



### **Twin Cities Campus**

## **Physics B.A.**

*School of Physics & Astronomy*

### **College of Liberal Arts**

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2017
- Required credits to graduate with this degree: 120
- Required credits within the major: 60
- Degree: Bachelor of Arts

The undergraduate physics program prepares students for employment, often in industrial or governmental laboratories, or for further study at graduate or professional schools in physics, engineering, biophysics, medicine, education, law, or business.

The program integrates a broad foundation in physics that can be flexibly combined with coursework in other technical disciplines or used to specialize in physics. Students should consult a physics adviser to help formulate objectives for undergraduate study.

## **Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

## **Admission Requirements**

Students must complete 7 courses before admission to the program.

For information about University of Minnesota admission requirements, visit the [Office of Admissions website](#).

### **Required prerequisites**

#### **Math Requirements**

Take 3 courses for a total of 12 credits.

##### **Calculus I**

[MATH 1271](#) - Calculus I [MATH] (4.0 cr)

or [MATH 1371](#) - CSE Calculus I [MATH] (4.0 cr)

or [MATH 1571H](#) - Honors Calculus I [MATH] (4.0 cr)

##### **Calculus II**

[MATH 1272](#) - Calculus II (4.0 cr)

or [MATH 1372](#) - CSE Calculus II (4.0 cr)

or [MATH 1572H](#) - Honors Calculus II (4.0 cr)

##### **Linear Algebra**

[MATH 2243](#) - Linear Algebra and Differential Equations (4.0 cr)

or [MATH 2373](#) - CSE Linear Algebra and Differential Equations (4.0 cr)

or [MATH 2574H](#) - Honors Calculus IV (4.0 cr)

### **Physics Requirements**

Take 4 courses for a total of 16 credits.

#### **Physics I**

[PHYS 1301W](#) - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)

or [PHYS 1401V](#) - Honors Physics I [PHYS, WI] (4.0 cr)

or [PHYS 1501V](#) *{Inactive}* [PHYS, WI] (4.0 cr)

#### **Physics II**

[PHYS 1302W](#) - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)

or [PHYS 1402V](#) - Honors Physics II [PHYS, WI] (4.0 cr)

or [PHYS 1502V](#) *{Inactive}* [PHYS, WI] (4.0 cr)

#### **Thermodynamics**

[PHYS 2201](#) - Introductory Thermodynamics and Statistical Physics (4.0 cr)

#### **Physics III**

[PHYS 2503](#) - Physics III: Intro to Waves, Optics, and Special Relativity (4.0 cr)

or [PHYS 2503H](#) - Honors Physics III (4.0 cr)

## **General Requirements**

All students are required to complete general University and college requirements including writing and liberal education courses. For



more information about University-wide requirements, see the [liberal education requirements](#). Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) do not count toward the major or minor (including transfer courses).

## Program Requirements

Students are required to take 4 semester(s) of any second language.

CLA BA degrees require 18 upper-division (3xxx-level or higher) credits outside the major designator. These credits must be taken in designators different from the major designator and cannot include courses that are cross-listed with the major designator. The major designator for the Physics BA is PHYS.

Students may earn no more than one undergraduate degree in the physics program: a BA or a BS or a minor.

All incoming CLA freshmen must complete the First Year Experience course sequence.

### Multivariable Calculus

Take 1 course for 4 credits.

[MATH 2263](#) - Multivariable Calculus (4.0 cr)

or [MATH 2374](#) - CSE Multivariable Calculus and Vector Analysis (4.0 cr)

or [MATH 2573H](#) - Honors Calculus III (4.0 cr)

### Major Courses

Take 6 courses for a total of 23 credits.

[PHYS 2601](#) - Quantum Physics (4.0 cr)

[PHYS 3041](#) - Mathematical Methods for Physicists (3.0 cr)

#### Experimental Physics Requirements

[PHYS 3605W](#) - Modern Physics Laboratory [WI] (3.0 cr)

[PHYS 4051](#) - Methods of Experimental Physics I (5.0 cr)

#### Upper-Division Requirements

Take 2 or more course(s) from the following:

• [PHYS 4001](#) - Analytical Mechanics (4.0 cr)

• [PHYS 4002](#) - Electricity and Magnetism (4.0 cr)

• [PHYS 4101](#) - Quantum Mechanics (4.0 cr)

### Senior Project

The senior project is completed in [PHYS 4025W](#), or by some alternate means subject to prior departmental approval. Should the approved alternate physics project total fewer than 5 credits, an additional physics elective at the 3xxx-level or higher is required to meet the 5-credit senior project minimum.

[PHYS 4052W](#) - Methods of Experimental Physics II [WI] (5.0 cr)

### Upper Division Writing Intensive within the major

Students are required to take one upper division writing intensive course within the major. If that requirement has not been satisfied within the core major requirements, students must choose one course from the following list. Some of these courses may also fulfill other major requirements.

Take 0 - 2 course(s) from the following:

• [PHYS 4052W](#) - Methods of Experimental Physics II [WI] (5.0 cr)

• [PHYS 3605W](#) - Modern Physics Laboratory [WI] (3.0 cr)