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/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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</thead>
<tbody>
<tr>
<td>Total Credit Hours Required for Major in Chemical Physics</td>
<td>73</td>
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<tr>
<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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Core Requirements

CHEM 121 GENERAL CHEMISTRY I ¹ 3
or CHEM 111 AP/OTH CREDIT IN GENERAL CHEMISTRY I 1
CHEM 123 GENERAL CHEMISTRY LABORATORY I ¹ 1
or CHEM 113 AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I
CHEM 122 GENERAL CHEMISTRY II ¹ 3
or CHEM 112 AP/OTH CREDIT IN GENERAL CHEMISTRY II
CHEM 124 GENERAL CHEMISTRY LABORATORY II ¹ 1
or CHEM 114 AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II
CHEM 211 ORGANIC CHEMISTRY I 3
& CHEM 213 ORGANIC CHEMISTRY DISCUSSION
CHEM 215 ORGANIC CHEMISTRY LAB 2
or CHEM 365 ORGANIC CHEMISTRY LAB
CHEM 301 PHYSICAL CHEMISTRY I 3
CHEM 302 PHYSICAL CHEMISTRY II 3

Select 1 from the following:

PHYS 101 & PHYS 103 MECHANICS (WITH LAB) and MECHANICS DISCUSSION 4
PHYS 111 HONORS MECHANICS (WITH LAB)

Select 1 from the following:

PHYS 102 & PHYS 104 ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION 4
PHYS 112 HONORS ELECTRICITY & MAGNETISM (WITH LAB)

PHYS 201 WAVES, LIGHT, AND HEAT 3
PHYS 202 MODERN PHYSICS 3
PHYS 231 ELEMENTARY PHYSICS LAB 1
PHYS 301 INTERMEDIATE MECHANICS 4
PHYS 302 INTERMEDIATE ELECTRODYNAMICS 4
MATH 101 SINGLE VARIABLE CALCULUS I 3
or MATH 105 AP/OTH CREDIT IN CALCULUS I
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

Elective Requirements

Advanced Coursework in Physics and Chemistry

Select 3 courses 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
Bachelor of Science (BS) Degree with a Major in Chemical Physics

Advanced Laboratories
Select 2 courses from the following:

<table>
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<tr>
<td>PHYS 425</td>
<td>STATISTICAL &amp; THERMAL PHYSICS</td>
</tr>
<tr>
<td>CHEM 366</td>
<td>INORGANIC CHEMISTRY LAB</td>
</tr>
<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</td>
</tr>
<tr>
<td>PHYS 461</td>
<td>INDEPENDENT RESEARCH</td>
</tr>
<tr>
<td>PHYS 462</td>
<td>INDEPENDENT RESEARCH</td>
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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

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<tr>
<td>CHEM 151</td>
<td>may be substituted for CHEM 121 or CHEM 111</td>
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<tr>
<td>CHEM 153</td>
<td>may be substituted for CHEM 123 or CHEM 113</td>
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<tr>
<td>CHEM 152</td>
<td>may be substituted for CHEM 122 or CHEM 112</td>
</tr>
<tr>
<td>CHEM 154</td>
<td>may be substituted for CHEM 124 or CHEM 114</td>
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</table>

Total Credit Hours Required for the Major in Chemical Physics 73
University Graduation Requirements

Total Credit Hours 133

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 CHEM 151 may be substituted for CHEM 121 or CHEM 111; CHEM 153 may be substituted for CHEM 123 or CHEM 113; CHEM 152 may be substituted for CHEM 122 or CHEM 112; and CHEM 154 may be substituted for CHEM 124 or CHEM 114.

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

Policies for the BS Degree with a Major in Chemical Physics

Transfer Credit
For Rice University’s policy regarding transfer credit, see Transfer Credit.

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://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 and Distinction in Research and Creative Work. 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://physics.rice.edu/