2 A limit of 2 credit hours from CHEM 491 or PHYS 461 or PHYS 462 may count toward the Advanced Laboratories requirement.