PHYSICS

Program Description

Physics is the foundation discipline which must be incorporated into the education of anyone preparing for a career in engineering or science. It is equally true for the non-scientist having the responsibility to make meaningful decisions in society—the citizen in politics, the business person or social scientist who deals with problems of a society strongly linked to technology based on application of physical principles. A truly educated person preparing for life in the 21st century can hardly afford not to be aware of the statements of contemporary physics.

The Physics Department, in addition to offering courses for the major, provides a support service in offering Physics courses satisfying the needs of other disciplines.

There is a three-semester, calculus-based sequence (PHYS 121 Mechanics Of Solids And Fluids, PHYS 122 Electricity and Magnetism, PHYS 123 Heat, Light and Modern Physics) for the student in Engineering, Physics and other physical sciences. The department also offers the Excellence in Mathematics, Sciences and Engineering (EMSE) workshop program (PHYS 121W Workshop for Physics 121, PHYS 122W Workshop for Physics 122, and PHYS 123W Workshop for Physics 123) to assist students in calculus-based Physics courses.

For the Biological Sciences student, both a two-semester trigonometry-level Physics sequence (PHYS 105 General Physics and PHYS 106 General Physics) and a two-semester calculus-level Physics sequence (PHYS 110 Introductory Physics and PHYS 111 Introductory Physics) are offered.

PHYS 122 Electricity and Magnetism is only taught in the Fall Semester and PHYS 123 Heat, Light and Modern Physics is only taught in the Spring Semester.

Planning a Program of Study

Students should work with Santa Barbara City College’s counseling staff in planning semester-by-semester programs of study. Important conditions to be met by students majoring in the Physical Sciences include:

1. The number of units taken each semester is a matter of personal choice. Students who work full-time should take a reduced course load.
2. Many required courses are in sequences—which must be taken in the prescribed order (e.g., MATH 150 Calculus with Analytic Geometry I, MATH 160 Calculus With Analytic Geometry II, MATH 200 Multivariable Calculus/MATH 210 Linear Algebra and MATH 220 Differential Equations), hence schedule courses in the major first and schedule IGETC courses second. See www.assist.org (http://www.assist.org) for help.
3. Some courses are prerequisites for courses in the sequences (e.g., MATH 150 Calculus with Analytic Geometry I is a prerequisite for PHYS 121 Mechanics Of Solids And Fluids).
4. PHYS 122 Electricity and Magnetism is only taught in the Fall Semester and PHYS 123 Heat, Light and Modern Physics is only taught in the Spring Semester.
5. PHYS 123 Heat, Light and Modern Physics may be taken before PHYS 122 Electricity and Magnetism.
6. PHYS 121 Mechanics Of Solids And Fluids should be taken with MATH 160 Calculus With Analytic Geometry II and PHYS 122 Electricity and Magnetism/PHYS 123 Heat, Light and Modern Physics should be taken with MATH 200 Multivariable Calculus/ MATH 210 Linear Algebra/MATH 220 Differential Equations else there may be a scheduling time conflict.

Some sequences are especially important for the sciences. The sciences do require reading, writing and mathematical skills. Science textbooks are typically at a grade 13-14 reading level. Students deficient in such skills have a unique opportunity at Santa Barbara City College to quickly and efficiently reach the levels required in the majors programs through the following sequences:

English Sequence
1. Passing score on placement exam (to) ENG 110 Composition and Reading (to) ENG 111 Critical Thinking and Composition Through Literature; or
2. English Skills (to) ENG 098 Fundamentals of Composition (to) ENG 110 Composition and Reading (to) ENG 111 Critical Thinking and Composition Through Literature.

