MAJOR IN INTERDISCIPLINARY PHYSICS - COMPUTATIONAL PHYSICS CONCENTRATION

Requirements

(Beginning Spring 2025)

The#Interdisciplinary Physics major is designed for students with an interest in physics and its applications in other fields with high potential for employment and postgraduate opportunities. The program provides students#with a strong foundation in physics along with the freedom#to develop a coherent#academic#program across other disciplines such as computer science, mathematics, astronomy, geology, marketing, and entrepreneurship through concentrations in Computational Physics, Planetary Science and Physics Innovation and Entrepreneurship. The curricular pathways offered through the concentrations in the Interdisciplinary Physics major prepare students for careers in an increasingly technical workforce that values skills across many disciplines.

All Interdisciplinary Physics majors take a core set of physics courses, including a three-course sequence in fundamental classical physics and courses in computational methods, modern physics, and laboratory techniques. Students will be assigned an adviser in the Department of Physics, Astronomy, and Geosciences who will assist them in selecting elective courses within their program to best meet their career goals.

Required Courses for B.S. in Interdisciplinary Physics

Code	Title	Units
Required Physics Courses		
PHYS 185	INTRODUCTORY SEMINAR IN PHYSICS	1
PHYS 241	GENERAL PHYSICS I CALCULUS-BASED A grade of B or better in PHYS 211 is required to substitute for PHYS 241	4
or PHYS 211	GENERAL PHYSICS I; NON CALCULUS-BASED	
PHYS 242	GENERAL PHYSICS II CALCULUS-BASED	4
PHYS 243	GENERAL PHYSICS III	4
PHYS 305	COMPUTERS IN PHYSICS	4
PHYS 311	MODERN PHYSICS I	3
PHYS 341	INTERMEDIATE PHYSICS LABORATORY I	3
PHYS 385	PHYSICS SEMINAR	1
or ASTR 385	ASTROPHYSICS SEMINAR	
PHYS 486	PHYSICS SEMINAR II	1
Non-Physics Requirements		
MATH 273	CALCULUS I	4
MATH 274	CALCULUS II	4
Total Units		**33**

This concentration blends Physics with courses in Mathematics and Computer Science appropriate for students interested in technical careers involving data analysis and modeling. Students in this concentration may pursue the accelerated Bachelor's to Master's degree program in conjunction with TU's Master's in Computer Science. This concentration also allows students an opportunity to complete advanced physics courses in preparation for applying to Ph.D. programs.

Code	Title	Units
Additional Physics Content Requirements		
PHYS 307	INTRODUCTORY MATHEMATICAL PHYSICS	3
PHYS 337	DIGITAL ELECTRONICS	4
PHYS 460	COMPUTATIONAL METHODS IN PHYSICS	3
Additional Non-Physics Content Requirements		
COSC 236	INTRODUCTION TO COMPUTER SCIENCE I	4
COSC 237	INTRODUCTION TO COMPUTER SCIENCE II	4
COSC 290	PRINCIPLES OF COMPUTER ORGANIZATION	4
COSC 336	DATA STRUCTURES AND ALGORITHM ANALYSIS	4
MATH 263	DISCRETE MATHEMATICS	3
MATH 275	CALCULUS III	4
MATH 374	DIFFERENTIAL EQUATIONS	3
ELECTIVES	300- or 400- level from PHYS, COSC, or MATH	12
Total Units		**48**

Four-Year Plan of Study

Sample Four-Year Plan

The selected course sequence below is an example of the simplest path to degree completion. Based on course schedules, student needs, and student choice, individual plans may vary. Students should consult with their adviser to make the most appropriate elective choices and to ensure that they have completed the required number of units (120) to graduate.

Freshman

Term 1	Units Term 2	Units
PHYS 185	1 PHYS 241 (Core 7)	4
COSC 236	4 COSC 237	4
MATH 273	4 Core 2 (or Core 1)	3
Core 1 (or Core 2)	3 Core 4	3
Elective	3	
	15	**14**

Sophomore

Term 1	Units Term 2	Units
PHYS 242 (Core 8)	4 PHYS 243	4
PHYS 305	4 MATH 275	4
MATH 263	3 MATH 374	3
MATH 274	4 Core 5	3
	15	**14**

Junior

Term 1	Units Term 2	Units
PHYS 311	3 PHYS 307	3
PHYS 341	3 PHYS 385	1
COSC 290	4 COSC 336	4
Elective	3 Elective	3
Core 6	3 Core 9	3

	Core 10	3
	16	**17**

Senior

Term 1	**Units**	**Term 2**	**Units**
PHYS 337	4	Elective	3
PHYS 460	3	Elective	3
PHYS 486	1	Core 12	3
Elective	3	Core 13	3
Core 11	3	Core 14	3
	14		**15**

Total Units 120

Learning Outcomes

The IP program has two overarching student learning outcomes. Upon successful completion of the degree, students in all IP concentrations will be able to:

1. Demonstrate an understanding of fundamental principles of physics and major concepts in a student's chosen concentration and be able to apply these principles to solve quantitative problems.
2. Communicate scientific information effectively in both oral and written formats.
3. Demonstrate the ability to apply computational methods and computer controls to investigate experimental and theoretical scientific problems.