

Physics B.S. and Minor



Contact Information

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Faculty

Professor Petukhov, Chair; Professors Foygel and Sobolev; Associate Professor Corey

Physics

The goal of a program of study in physics is to provide the student with an understanding of the basic laws of physics and to develop skills that will enable the student to further explore physical phenomena and to solve related problems.

The student should have a sense of curiosity about their surroundings and a strong desire, not only to find solutions to problems that are encountered, but also to develop a deeper understanding of the basic principles involved. The student will be expected to develop a high level of mathematical skills and to become proficient in oral and written communications. Laboratory skills are also emphasized.

At the bachelor of science level, the student will not be expected to specialize in any branch of physics. However, the curriculum does have room for electives, providing an opportunity to develop a minor in other fields of science or in an

engineering discipline. It provides a background in applications of physics for students seeking employment in industry and also provides a solid foundation for graduate study in physics or in other fields such as geophysics, meteorology, metallurgy, computer science, mathematics, materials science, and many branches of engineering.

Because physics is the basis of most engineering disciplines, understanding basic principles of physics can help one become a better engineer. An increasing number of students are choosing a double major, consisting of physics plus some field of engineering. Students going this route often end up in industrial research and development. Another factor to consider is that, in a rapidly changing economy, where one field of engineering may be in a slump while others are not, understanding physics can assist one in moving across disciplines. For these reasons, we encourage all students to consider double majors.

Graduate studies leading to the degree of master of science and Ph.D are offered. Research is primarily in solid state physics. At this level of study, the student will be expected to assume much of the responsibility for carrying out a research project. Graduate studies in the physics department are an integral component of the materials engineering and science, and nanoscience and nanoengineering programs. For details of graduate programs in physics, see the graduate section.

Minor in Physics

A minor in physics requires a minimum of eighteen (18) hours of courses in physics, which must include PHYS 213, and at least fifteen (15) hours of physics courses numbered higher than PHYS 213. All minors in physics must be approved by the department and must conform to the institutional policies and guidelines for minors.

Physics Laboratories

The facilities in the EE-Physics Building are ample for all aspects of the department's experimental work from the introductory

laboratories through graduate research. They are equipped to enable the student to observe physical phenomena, demonstrate physical principles, and learn techniques for making quantitative measurements in the fields of mechanics, heat, optics, electricity and magnetism, atomic physics, and solid state physics. The equipment is of the type that the student is likely to encounter after graduation with emphasis on computer-based data acquisition and control of experiments.

Physics Curriculum/Checklist

It is the student's responsibility to check with his or her advisor for any program modifications that may occur after the publication of this catalog.

Freshman Year

First Semester

MATH 123	Calculus I	4
CHEM 112	General Chemistry I	3
CHEM 112L	General Chemistry I Lab	1
ENGL 101	Composition I	3
PE	Physical Education	1
IS 110	Explorations	2
Humanities or Social Sciences Elective(s)		3
TOTAL		17

Second Semester

MATH 125	Calculus II	4
PHYS 211	University Physics I	3
PE	Physical Education	1
CHEM 114	General Chemistry II	3
CHEM 114L	Gen Chemistry II Lab	1
CSC 150	Computer Science I	3
TOTAL		15

Sophomore Year

First Semester

MATH 225	Calculus III	4
PHYS 213	University Physics II	3
PHYS 213L	University Physics II Lab	1
PHYS 275	Relativity	3
ENGL 279	Technical Comm I	3
Humanities or Social Sciences Elective(s)		3
TOTAL		17

Second Semester

MATH 321	Differential Equations	4
EE 220	Circuits I	4
ENGL 289	Technical Comm II	3
Humanities or Social Sciences Elective(s)		6
TOTAL		17

Junior Year

First Semester

MATH 432	Partial Differential Equations	3
PHYS 341	Thermodynamics	3
PHYS 312	Exper Physics Design I	2
CENG 244	Intro to Digital Systems	4
Phys 451	Classical Mechanics	4
TOTAL		16

Second Semester

MATH 315	Linear Algebra	4
PHYS 471	Quantum Mechanics	4
PHYS 445	Statistical Mechanics ¹	4
PHYS 314	Exper Physics Design II	2
Humanities or Social Sciences Electives		1
TOTAL		15

Senior Year

First Semester

PHYS 421	Electromagnetism	4
PHYS 361	Optics ¹	3
PHYS 412	Advanced Design Projects I	2
PHYS 481	Mathematical Physics ¹	4
Humanities or Social Sciences Elective(s)		3
TOTAL		16

Second Semester

PHYS 433	Nuclear and Particle Physics ¹	3
PHYS 439	Solid State Physics ¹	4
PHYS 414	Advanced Design Projects II	2
Humanities or Social Sciences Elective(s) ⁶		6
TOTAL		15

128 credits required for graduation

Curriculum Notes

At the end of the sophomore year twelve (12) hours of electives must include six (6) hours in humanities (in two (2) disciplines or in a sequence of foreign language courses) and six (6) hours in social sciences (in two (2) disciplines).

The electives must contain a minimum of sixteen (16) hours in social sciences and humanities and three (3) hours of mathematics or computer science at the 200 level or above. Ten (10) credit hours of military science may also be used as electives.

¹ Courses offered alternate years.



Mines Matters: The South Dakota School of Mines and Technology's under class Mini Baja team finished in seventh place during the 2007 Mini Baja West competition, held May 23-26 in Rapid City, South Dakota. The School of Mines also raced a senior team vehicle, which finished in 11th place overall. The under class vehicle also took eighth place in the sales portion of the competition.