Mathematics Sequence
1. MATH 095 Elementary Algebra (to) MATH 111 (to) MATH 137 College Algebra (to) MATH 138 Precalculus - College Algebra and Trigonometry (to) MATH 150 Calculus with Analytic Geometry I, MATH 160 Calculus With Analytic Geometry II, MATH 200 Multivariable Calculus/MATH 210 Linear Algebra, MATH 220 Differential Equations; or
2. High school algebra and trigonometry, plus passing score on placement exam (to) MATH 150 Calculus with Analytic Geometry I, MATH 160 Calculus With Analytic Geometry II, MATH 200 Multivariable Calculus/MATH 210 Linear Algebra, MATH 220 Differential Equations.
Special Note: If you have not been tested for appropriate course placement in respect to the aforementioned sequences, contact the Counseling Center for up-to-date pre-enrollment testing schedule information. You should make sure that you have the necessary skills for each class taken—in order to succeed and/or progress in your chosen major.

Chemistry Sequence
CHEM 101 Introductory Chemistry or high school chemistry (to)
CHEM 155 General Chemistry I (to) CHEM 156 General Chemistry II.

Physics Sequence
PHYS 102 Introductory Physics For Science Majors or high school physics with trigonometry (to) PHYS 121 Mechanics Of Solids And Fluids (to) PHYS 122 Electricity and Magnetism or PHYS 123 Heat, Light and Modern Physics (to) PHYS 123 Heat, Light and Modern Physics or PHYS 122 Electricity and Magnetism. Note: PHYS 123 Heat, Light and Modern Physics may be taken before PHYS 122 Electricity and Magnetism. PHYS 102 Introductory Physics For Science Majors and PHYS 121 Mechanics Of Solids And Fluids are offered every semester, but PHYS 122 Electricity and Magnetism and PHYS 123 Heat, Light and Modern Physics are only offered once a year.

Preparation for Transfer
Course requirements for transfer vary depending upon the college or university a student wishes to attend. Therefore, it is most important for a student to consult with his/her counselor, departmental adviser, and www.assist.org before planning an academic program for transfer.

Honors and Awards

Outstanding Student Award
The Physics Department selects one student each year as Outstanding Student. The selection is made by faculty in the department. Selections are based solely on academic excellence and no applications by students are required.

Joseph P. Cosand Award
The Joseph P. Cosand Award is granted to a student who has demonstrated excellence in at least two of the Physical Sciences and in Mathematics. Annually, the Physics, Chemistry and Geology faculty nominate outstanding candidates for this prestigious award. Selection is determined by a consensus of the three physical science departments, with the concurrence of the Mathematics Department.

Programs of Study

- Physics, Associate in Science for Transfer (AS-T) (https://catalog.sbcc.edu/academic-departments/physics/physics-ast)
- Physics, Associate in Arts or Science (AA/AS) (https://catalog.sbcc.edu/academic-departments/physics/physics-aa)

Credit Courses

Physical Science (PHSC)

PHSC 103 The Physical Universe (4 Units)
Skills Advisories: Eligibility for ENG 98 and proficiency in MATH 1 or MATH 41.
Hours: 108 (54 lecture, 54 lab)
Conceptual non-mathematical introduction to the physical sciences. Topics of current interest from astronomy, physics, chemistry, geology, weather and the environment. Practical illustrations taken from art, music, sports, the home. Recommended for all non-science majors. Satisfies General Education laboratory science requirement.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: No credit for PHYS 103 if taken after a college level course in astronomy, chemistry, geology, or physics.

PHSC 107 Nanoscience in Society (4 Units)
Skills Advisories: Eligibility for ENG 110 or ENG 110H and proficiency in MATH 95.
Hours: 108 (54 lecture, 54 lab)
Interdisciplinary physical sciences course that uses the fundamental principles of science to examine nanoscience, nanotechnology, and the societal impact of these emerging technologies on our lives and environment. Topics of interest include development and global sustainability, nanotechnology and personal responsibility, developing a green future, the pros and cons of emerging nanotechnologies, and energy.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable

Physics (PHYS)

