Duluth Campus

Applied Physics B.S.

UMD-Physics & Astronomy

Swenson College of Science and Engineering

- **Students will no longer be accepted into this program after Spring 2017. Program requirements below are for current students only.**
- **The Applied Physics B.S. is no longer accepting students. Students interested in Applied Physics should consider the Physics B.S. or Physics B.A.**

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2018
- Required credits to graduate with this degree: 120
- Required credits within the major: 78 to 79
- Degree: Bachelor of Science

The B.S. in applied physics is primarily for students planning to work in industry and offers flexibility in selection of technical electives. The physics courses emphasize conceptual foundations, problem-solving skills, and experimental and computational techniques.

Students are encouraged to participate in research, with emphasis in experimental high-energy physics and particle astrophysics, limnological research, including observational studies and modeling of lakes, and computational physics. Additional faculty interests include optics and condensed matter physics. The department also offers courses required for other science and engineering programs.

Honors Requirements: To graduate with honors, students must participate in the department honors program, complete and present a research project, and maintain a GPA above 3.00 overall and in the major. They are also expected to attend department colloquia. Interested students should contact the physics honors program coordinator.

Program Delivery

This program is available:

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

Admission Requirements

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

General Requirements

The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:

1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xxx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.
8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements

1. A minor or a second major in a different program.

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2. The first math course is determined by the Math ACT score. The sample plan presupposes placement into MATH 1296.

3. Courses numbered above 3xxx are offered in alternate years only. Some courses suggested in the sample plan for the junior and senior years may need to be switched to match the course offerings.

Core Courses (31 cr)

Physics I

PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)

Physics II

PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)
PHYS 2016 - General Physics Lab II (1.0 cr)

Additional Core Physics Requirements

PHYS 1021 - Exploring Current Topics in Physics (1.0 cr)
PHYS 2021 - Relativity and Quantum Physics (4.0 cr)
PHYS 2022 - Classical Physics (4.0 cr)
PHYS 2033 - Classical and Quantum Physics Lab (2.0 cr)
PHYS 3061 - Instrumentation (3.0 cr)
PHYS 5061 - Experimental Methods (3.0 cr)
PHYS 5090 - Physics Seminar (1.0 cr)
PHYS 5052 - Computational Methods in Physics (3.0 cr)
or PHYS 5053 - Data Analysis Methods in Physics (3.0 cr)

Electives (8 cr)

Take 8 or more credit(s) from the following:
•PHYS 4001 - Classical Mechanics (4.0 cr)
•PHYS 4011 - Electromagnetic Theory (4.0 cr)
•PHYS 4021 - Quantum Physics II (4.0 cr)
•PHYS 4031 - Thermal and Statistical Physics (4.0 cr)

Technical Electives (9 cr)

The computational course not selected in Core Courses may be used as a technical elective. Engineering courses approved by the department may also be used.
Take 9 or more credit(s) from the following:
•AST 4110 - Observational Astronomy (3.0 cr)
•LIM 5101 - Physical Limnology (3.0 cr)
•PHYS 3033 - Analytical Methods in Physics (3.0 cr)
•PHYS 5041 - Optics (3.0 cr)
•PHYS 5531 - Introduction to Solid State Physics (3.0 cr)
•PHYS 5541 - Fluid Dynamics (3.0 cr)
•PHYS 5052 - Computational Methods in Physics (3.0 cr)
or PHYS 5053 - Data Analysis Methods in Physics (3.0 cr)
•PHYS 3561 - Astrophysics I Stellar Astrophysics (3.0 cr)
or PHYS 5561 - Astrophysics I Stellar Astrophysics (3.0 cr)

Courses From Other Programs (30 - 31 cr)

Two semesters of chemistry are recommended.

Chemistry

CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)

Computer Science

CS 1411 - Introduction to Programming in Matlab (4.0 cr)
or CS 1511 - Computer Science I [LE CAT] (5.0 cr)

Math

MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
or MATH 1596 *{Inactive}*[LE CAT2, LOGIC & QR] (5.0 cr)
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)
or MATH 1597 *{Inactive}*[LOGIC & QR] (5.0 cr)
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
MATH 3298 - Calculus III (4.0 cr)

Advanced Writing

WRIT 3130 - Advanced Writing: Engineering (3.0 cr)
or WRIT 3150 - Advanced Writing: Science (3.0 cr)

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