

NATURAL SCIENCES

Program in Natural Sciences

School of Natural Sciences, Mathematics, and Engineering

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The Departments of Biology, Chemistry, Geology, and Physics offer a Bachelor of Science in Natural Sciences. This degree program offers the required subject matter content to help prepare prospective science teachers to apply for subject matter certification in California by taking the California Subject Matter Examinations for Teachers (CSET) in Science. The four disciplinary concentrations within the BS in Natural Sciences prepare the candidate for the CSET Science exams, which consist of three exams: two covering breadth in science (Life Science, Chemistry, Earth and Planetary Science, and Physics), and one covering depth in one of these areas, corresponding to the concentration. Passage of the CSET in science is required to certify subject matter competency before entering a teacher credential program. Consult your advisor or the Department of Education for details on other entry requirements for pursuing a secondary teaching credential. The foundational science concentration prepares students for the foundational science CSET exams (two exams covering science breadth, as above) and includes credential coursework, providing science subject matter and the credential in a blended program. The core courses in the BS in Natural Sciences offer a broad foundation in all four of the natural science areas (Biology, Chemistry, Geology, and Physics) and Mathematics. The disciplinary concentrations and minors add depth preparation in two of the four areas, while the foundational science concentration adds credential coursework to this foundation. While this broad foundation has been developed for prospective teachers, it also serves as excellent preparation for employment in any area of business, industry or government where scientific skills are in demand.

Please be aware that several courses in the core require satisfactory scores on placement tests or completion of prerequisite courses. CHEM 211, 211L requires a satisfactory score on the chemistry placement exam or completion of CHEM 101; MATH 192 requires a satisfactory score on the pre-calculus readiness exam or completion of MATH 190 or 191. In addition, MATH 190 or 191 requires satisfactory ELM scores or completion of previous remedial mathematics coursework.

The disciplinary concentrations in the BS in Natural Sciences consist of three components: I. Core Coursework, which all students complete, includes all four sciences and mathematics. II. A Concentration consisting of 6-7 additional upper division courses within a specific science discipline (Biology, Chemistry, Geology or Physics), and III. An optional minor in a second science discipline, Mathematics, or Statistics. For students with science minors, 2 courses (ten

units) from the core, in the same discipline as the minor, will be counted towards the minor. Minors are highly recommended. Additional subject matter competency can be established via the CSET in the area of the minor, increasing versatility and job prospects of the prospective teacher. Students are advised to satisfy the Gender-Race-Ethnicity requirement with EDTE 416. For students in the Physics concentration, the required courses PHYS 221, 222 and ENGR 207 satisfy the A3 General Education requirement.

Requirements for the Bachelor of Science Degree in Natural Sciences: Disciplinary Concentrations

Total Units Required to Graduate	180 units
Major Requirements	99-103 units
Core Courses	70-73
Concentration	29-30
Other University Requirements	60-72units
CSUB 101	2
American Institutions	5
Area A	10-15
Area B	0*
Area C	15
Area D	15
Theme 1	0*
Theme 2	5
Theme 3	5
GRE	3-5
GWAR (Exam) or Class	0-5
*satisfied in major, minor or other university requirements	
Additional Units	5-21 units

See <http://www.csub.edu/schedules.shtml> for current list of courses satisfying university-wide requirements. **Note:** One (1) quarter unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week

Requirements for the Major in Natural Sciences Disciplinary Concentrations

I. Core Coursework (60-73 units) Note: For science minors, 2 courses (10 units) from the core, in the same discipline as the minor will be counted toward the minor instead of the core.

Life Science (Biology): (15 units)

BIOL 201, 202, and 203

Chemistry: (15 units)

CHEM 211, 211L, 212, 212L, 213 and 213L

Earth and Planetary Science (Geology): (15 units)

GEOL 201, 204 and one of PHYS 110 or GEOL 205 or 308

Math: (10 units)

Physics Concentration: MATH 192 and one of MATH 201 or 231

Biology, Chemistry and Geology Concentrations: MATH 191 and 211 or 192 and one of MATH 201 or 231

Foundational Concentration: MATH 191 and 140 or 211 or 192 and one of MATH 201 or 231

Physics:¹(15-18 units)

One physics sequence: either PHYS 201, 202 and 203 or PHYS 221, 222 and 223. For students in the disciplinary concentrations, one course from the core, outside of the concentration and minor, can be waived.