PHYS 101 Conceptual Physics (3 Units)
Skills Advisories: Eligibility for ENG 098 and proficiency in MATH 001 or MATH 041.
Hours: 54 (54 lecture)
Concept-oriented non-mathematical course in general physics. Topics include motion, heat, sound, light, electricity and modern physics. Special emphasis on everyday experience, with practical illustrations taken from art, music, sports, the home.
SBCC General Education: SBCCGE Area A Lecture
Transfer Information: CSUGE Area B1, IGETC Area 5A, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 101, 101L and 102 combined: maximum credit, 4 units; no credit for PHYS 101 or 102 if taken after 105; PHYS 101 and 101H combined: maximum credit, one course.
PHYS 101L Conceptual Physics Laboratory (1 Unit)
Corequisites: PHYS 101.
Skills Advisories: Eligibility for ENG 98 and proficiency in MATH 1 or MATH 41.
Hours: 54 (54 lab)
Concept-oriented laboratory in general physics. Topics include motion, heat, sound, light, electricity and modern physics. Special emphasis on everyday experience, with practical illustrations taken from art, music, sports, the home.
SBCC General Education: SBCCGE Area A Lab
Transfer Information: CSUGE Area B3, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 101, 101L and 102 combined: maximum credit, 4 units.

PHYS 102 Introductory Physics For Science Majors (4 Units)
Skills Advisories: Eligibility for ENG 110 or ENG 110H and proficiency in MATH 104 or MATH 107 or MATH 111.
Hours: 108 (54 lecture, 54 lab)
Introductory course, with quantitative applications and problem-solving introduced where appropriate, for students majoring in the physical sciences. Topics include the meaning of physical law, vectors, Newton's Laws of Motion (classical physics), work and energy, waves, electricity, magnetism, light, atomic and nuclear physics.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 101, 101L and 102 combined: maximum credit, 4 units; no credit for PHYS 101 or 102 if taken after 105.

PHYS 105 General Physics (4 Units)
Prerequisites: MATH 120.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 108 (54 lecture, 54 lab)
Newton's Laws of Motion, statics and dynamics of particles and rigid bodies, work and energy, rotational motion, fluid statics and dynamics, temperature and heat, thermodynamics, wave motion and sound.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 105.

PHYS 105D Physics Discussion I (1 Unit)
Corequisites: PHYS 105 or PHYS 110.
Hours: 54 (54 lab)
Concurrent Discussion session designed to accompany PHYS 105 or PHYS 110. This course will allow for extra practice and group discussion of the course topics, and also cover more in-depth problem solving techniques and applying the concepts to real world scenarios. Topics include Newton's Laws of Motion, statics and dynamics of particles and rigid bodies, work and energy, rotational motion, fluid statics and dynamics, temperature and heat, thermodynamics, wave motion and sound.
Transfer Information: CSU Transferable, UC Transferable

PHYS 106 General Physics (4 Units)
Prerequisites: MATH 120, PHYS 105.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 108 (54 lecture, 54 lab)
Electricity, magnetism, circuits, optics, relativity, atomic and nuclear physics.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 110.

PHYS 106D Physics Discussion II (1 Unit)
Corequisites: PHYS 106 or PHYS 111.
Hours: 54 (54 lab)
Concurrent Discussion session designed to accompany PHYS 106 or PHYS 111. This course will allow for extra practice and group discussion of the course topics, and also cover more in-depth problem solving techniques and applying the concepts to real world scenarios. Topics include electricity, magnetism, circuits, optics, relativity, atomic and nuclear physics.
Transfer Information: CSU Transferable, UC Transferable

PHYS 110 Introductory Physics (4 Units)
Prerequisites: MATH 130 or MATH 150.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 108 (54 lecture, 54 lab)
Newton's Laws of Motion, statics and dynamics of particles and rigid bodies, work and energy, rotational motion, fluid statics and dynamics, temperature and heat, thermodynamics, wave motion and sound. (Appropriate for Life Science majors requiring calculus-level physics).
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 105.

