



## **Bachelor's-Accelerated Master's Program in Engineering Physics (Bachelor of Science in Engineering Physics and Master of Science in Physics)**

*for students admitted on or after July 1, 2019*

### **Statement of Purpose**

The Bachelor's-Accelerated Master's (BAM) Program in Engineering Physics aims to provide new opportunities for undergraduate engineering physics majors. The program is specifically addressed to the students in the engineering physics major program of the Department of Physics. The engineering physics major gives students a thorough grounding in theoretical physics, applied mathematics, and broad exposure to engineering topics, so they are well prepared either to proceed with graduate work or with professional employment. For students interested in immediate professional employment, the BAM program would serve as a terminal degree program that may qualify students for a higher level of employment.

### **Admissions Requirements and Process**

In order to gain admission to the BAM program named above, a student must meet the following requirements and follow the admissions process.

#### **Requirements**

- Have a cumulative GPA of 3.30 or higher and a physics major GPA of 3.30 or higher
- Have completed a minimum of 75 credit hours of coursework
- Transfer students must have completed a minimum of 24 credit hours at CU Boulder
- Students must have a letter of support from a faculty advisor to complete master's level research. The letter must describe the master's level research project, the time scale for completion, and the minimum goals achieved to be considered acceptable for degree completion.
- Submit a written course plan with the application that has been approved by the BAM program advisor (see below)

#### **Process**

- Student must meet with advisor of BAM program (Associate Chair of Engineering Physics) prior to applying. Student must have a written course plan listing the 6 courses to take and in which semesters, and establishing whether they plan to write and defend a master's thesis or pass the comprehensive examination II.
- Student fills out [BAM Intent Application](#), typically during the junior year. If applying to the BAM program during the final undergraduate semester, the intent application must be submitted by January 1 for May graduates, February 1 for August graduates, and September 1 for December graduates.
- Approved intent application enables an undergraduate student to use up to 12 credit hours of coursework (as an undergraduate and at undergraduate tuition rates) for the accelerated master's program.
  - 6 credit hours may be double counted toward the accelerated master's (PHYS 3210 and PHYS 4410 only)

### **Completing the Bachelor's Degree**

During the semester in which students are enrolled in the remaining requirements for the undergraduate degree, they must complete the following by the deadline listed below:

- [Apply to graduate](#) with the bachelor's degree in Buff Portal
- Apply to be formally admitted to continue with the accelerated master's program by completing the [Master's Continuation Form](#). Students will be matriculated into the master's program , provided they meet the basic continuation requirement of 3.30 cumulative GPA. International students must have approval from International Student and Scholar Services (ISSS) prior to matriculation.
- Submit a [BAM Supplement Form](#) to identify which courses are being double-counted and which courses are being used toward the master's degree.

**Deadlines for completing all three steps:**

- February 1 if graduating with the bachelor's degree in May
- March 1 if graduating with the bachelor's degree in August
- October 1 if graduating with the bachelor's degree in December

**Continuing with the Master's Degree Program**

Students must begin the master's program within one year of completing their bachelor's degree, and must select their term of admission upon applying. After completing the bachelor's degree, students must maintain a cumulative GPA of 3.00 (B) for the duration of the program. All graduate courses applied to the BAM degree must be completed with a "B-" or better.

**Curriculum**

The following charts show a typical curriculum for years 1 through 4 and the first year of graduate studies.

**BACHELOR OF SCIENCE IN ENGINEERING PHYSICS CURRICULUM: 8 semester overview**

**FRESHMAN YEAR**

**Fall Semester**

PHYS 1110 or 1115 General Physics 1 (4)

**Spring Semester**

PHYS 1120 or 1125 General Physics 2 (4)  
PHYS 1140 Experimental Physics (1)

**SOPHOMORE YEAR**

**Fall Semester**

PHYS 2170 Foundations of Modern Phys (3)  
PHYS 2150 Experimental Physics (1)

**Spring Semester**

PHYS 2210 Classical Mech & Math Methods 1 (3)

**JUNIOR YEAR**

**Fall Semester**

PHYS 3210 Classical Mech & Math Methods 2 (3)  
PHYS 3310 Principles of Elec & Mag 1 (3)  
PHYS 3330 Junior Laboratory (2)

**Spring Semester**

PHYS 3220 Quantum Mechanics 1 (3)  
PHYS 3320 Principles of Elec & Mag 2 (3)  
Physics Elective (3)

**SENIOR YEAR**

**Fall Semester**

PHYS 4230 Thermo/Stat Mech (3)  
PHYS 4410 Quantum Mechanics 2 (3)  
Physics Elective (3)

**Spring Semester**

Physics Elective (3)

This chart emphasizes the required physics courses. In addition, students are expected to take courses to satisfy the College of Engineering and Applied Sciences undergraduate requirements, and additional applied mathematics and chemistry courses that are part of the engineering physics major. At the end of the fourth year, students will have completed 45 credit hours of physics courses, consistent with the present engineering physics major requirements of 45 credits. We note that students in the BAM program may still participate in the physics honors sequence and qualify for honors designation on their BS degree.

