College of Liberal Arts and Sciences
UNIVERSITY OF COLORADO **DENVER**

PHYSICS – BIOPHYSICS & MEDICAL PHYSICS

Bachelor of Science (B.S.) – Catalog Year Fall 2017

PROGRAM OVERVIEW

From medical advances to space exploration, physicists find their home across the whole range of science and technology. The most basic of the sciences, physics is all around us every day. The physics major is one of the few academic degree programs that prepares its graduates for an amazing array of careers. Physicists are renowned for their logical thought, analytical minds, problem solving skills and mathematical ability.

The physics major can be completed via one of two tracks. Biophysics & Medical Physics is a broader-based track emphasizing the application of physics to biological and medical fields. It is a good option for students planning to go to medical school, to pursue graduate studies in biophysics or bioengineering, or to teach science in secondary schools. Currently, students assist in research on biomedical optics and medical devices.

ACADEMIC ADVISING

The College of Liberal Arts and Sciences (CLAS) supports students to graduation using a dual-advising system. CLAS students have two academic advisors with whom they should meet regularly to discuss academic and degree progress: a CLAS Academic Advisor and a major/faculty advisor.

For questions related to CU Denver Core Curriculum, CLAS, general graduation requirements, university/college academic policies, or campus resources contact:

CLAS Academic Advising
clas_advising@ucdenver.edu
Find your CLAS Advisor here
North Classroom (NC) Building 1030
303-315-7100

For questions related to major requirements, major course prerequisites, or evaluation of transfer coursework in your major contact:

Clyde Zaidins
clyde.zaidins@ucdenver.edu
Visit the department website here
North Classroom (NC) 3123B
303-315-7365

GENERAL GRADUATION REQUIREMENTS & POLICIES

All CU Denver CLAS students are required to complete the following minimum general graduation requirements to be eligible to apply for graduation:

1. Complete a minimum of 120 semester hours passed
2. Achieve a minimum 2.0 CU cumulative grade point average (GPA)
3. Complete a minimum of 45 upper-division (3000- to 4000-level) semester hours
4. Complete all college and major requirements
5. Residency: complete a minimum of 30 CLAS hours at CU Denver

Credits exceeding the following maximum hour restrictions will not be applied toward the minimum 120 hours required for graduation:

- 56 semester hours in major department/prefix courses
- 16 semester hours Pass/Fail
- 12 semester hours of Independent Study
- 9 semester hours of internship credit
- 8 semester hours of physical education credit

CAREER RESOURCES

The Physics (Biophysics & Medical Physics Track) B.S. degree prepares students for graduate studies in biophysics, bioengineering and medicine, or to teach science in secondary schools. Due to the department's focus on innovation, physics students develop a variety of unique and transferrable skills to prepare them for any number of careers. Related occupations for Physics graduates include:

- Biophysicist
- Laboratory Analyst
- Pharmacist
- Cardiac Imaging Researcher
- Medical Physicist
- Physician
- Health Physicist
- Medical Products Designer
- Radiographer
- Industrial Health Engineer
- Molecular Physicist
- Research Scientist

Some careers and occupations require additional training or education. Interested in learning more about career and occupational options for this major? Visit the CU Denver Career Center located in the Tivoli Student Union (TV) Suite 267 to speak with a career counselor. The Career Center also provides *Career Briefs*, overviews of careers related to specific CU Denver majors, which include related links and resources to the particular field and show potential jobs related to the major. Access Career Briefs here.

PROGRAM REQUIREMENTS & POLICIES

Students are responsible for meeting with the major/faculty advisor in the department to confirm major requirements. Students completing the Physics B.S. Degree are required to complete the following minimum program requirements:

1. Students must declare their intention to major in Physics by the time they have completed 60 semester hours.
2. Students must complete 46 credit hours in physics for the Pure & Applied track to receive the degree of Bachelor of Science (B.S.) in Physics.
3. No grade below a C (2.0) can be used to meet the requirements for the major.
4. At least 12 semester hours of the requirements for the major must be completed at CU Denver.