PHYS 111 Introductory Physics (4 Units)
Prerequisites: PHYS 110 and MATH 130 or MATH 150.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 108 (54 lecture, 54 lab)
Electricity, magnetism, circuits, optics, relativity, atomic and nuclear physics. Appropriate for Life Science majors requiring calculus-level physics.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 110.
PHYS 121 Mechanics Of Solids And Fluids (5 Units)
Prerequisites: PHYS 102 or trigonometry based High School Physics and Math 150.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 126 (72 lecture, 54 lab)
For Engineering and Physical Science students. Statics and dynamics of particles and rigid bodies, Newton's Laws of Motion, conservation principles, rotational motion, simple harmonic motion, wave motion and sound, and introduction to hydrostatics and hydrodynamics.
SBCC General Education: SBCCGE Area A
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 200S, PHYS 205.

PHYS 121W Workshop for Physics 121 (1 Unit)
Corequisites: PHYS 121 (concurrent).
Hours: 54 (54 lab)
"Excellence in Mathematics, Science and Engineering" (EMSE) supplementary problem-solving workshop designed for PHYS 121.

PHYS 122 Electricity and Magnetism (5 Units)
Prerequisites: PHYS 121 and MATH 160.
Skills Advisories: Eligibility for ENG 110 or ENG 110H.
Hours: 126 (72 lecture, 54 lab)
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or PHYS 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.

PHYS 122W Workshop for Physics 122 (1 Unit)
Corequisites: PHYS 122 (concurrent).
Hours: 54 (54 lab)
"Excellence in Mathematics, Science and Engineering" (EMSE) supplementary problem-solving workshop designed for PHYS 122.

PHYS 123 Heat, Light and Modern Physics (5 Units)
Prerequisites: PHYS 121 and MATH 160.
Skills Advisories: Eligibility ENG 110 or ENG 110H.
Hours: 126 (72 lecture, 54 lab)
For Engineering and Physical Science students. Mechanical waves, thermodynamic processes and systems, kinetic theory, light and modern physics.
Transfer Information: CSUGE Area B1, CSUGE Area B3, IGETC Area 5A, IGETC Area 5C, CSU Transferable, UC Transferable
UC Transfer Limit: PHYS 105 and 106 or 110 and 111 or 121, 122 and 123 combined: maximum credit, one series.
C-ID: PHYS 200S, PHYS 215.

PHYS 123W Workshop for Physics 123 (1 Unit)
Corequisites: PHYS 123 (concurrent).
Hours: 54 (54 lab)
"Excellence in Mathematics, Science and Engineering" (EMSE) supplementary problem-solving workshop designed for PHYS 123.

PHYS 298 Independent Reading in Physics (1-4 Units)
Limitations on Enrollment: To be eligible for independent reading, a student must have completed 12 units at SBCC with a G.P.A. of 2.5 and a minimum of 4 units with a G.P.A. of 2.5 in the Physics Department.
Hours: 192 (192 lab)
Other: To be eligible for independent reading, a student must have completed 12 units at SBCC with a G.P.A. of 2.5 and a minimum of 4 units with a G.P.A. of 2.5 in the Physics Department. Independent literature search and/or reading of material on a topic in physics. Student works under guidance and direction of sponsoring faculty member on project consistent with interests and abilities. A final report, including an annotated bibliography, is required.
Transfer Information: CSU Transferable

PHYS 299 Independent Research in Physics (1-4 Units)
Limitations on Enrollment: Completion of a minimum of 12 units at SBCC, with a 2.5 G.P.A., and a minimum of 4 units, with a 2.5 G.P.A. within the department.
Hours: 192 (192 lab)
Independent, systematic research investigation of a problem in physics. A final report on research conducted is required. May be taken four times for credit. Course restricted to 3 repetitions.
Transfer Information: CSU Transferable