II. Concentrations—Select one

Biology Concentration: (29-30 units)

BIOL 301 304, 305, 306, 470, and 490

One of BIOL 318 or 357

Chemistry Concentration: (30 units)

CHEM 331, 332, 340, 390, and 490

One of CHEM 421 or 422 and one upper division Chemistry Elective (Must be a 5-unit lab course)

Geology Concentration: (30 units)

GEOL 303, 306, 307, 309, 475, and 490

Physics Concentration¹: (30 units)

PHYS 207, 307, 324, 325, and 490

Four or more units of upper division PHYS electives or four or more units from CHEM 361, 362, 363

III. Recommended Minors: In addition to the courses listed under core coursework, the following courses are recommended to complete a relevant minor.

Biology Minor: (10 units)

10 Upper division units in Biology. Recommended courses: BIOL 304, 305 306, or 470

Chemistry Minor: (10 units)

10 upper division units in Chemistry. Recommended courses: CHEM 331, 350

Geology Minor: (10 units)

10 upper division units in Geology. Recommended courses: GEOL 303, 306, 307, 309 or 475

Math Minor:¹ (20 units)

20 units in Mathematics, 10 of which must be upper division. Recommended courses: MATH 202 or 212 or 232, MATH 203 or 233 and 10 units of upper division Mathematics. Recommended for Physics concentration: MATH 302 and 304

Physics Minor:¹ (10 units)

10 upper division units in Physics. Recommended courses: MATH 202 or 212 or 232, MATH 203, or 233, PHYS 324 and 5 or more units of upper division physics.

Statistics minor: (20 units)

MATH 140, 338, 339, and 415

¹Students in the Physics Concentration and minor must complete the PHYS 221, 222 and 223 sequence. MATH 203 is required for most upper division physics courses. The MATH Minor is strongly encouraged for students within the physics concentration.

The Foundational science concentration in the BS in Natural Sciences has been developed for individuals seeking the Foundational Science Credential for Middle School and Junior High School science teachers. The Foundational science concentration requires the same core coursework as the disciplinary concentrations, but the disciplinary concentration is replaced by teaching credential coursework. A minor is optional, but encouraged. The Foundational science concentration prepares the candidate for the CSET exams in Foundational Science, which consist of 2 exams covering breadth in science (Life Science, Chemistry, Earth and Planetary Science and Physics). This allows students to earn the foundational science credential in a blended, 4-year program including both science and credential coursework. Please be advised that the foundational science credential is intended for teaching grades 6-8. Additional appropriate post-baccalaureate coursework and CSET exams can be taken to add an authorization for High School level single subject certification.

The CSET exams must be passed before beginning credential coursework, with the exception of prerequisite and foundational courses which should be taken during the junior year. Other credential coursework should not be started until the senior year in most cases. Please consult an advisor for help with CSET planning.

Requirements for the Bachelor of Science Degree in Natural Sciences: Foundational Science Concentration

Total Units Required to Graduate	186-194 units
Major Requirements	124-127 units
Core Courses	70-73
Concentration	51
Senior Seminar	3
Other University Requirements	62-67 units
CSUB 101	2
American Institutions	5
Area A	15
Area B	0*
Area C	15
Area D	15
Theme 1	0*
Theme 2	5
Theme 3	5
GRE	0*
GWAR (Test) or Class	0-5

*satisfied in major, minor or other university requirements

Additional Units **0 units**

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Requirements for the Major in Natural Sciences:

Foundational Science Concentration

I. Core Coursework: see I above (70-73 units)

II. Concentration: (51 units):

Foundational/prerequisite courses: EDSP 301,
EDTE (300 or 310), 410 and 416

Stage I: EDSE 531 and 532, EDTE 401 and 415

Stage II: EDSE 533, 534 and 535, EDTE 402

Stage III: EDSE 599, EDTE 403 and 404

III. Senior Seminar: SCI 490