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College of SCIENCE
Department of PHYSICS
Bachelor of Science in PHYSICS
Major in PHYSICS
For student date of entry under UG Catalog 2022-2023

A hashtag (#) indicates a course with prerequisites or corequisites.

I. Pathways to General Education Requirements (49 credits)

Concept 1 Discourse (9 credits)

6 credits in foundational courses. The following course sequence is required of all students majoring in Physics within the B.S. Degree in Physics.

ENGL 1105 First-year Writing	3		ENGL 1106 First-year Writing	3	

3 credits in advanced or applied writing or speaking courses.

	3	

Concept 2 Critical Thinking in the Humanities (6 credits)

	3			3	

Concept 3 Reasoning in the Social Sciences (6 credits)

	3			3	

Concept 4 Reasoning in the Natural Sciences (8 credits). The following course sequence is required of all students majoring in Physics within the B.S. Degree in Physics.

# CHEM 1035 General Chemistry	3		# CHEM 1036 General Chemistry	3	
# CHEM 1045 General Chemistry Lab	1		# CHEM 1046 General Chemistry Lab	1	

Concept 5 Quantitative and Computational Thinking (11 credits)

8 credits in foundational courses. The following course sequence is required of all students majoring in Physics within the B.S. Degree in Physics.

MATH 1225 Calculus of a Single Variable	4		MATH 1226 Calculus of a Single Variable	4	

3 credits in advanced or applied courses. The following course is required of all students majoring in Physics within the B.S. Degree in Physics.

# MATH 2214 or # MATH 2214H Introduction to Differential Equations	3	

Concept 6 Critique and Practice in Design and the Arts (6 credits. 3 in design + 3 in arts, or 6 in integrated design & arts)

	3			3	

Concept 7 Critical Analysis of Identity and Equity in the United States (3 credits)

	3	

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II. Physics Bachelor of Science Core Courses (21 credits)

# PHYS 2504 Mathematical Methods in Physics	3	
PHYS 3314 Intermediate Laboratory	3	
# PHYS 3324 Modern Physics	4	
# PHYS 3355 Intermediate Mechanics	3	
# PHYS 3405 Intermediate Electricity and Magnetism	3	
# PHYS 3704 Thermal Physics	3	
# PHYS 4315 Modern Experimental Physics	2	

III. Additional Required Courses for the Bachelor of Science in Physics, Major in Physics (39-42 credits)*

# PHYS 2325-2326 Seminar for Physics Majors	1		1	
# PHYS 2305-2306 Foundations of Physics	4		4	
# PHYS 3356 Intermediate Mechanics	3			
# PHYS 3406 Intermediate Electricity & Magnetism	3			
# PHYS 4316 Modern Experimental Physics	2			
# PHYS 4455-4456 Introduction to Quantum Mechanics	3		3	
# MATH 2114 Introduction to Linear Algebra **or** # MATH 2114H Introduction to Linear Algebra	3			
# MATH 2204 Intro to Multivariable Calculus **or** # MATH 2204H Intro to Multivariable Calculus	3			
# MATH 3214 Calculus of Several Variables	3			
# MATH 4425 Fourier Series and Partial Differential Equations **or** # MATH 4564 Operational Methods for Engineers	3			
# MATH 3574 Applied Complex Variables (1 credits) **or** # MATH 4234 Elementary Complex Analysis (3 credits) **or** # MATH 4574 Vector and Complex Analysis for Engineers (3 credits)	1 **or** 3			
CS 1064 Introduction to Programming in Python **or** CS 1114 Introduction to Software Design **or** # ECE 1574 Engr Problem Solving with C++ **or** # AOE/ESM 2074 Computational Methods	2 **or** 3			

* MATH 1225-1226 (#) and MATH 2214 (#) or # MATH 2214H (#) and CHEM 1035-1036 (#) and CHEM 1045-1046 (#) are also required of all Physics Majors within the B.S. Degree Program in Physics. They are listed in Section I above.

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IV. Restricted Electives (two courses from the list below, 6 credits)		
# PHYS 4254 Quantum Information Technologies	3	
# PHYS 4264 Quantum Optics and Qubit Processors	3	
# PHYS 4514 Introduction to Nuclear Physics	3	
# PHYS 4554 Introduction to Solid State Physics	3	
# PHYS 4564 Polymer Physics	3	
# PHYS 4574 Nanotechnology	3	
# PHYS 4614 Optics	3	
# PHYS 4634 Modern Classical Physics	3	
# PHYS 4654 Modern Cosmology	3	
# PHYS 4674 Introduction to General Relativity	3	
# PHYS 4714 Introduction to Biophysics	3	
# PHYS 4724 Soft Matter Physics	3	
# PHYS 4755 Introduction to Computational Physics	3	
# PHYS 4774 Introduction to Physics of Galaxies	3	

V. Free Electives (2-5 credits)		

	3			3	
	3			3	

Accepted Substitutions

PHYS 3355: AOE 3154 (Astromechanics), or ESM 3124 (Dynamics II Analytical and 3-D Motion).
PHYS 3356: ESM 3134 (Dynamics III Vibration and Control) or ESM 4114 (Nonlinear Dynamics and Chaos).
PHYS 3405: ECE 3105 (Electromagnetic Fields).
PHYS 3406: ECE 3106 (Electromagnetic Fields).
PHYS 3314: AOE 3054 (AOE Experimental Methods), or ECE 2204 (Electronics) & ECE 2274 (Electronic Networks Laboratory I), or ESM 3444 (Mechanics Laboratory).
PHYS 4316: PHYS 3154 (Observational Astrophysics).

Foreign Language Requirement

Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six credits of a single foreign, classical, or sign language at the college level. Courses taken to meet this requirement do not count toward the credits required for graduation. Please consult the Undergraduate Course Catalog for details.

Satisfactory Progress Toward Degree

A student will be certified as making satisfactory progress toward the B.S. degree in Physics by satisfying the university's academic eligibility requirements, as well as the following requirements:

- Upon having attempted 60 credit hours, the student will have completed Section I Concept 1 and Concept 4 requirements, the Mathematics requirements (in Sections I and III) as well as PHYS 2305-2306, PHYS 2504, and PHYS 3324.
- Upon having attempted 45 credit hours, the student must have 2.0 overall and in-major GPAs. All PHYS courses attempted are used in the calculation of the in-major GPA. Non-PHYS courses used as Accepted Substitutions are not used in the calculation of the in-major GPA.
- Upon having attempted 96 credit hours, the student will have completed PHYS 3314, PHYS 3355-3356, and PHYS 3405-3406.
- Upon having attempted 72 credit hours, the student will have completed the foreign language requirement by the

close of the academic year (spring semester). [College of Science requirement]

- Upon having attempted 96 credit hours, the student will have completed all credits for the Pathways to General Education.

Outcomes Assessment

Each student is required to participate in the department's Outcomes Assessment procedures as determined by each year's Undergraduate Program Committee and approved by the Department Chair.

Minimum hours and GPA required for graduation

A minimum of 120 credit hours must be completed for graduation. A minimum overall and in-major GPA of 2.0 is required for graduation. All PHYS courses attempted are used in the calculation of the in-major GPA. Non-PHYS courses used as Accepted Substitutions are not used in the calculation of the in-major GPA.

Prerequisites and Corequisites

Courses in this checksheet marked with a hashtag (#) have prerequisites or corequisites. Please check with your advisor or consult the Undergraduate Course Catalog.