### **ACCELERATED MASTER OF SCIENCE IN PHYSICS CURRICULUM**

The accelerated master's curriculum includes 9 credit hours of required physics classes, 9 credit hours of physics electives, and 6 credit hours of research, for a total of 24 credit hours at the graduate level (not including the double-counted courses).

#### **Standard required graduate courses (9 credit hours)**

PHYS 5250 Introduction to Quantum Mechanics 1 (3)

PHYS 7230 Statistical Mechanics (3)

PHYS 7310 Electromagnetic Theory 1 (3)

*Note: Other graduate courses may be taken in place of these required courses by petition to the Associate Chair of Engineering Physics in the Department of Physics.*

#### **Graduate electives (choose 9 credit hours)**

PHYS 5210 Theoretical Mechanics (3)

PHYS 5030 Intermediate Math Physics 1 (3)

PHYS 5040 Intermediate Math Physics 2 (3)

PHYS 5150 Introductory Plasma Physics (3)

PHYS 5160 Fundamentals of Optics and Lasers (3)

PHYS 5260 Introduction to Quantum Mechanics 2 (3)

PHYS 5606 Optics Laboratory (3)

PHYS 5770 Gravitational Theory (3)

PHYS 6610 Earth and Planetary Physics 1 (3)

PHYS 7160 Intermediate Plasma Physics (3)

PHYS 7240 Advanced Statistical Mechanics (3)

PHYS 7320 Electromagnetic Theory 2 (3)

PHYS 7430 Soft Condensed Matter Physics (3)

PHYS 7440 Theory of the Solid State (3)

PHYS 7450 Theory of Solid State 2 (3)

PHYS 7550 Atomic and Molecular Spectra (3)

PHYS 7560 Quantum Optics (3)

PHYS 7570 Quantum Information and Computing (3)

PHYS 7650 Nonlinear and Nano-Optics (3)

PHYS 7660 Ultrafast Optics (3)

PHYS 7730 Theory of Elementary Particles (3)

PHYS 7810 Special Topics in Physics (3)

*Note: Graduate electives other than those listed, including those from other disciplines may be taken with prior approval of the Associate Chair of Engineering Physics in the Department of Physics.*

## Accelerated master's research experience (6 credit hours of graduate research)

There are two options available, which include either writing and defending a master's thesis or passing the Comprehensive Examination II.

1. PHYS 6950 Master's Thesis (6 credit hours total, no more than 3 credit hours per semester)  
\*\*Must complete master's thesis and defense, per Graduate School guidelines, see website for guidelines: <http://www.colorado.edu/physics/academics/graduate-students/graduate-program-requirements-phd/masters-degree#withthesis>
2. PHYS 5840 Graduate Independent Study (6 credit hours total, no more than 3 credit hours per semester)  
\*\*Must complete Comprehensive Examination II:
  - a. **Paper:** Preparation of a formal paper that summarizes the student's research turned in at least two weeks prior to the exam. The paper should be a formal, publication-quality document of 2500-3000 words. It should contain an abstract, figures and/or tables properly referenced, and citations. The paper's writing quality, organization, typesetting, and figures should be up to professional standards.
  - b. **Exam:** The student then delivers a 20 minute oral presentation about the content of the research paper, followed by 60 minutes of questions. At least 40 minutes of questions will be on physics topics unrelated to the talk or paper.
  - c. **Proposal and Committee Selection:** The student must submit a title and abstract to the Comprehensive Exam Committee (CEC) at least 2 months before the anticipated exam date. The CEC will choose appropriate committee members for the exam.
    - i. The student's research advisor may not be a member of the exam committee
    - ii. One member of the CEC must be on the exam committee
    - iii. The Chair of the Arts and Sciences Advising Committee, Associate Chair of Engineering Physics, or the Associate Chair of Graduate Studies must be on the exam committee

## Completing the Master's Degree Program

BAM students follow all normal Graduate School procedures and policies for graduating with the master's degree. In the final semester of the Master's degree program, the student must submit forms to Graduate Program Assistant (Jeanne Nijhowne) according to Master's deadlines published on the Graduate School website.

- [Master's Graduation: Thesis Plan](#)
- [Master's Graduation: Without Thesis](#)

## Withdrawing from the BAM Program

- **Undergraduate status:** Prior to graduating with the bachelor's degree, BAM students can withdraw by submitting the [BAM Program Change/Discontinuation Form](#).
- **Graduate status:** After graduating with the bachelor's degree, BAM students can [withdraw](#) from the master's program and/or courses using the normal procedures for graduate students.