



Physics B.S. and Minor

Contact Information

Dr. Andre G. Petukhov

Department of Physics
Electrical Engineering/Physics 223
(605) 394-2364

E-mail: Andre.Petukhov@sdsmt.edu

Faculty

Professors Foygel, Petukhov, Sobolev; Associate Professor Corey; Assistant Professor Bai.

Physics

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

Students 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. Students 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, students 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. In a rapidly changing economy where one field of engineering may be in a slump while others are not, understanding physics can assist students in moving across disciplines. For these reasons, students are encouraged to consider double majors.

Graduate studies leading to the degree of Master of Science in Physics and Materials Science and Ph.D. in Materials Science and Nanoscience are offered. Research is primarily in condensed matter and particle physics. At this level of study, students are expected to assume much of the responsibility for carrying out a research project. For details of graduate programs in physics, see the graduate section.

Minor in Physics

A minor in physics requires a minimum of 18 hours of courses in physics, which must include PHYS 213, and at least 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 students 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, particle, and solid state physics. The equipment is the type that students will likely to encounter after graduation, with emphasis on computer-based data acquisition and control of experiments.

Physics Curriculum Checklist

Students are responsible for checking with their advisors 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	2
PHYS 343	Statistical Physics	2
PHYS 312	Exper. Physics Design I	2
CENG 244	Intro to Digital Systems	4
PHYS 451	Classical Mechanics	4
TOTAL		17

Second Semester

MATH 315	Linear Algebra	3
PHYS 471	Quantum Mechanics	4
PHYS 314	Exper. Physics Design II	2
Physics/Math/Computer Science Electives		6
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)		2
TOTAL		15

Second Semester

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

128 credits required for graduation

Curriculum Notes

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

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

¹ Courses offered alternate years.