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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.
- Demonstrate a solid foundation of knowledge in physics as applicable to chemical physics.
- 3. Critically analyze challenging scientific and technical problems as encountered in chemical physics.
- 4. Read basic scientific literature and communicate scientific results via relevant channels.

Requirements for the BS Degree with a Major in Chemical Physics

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

- A minimum of 72-73 credit hours, depending on course selection, 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 <u>Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/</u>).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit
		Hours
Total Credit Hours	Required for Major in Chemical Physics	72-73
Total Credit Hours Chemical Physics	Required for the BS Degree with a Major in	120

Degree Requirements

Code	Title	Credit		
Core Requirements				
General Chemistr	v ¹			
CHEM 121	GENERAL CHEMISTRY I	4		
& CHEM 123	and GENERAL CHEMISTRY LABORATORY I			
Select 1 from the	following:	3-4		
CHEM 122	GENERAL CHEMISTRY II			
& CHEM 124	and GENERAL CHEMISTRY LABORATORY			
CHEM 201	ADVANCED TOPICS IN GENERAL CHEMISTRY			
CHEM 211 & CHEM 213	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY DISCUSSION I	3		
or CHEM 219	ORGANIC CHEMISTRY I HONORS			
CHEM 215	ORGANIC CHEMISTRY LAB	2		
or CHEM 365	ORGANIC CHEMISTRY LAB			
CHEM 301	PHYSICAL CHEMISTRY I	3		
CHEM 302	PHYSICAL CHEMISTRY II	3		
Physics				
Select 1 from the	following: ²	4		
PHYS 101	MECHANICS (WITH LAB)			
& PHYS 103	and MECHANICS DISCUSSION			
PHYS 111	HONORS MECHANICS (WITH LAB)			
Select 1 from the	following: ³	4		
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	3		
PHYS 202	MODERN PHYSICS	3		
PHYS 231	ELEMENTARY PHYSICS LAB	1		
PHYS 301	INTERMEDIATE MECHANICS	4		
PHYS 302	INTERMEDIATE ELECTRODYNAMICS	4		
Mathematics				
MATH 101	SINGLE VARIABLE CALCULUS I ⁴	3		
or MATH 105	AP/OTH CREDIT IN CALCULUS I			
MATH 102	SINGLE VARIABLE CALCULUS II ⁴	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	5		
or MATH 221	HONORS CALCULUS III			
MATH 212	MULTIVARIABLE CALCULUS	3		
or MATH 222	HONORS CALCULUS IV			
or MATH 232	HONORS MULTIVARIABLE CALCULUS			
Elective Requiren	nents			
Advanced Coursework in Physics and Chemistry				
Select 3 courses f	rom the following:	9		
PHYS 311	INTRODUCTION TO QUANTUM PHYSICS I			
PHYS 312	INTRODUCTION TO QUANTUM PHYSICS II			
or CHEM 43(QUANTUM CHEMISTRY				

CHEM 360	INORGANIC CHEMISTRY	
CHEM 415	CHEMICAL KINETICS AND DYNAMICS	
CHEM 420	CLASSICAL AND STATISTICAL THERMODYNAMICS	
or PHYS 42	25 STATISTICAL & THERMAL PHYSICS	
Advanced Labora	atories	
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 5	
or PHYS 46	1 INDEPENDENT RESEARCH	
PHYS 332	JUNIOR PHYSICS LAB II	
Advanced Cours Computational A Research (CMOF	ework in Mathematics (MATH) or pplied Mathematics and Operations 3)	
Select 2 courses from MATH or CMOR course offerings at the 300-level or above		6
Total Credit Hou	rs Required for the Major in Chemical Physics	72-73
Additional Credit Hours to Complete Degree Requirements *		16-17
University Graduation Requirements (https://ga.rice.edu/		31
undergraduate-s	tudents/academic-policies-procedures/	
graduation-requi	rements/)	
Total Credit Hou	rs	120

Footnotes and Additional Information

- * Note: <u>University Graduation Requirements</u> 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. <u>Additional Credit Hours to Complete Degree</u> <u>Requirements</u> 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 Students without credit for basic calculus (e.g., MATH 101, MATH 105, and/or MATH 102, MATH 106) must either enroll in the relevant course(s) or substitute more advanced MATH or CMOR coursework with prior approval by the program advisor.
- ⁵ A limit of 2 credit hours from CHEM 491 **or** PHYS 461 may count toward the Advanced Laboratories requirement.

Policies for the 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 BA degree with a major in Chemistry.
- Students pursuing the major in Chemical Physics may not declare the BA degree with a major in Physics.
- 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 <u>Transfer</u> <u>Credit (https://ga.rice.edu/undergraduate-students/academic-policiesprocedures/transfer-credit/</u>). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of <u>transfer credit advisors (https:// oaa.rice.edu/advising-network/transfer-credit-advisors/</u>) on their website: <u>https://oaa.rice.edu</u>. 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. For more information, please see https://chemistry.rice.edu/transfer-credit (https://chemistry.rice.edu/transfer-credit ((https://chemistry.rice.edu/transfer-credit ((https://chemistry.rice.edu/transfer-credit ((<a href="h

Additional Information

For additional information, please see the following department websites:

- · Chemistry: https://chemistry.rice.edu/ (https://chemistry.rice.edu),
- Physics and Astronomy: <u>https://physics.rice.edu/</u>.

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/,
- · Physics and Astronomy: https://physics.rice.edu/.