

Information for New Students in the Department of Physics and Astronomy

The Department of Physics and Astronomy offers a variety of introductory courses for students of different interests. The department offers three majors: Physics, Engineering Physics, and Astronomy; and offers minors in Physics, Astronomy, Mathematical Physics (in conjunction with the Mathematics department), and Materials Science (in conjunction with the Engineering Sciences and Chemistry departments). The Physics Major offers a solid training in the fundamentals of the discipline. The Engineering Physics Major is done in conjunction with Engineering Sciences at Thayer (similar to a modified major). Astronomy is a separate major, which includes relevant study in physics.

ASTRONOMY

Astronomy 1, 2, 3, and 4 are intended primarily for students who do not plan to major in a physical science. These courses have no prerequisites and any one of them may be taken independently of the others. Students who wish a more technical introduction to astronomy and astrophysics are encouraged to take Astronomy 15 and/or 25.

Students interested in majoring in astronomy should consult Professor John Thorstensen. A brochure describing the major, including research opportunities for undergraduates, is available from the department office in 105 Wilder.

The following are recommended first-year courses:

1. Exploration of the Solar System (S, X)
2. Exploring the Universe (F, X)
3. Exploring the Universe with Laboratory (F, X)
15. Stars and the Milky Way (S)

Astronomy now has a Foreign Study Program in South Africa, open to both majors and non-majors. Students intending to do the FSP should postpone taking Astronomy 15 until the FSP term. The FSP will be offered in alternate winter terms starting with 2015W.

PHYSICS

Physics 1, 2, and 5 are intended primarily for students who do not plan to major in a physical science. These courses have no prerequisites and any one of them may be taken independently of the others.

There are three sequences of physics courses open to first-year students. Physics 13 and 14 are intended for students oriented toward the physical sciences or engineering. The two courses constitute the regular introduction to the fundamentals of mechanics, electricity and magnetism, and freely use calculus. These courses are offered in the fall (13), winter (13, 14),



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and spring (14). First-year students who take Physics 13/14 fall-winter may take Physics 19 in the spring term and can then start intermediate physics (40's level) in their second year. Alternatively, students who complete Physics 13/14 in the spring term can take Physics 19 in the fall or spring terms of their second year, and then move on to intermediate physics.

Physics 15 and 16 (fall and winter) are the accelerated track into the physics major. These courses are intended for students who have an extremely strong background in both calculus and classical mechanics from high school. Students must qualify for Physics 15 by taking a local placement exam offered by the department during New Student Orientation. These two courses together cover the material of Physics 13, Physics 14, and Physics 19. Students who complete Physics 15/16 and have sufficient math may move into intermediate physics (40's level).

Physics 3 (F, X) and Physics 4 (W, S) are somewhat less in-depth treatments of the topics covered in Physics 13/14 and 15/16, with the addition of some modern physics. These courses are aimed at students interested in the life sciences or medical school. They do not serve as engineering prerequisites. Relatively few first-year students take these courses.

Students interested in majoring in physics or engineering physics should consult the departmental undergraduate advisor, Professor Kristina Lynch. A brochure describing the major, including research opportunities for undergraduates, is available from the department office in 105 Wilder.

Here is an example of an introductory sequence for a student entering with no math or physics exemptions:

F - Math 3

W - Physics 13, Math 8

S - Physics 14, Math 13

F - Physics 19

Students entering with exemption from Math 3 or 8 may opt to take:

F - Physics 13, Math 8

W - Physics 14, Math 13

S - Physics 19 or 31 (if available)

Students with exemption from Math 3 or 8 and placement into Physics 15 via the departmental local placement exam may opt to take:

F - Physics 15, Math 8 or 13

W - Physics 16, Math 13 or 23

S - Physics 31 (if available) or 40's level

CREDIT ON ENTRANCE AND ADVANCED PLACEMENT

A score of 4 or 5 on CEEB Advanced Placement Examinations in Physics results in Physics 3 exemption for the C-Mechanics exam, and Physics 4 exemption for the C-Electricity exam.

Exemption from Physics 3, 4, 13, or 14 can also be earned by passing a local placement exam given by the department. The exam may be taken by those who have had a substantial physics



background in high school. For more information on local placement exams:
<http://www.dartmouth.edu/~orientation/placement/placementschedule.html>.

Students who have a grade of A in A-Level Physics are eligible for exemption from Physics 3 and 4 without taking the local placement exam.

Students are admitted to the honors sequence (Physics 15/16) based on (a) having placement into Math 8 or 9 or higher, and (b) satisfactory performance on a local placement exam administered at the testing center during Orientation.

Students receiving pre-matriculation exemption from Physics 13 and Physics 14 based on the local placement exam may take Physics 19 in the fall or spring of their first year.

For more information on “credit-on-entrance” at Dartmouth:
https://www.dartmouth.edu/~reg/enrollment/types_credits.html

https://www.dartmouth.edu/~reg//enrollment/credit_on_entrance_exemption_charts.html

TRANSFER CREDIT

Students who wish to receive transfer credit for college physics courses taken prior to matriculation at Dartmouth should see the undergraduate advisor (Prof. Kristina Lynch) of the Department of Physics and Astronomy during Orientation. Such students may be required to pass a proficiency examination in order to obtain credit.

SELECTED FALL TERM COURSES

ASTRONOMY

2. Exploring the Universe

A survey of contemporary knowledge of the nature and the evolution of stars, our Galaxy, other galaxies, dark matter, the expanding universe, and the big bang. Physical processes underlying these phenomena are discussed. Identical to Astronomy 3, but without the observing laboratory. Dist: SCI.

3. Exploring the Universe, with Laboratory

See description above. Students will make observations with radio and optical telescopes. Supplemental course fee required. Dist: SLA

PHYSICS

3. General Physics I

The fundamental laws and phenomena of mechanics, heat, wave motion, and sound, including relativistic concepts. The sequence Physics 3-4 is designed primarily for students who do not intend to take Physics 19. Prerequisite: Mathematics 3. Dist: SLA.

13. Introductory Physics I

The fundamental laws of mechanics. Reference frames. Harmonic and gravitational motion. Thermodynamics and kinetic theory. Physics 13, 14, and 19 are designed as a three-term



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sequence for students majoring in a physical science. Supplemental course fee may be required. Prerequisite: Mathematics 3 and 8 (at least concurrently). Dist: SLA.

15. Introductory Physics I, Accelerated Section

Physics 15 and 16 are an alternative sequence to Physics 13, 14, and 19 for students whose substantial background in physics and mathematics enables them to study the material at a greater speed than is possible in regular sections. Classical dynamics of particles and rigid bodies. Special Relativity. Introduction to Quantum Mechanics including wave-particle duality of radiation and matter. The Uncertainty Principle and the Schrodinger equation in one spatial dimension. One laboratory period per week. Supplemental course fee may be required. Prerequisite: Mathematics 8 or 9 concurrently, and achieving a threshold score on the physics departmental placement exam offered during New Student Orientation. Dist: SLA.

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