The Departments of Biology, Chemistry, Geological Sciences, and Physics and Engineering offer a Bachelor of Arts 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 BA 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 for prospective teachers. Consult your advisor or the School of Social Sciences and 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 BA in Natural Sciences offer a broad foundation in all four of the natural science areas (Biology, Chemistry, Geological Sciences, and Physics and Engineering) 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 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 191. In addition, MATH 191 may require completion of previous remedial mathematics coursework.

The Disciplinary Concentrations in the BA 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, Geological Sciences or Physics and Engineering), and III. A 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 instead of the core. They are listed with the core rather than with the minor for convenience of presentation. Students in the disciplinary concentrations are strongly advised to satisfy the Gender-Race-Ethnicity requirement with an upper division course (i.e. 300 or higher).

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

Total Units Required to Graduate 180-195 units
Major Requirements 89-103 units
Core Courses 60-73
Concentration 29-30
Minor Requirement 20 units
Other University Requirements 67-72 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 5
GWAR (Exam) or Class 0-5
*satisfied in major, minor or other university requirements
Additional Units 0-4 units

Students are strongly encouraged to monitor their upper division units to ensure achieving the 60 upper division units required for graduation. See http://www.csu.fullerton.edu/schedules.shtml for current list of courses satisfying university-wide requirements.

One (1) quarter unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week.

BA 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 (15 units)
BIOL 201, 202, and 203
Chemistry (15 units)
CHEM 211, 212, and 213
Earth and Planetary Science (15 units)
GEOL 201, 204 and one of PHYS 110 (Astronomy) or GEOL 205 or 308

Math (10 units)
MATH 192 and either: MATH 201 if the concentration is Geology or Physics or MATH 211 if the concentration is Biology or Chemistry or MATH 140, 201 or 211 for the Foundational concentration

Physics and Engineering\(^1\) (15-18 units)
One physics sequence: either PHYS 201, 202 and 203 or PHYS 221, 222 and 223

II. Concentration—Select one

Biology Concentration (29-30 units)
BIOL 304, 305, 306, 470, and 490. One of BIOL 318 or 357 and one upper division BIOL elective (must be a 5-unit lab course)

Chemistry Concentration (30 units)
CHEM 331, 332, 340, 390, and 490. One of CHEM 421 or 422 and one upper division CHEM elective (Must be a 5-unit lab course)

Geological Sciences Concentration (30 units)
GEOL 303, 306, 307, 309, 475, and 490

Physics and Engineering Concentration\(^1\) (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. Minor—Select one, different than Concentration

Biology Minor (10 units)
10 upper division units in BIOL. Recommended courses: BIOL 304, 305 306, 470

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

Geological Science Minor (10 units)
10 upper division units in GEOL. Recommended courses: GEOL 303 306, 307, 309 or 475

Math Minor\(^1\) (20 units)
20 units in MATH, 10 of which must be upper division. Recommended courses: MATH 202 or 212, MATH 203, and 10 units of upper division MATH. Recommended for PHYS concentration: MATH 302 and 304

Physics and Engineering Minor (10 units)
10 Upper division units in PHYS. Recommended courses: MATH 202 or 212, MATH 203, PHYS 324 and 5 or more units of upper division PHYS

Statistics minor (20 units)
MATH 140, 338, 339, and 415

\(^1\) Students in the Physics and Engineering 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. Students with this combination are also advised to take GEOL 308 in the core.

The Foundational science concentration in the BA 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 concentration and minor in science are replaced by teaching credential coursework. 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 valid only 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 (EDSE/EDTE 300, 410 and 416, EDSP 300) 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 Arts Degree in Natural Sciences: Foundational Science Concentration

<table>
<thead>
<tr>
<th>Total Units Required to Graduate</th>
<th>191-199 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Requirements</td>
<td>124-127 units</td>
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<tr>
<td>Core Courses</td>
<td>70-73</td>
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<tr>
<td>Concentration</td>
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<tr>
<td>Senior Seminar</td>
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<table>
<thead>
<tr>
<th>Minor Requirement</th>
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<tr>
<td>Other University Requirements</td>
<td>67-72 units</td>
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<tr>
<td>CSUB 101</td>
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<tr>
<td>American Institutions</td>
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<tr>
<td>Area A</td>
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<tr>
<td>Area D</td>
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<tr>
<td>Theme 1</td>
<td>0*</td>
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<tr>
<td>Theme 2</td>
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</tr>
<tr>
<td>Theme 3</td>
<td>5</td>
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<tr>
<td>GRE</td>
<td>5</td>
</tr>
<tr>
<td>GWAR (Exam) or Class</td>
<td>0-5</td>
</tr>
</tbody>
</table>

\*satisfied in major, minor or other university requirements

Additional Units 0 units

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

**BA in Natural Sciences: Foundational Science Concentration**

I. **Core Coursework:** see I above (70-73 units)
II. **Concentration (51 units):** EDSE 531, 532, 533, 534, 535 and 599, EDSE/EDTE 300, 410, 415 and 416, EDSP 301, EDTE 401, 402, 403 and 404.
III. **Senior Seminar:** SCI 490

**COURSE DESCRIPTION:**

**SCI 490 Senior Seminar in Science Teaching (3)**
Student presentations and discussions of science content, lessons and lab activities relevant to the middle school science audience. Open only to individuals pursuing the foundational science concentration in the BA in Natural Sciences. 3 hours discussion. Prerequisite: Senior Standing.