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PROGRAM REQUIREMENTS & POLICIES

Courses	Credits	Notes
*** Course prerequisites change regularly. Students are responsible for consulting advisors and the class schedule in the student portal for prerequisite information. ***		
Required Courses	**25**	
PHYS2311 General Physics I: Calculus-Based	4	**Prerequisite: MATH1401*
PHYS2321 General Physics Laboratory I	1	
PHYS2331 General Physics II: Calculus-Based	4	**Prerequisite: PHYS2311 & MATH2411*
PHYS2341 General Physics Laboratory II	1	
PHYS2711 Vibrations and Waves	3	**Prerequisite: PHYS2331 & MATH2411*
PHYS2811 Modern Physics I	4	**Prerequisite: PHYS2331 & MATH2411*
PHYS3120 Methods of Mathematical Physics	3	**Prerequisite: MATH2421 & MATH3195*
PHYS3711 Junior Lab I	2	**Prerequisite: PHYS2811*
PHYS3811 Quantum Mechanics	3	**Prerequisite: PHYS2811 & PHYS3211*
Required Courses: Biophysics & Medical Physics Track	**25**	
PHYS3251 Biophysics of the Body	4	**Prerequisite: PHYS2711, PHYS3161, MATH 2421, & MATH3195*
PHYS3451 Biophysics of the Cell	4	**Prerequisite: PHYS 2811, PHYS3151 and MATH 2421; *Corequisite: MATH3195*
PHYS4331 Principles of Electricity and Magnetism **or** PHYS4351 Bioelectromagnetism (recommended)	4	**Prerequisite: PHYS2331 and PHYS3120*
PHYS3721 Junior Lab II or both BIOL2071 General Biology Laboratory I and BIOL2081 General Biology Laboratory II	2	**Prerequisite: PHYS3711*
Biophysics-related electives at 3000-level or above or all four of the following: BIOL2051 General Biology I, BIOL2061 General Biology II, PHYS3151 Biophysics Outlook I and PHYS3161 Biophysics Outlook II	8	**See department for approved courses*
Numerical Modeling **or** Probability & Statistics Course	3	**See department for approved courses*
Required Ancillary Courses	**16**	
MATH1401 Calculus I	4	**Prerequisite: Placement*
MATH2411 Calculus II	4	**Prerequisite: C- or higher in MATH1401*
MATH2421 Calculus III	4	**Prerequisite: C- or higher in MATH2411*
MATH3195 Linear Algebra and Differential Equations or both MATH3191 Applied Linear Algebra and 3200 Elementary Differential Equations	4	**B- or higher in MATH2411 (recommended)*
Total Program Hours:	**66**	

SAMPLE ACADEMIC PLAN OF STUDY

The following academic plan is a *sample* pathway to completing degree requirements for this major. Students should tailor this plan based on previously completed college coursework (e.g., AP, IB, CLEP, dual/concurrent enrollment, and transfer credit), course availability, and individual preferences related to course load, schedules, or add-on programs such as minors or double-majors.

Year One	Milestones	Fall	CRS	Grade	√	Spring	CRS	Grade	√
	• Meet your advisors • Introduce yourself to faculty in your department • Create an academic plan and check your Degree Audit with your advisors • Visit campus resources	ENGL1020 – Core Composition I	3			ENGL2030 – Core Composition II	3		
		CU Core Behavioral Science	3			CU Core Humanities	3		
		MATH1401 [PE]	4			MATH2411 [PE]	4		
		CU Core Arts	3			PHYS2311 and PHYS2321	5		
		CU Core Social Science	3						

Year Two	Milestones	Fall	CRS	Grade	√	Spring	CRS	Grade	√
	• Meet with your advisors to complete a 60-hour check • Join a student club or organization • Begin to research internships • Visit the Career Center • Explore additional major(s) or minors	MATH2421 [PE]	4			PHYS2711	3		
		PHYS2331 and PHYS2341	5			MATH3195 [PR]	4		
		CLAS Communicative Skills	3			PHYS2811†	4		
		CLAS Humanities	3			CU Core International Perspectives	3		

† Availability of upper-division PHYS courses varies significantly by semester. Meet with the PHYS advisor to discuss course sequencing and availability. †

Year Three	Milestones	Fall	CRS	Grade	√	Spring	CRS	Grade	√
	• Explore research opportunities in your major • Apply for internships • Begin to research professional or graduate programs	PHYS3451†	4			CLAS Behavioral Science	3		
		PHYS3711†	2			PHYS3251†	4		
		PHYS3120†	3			PHYS3721†	2		
		CLAS Foreign Language Semester I	5			Num Model or Prob & Stats Course	3		
						CLAS Foreign Language Semester II	5		

Year Four	Milestones	Fall	CRS	Grade	√	Spring	CRS	Grade	√
	• See advisors for a grad check the semester before you plan to graduate • Explore independent studies in your major • Submit professional or graduate program applications	PHYS4331 **or** PHYS4351†	4			PHYS3811†	3		
		Biophysics Upper-Division Elective†	3			Biophysics Upper-Division Elective†	3		
		CLAS Social Science	3			Biophysics Upper-Division Elective†	2		
		CU Core Cultural Diversity	3			Upper-Division General Elective	3		
		Upper-Division General Elective	3			Upper-Division General Elective	2		

[M] *Major Course Available* [PE] *Prerequisite Enforced* [PR] *Prerequisite Recommended*