

# NATURAL SCIENCES, BS, CHEMISTRY CONCENTRATION

Natural Sciences, Mathematics, and Engineering (nsme) (<https://catalog.csusb.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/>)

Natural Sciences Program (<https://catalog.csusb.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/natural-sciences-program/>)

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[http://www.csusb.edu/natural\\_sciences/index.html](http://www.csusb.edu/natural_sciences/index.html) ([http://www.csusb.edu/natural\\_sciences/](http://www.csusb.edu/natural_sciences/))

Program Maps for Natural Sciences, Mathematics, and Engineering (<https://programmmap.csusb.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/>)

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 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 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), Engineering, and Mathematics. The disciplinary concentrations add depth preparation in one 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 may require satisfactory scores on placement tests or completion of prerequisite courses.

**The disciplinary concentrations in the BS in Natural Sciences** consist of two components: I. Core Coursework, which all students complete, includes all four sciences, Engineering, and Mathematics. II. A Concentration consisting of additional courses within a specific science discipline (Biology, Chemistry, Geology or Physics).

The disciplinary concentrations prepare the candidate for the CSET Science exams, which consist of two exams: one covering breadth in science (Life Science, Chemistry, Earth and Planetary Science, Engineering and Physics), and one covering depth in one of the science disciplines, 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** requires the same core coursework as the disciplinary concentrations, but the disciplinary concentration is replaced by teaching credential coursework. It has been

developed for individuals seeking the Foundational Science Credential for Middle School and Junior High School science teachers.

The Foundational Science Concentration prepares the candidate for the CSET exam in Foundational Science, which consist of one exam covering breadth in science (Life Science, Chemistry, Earth and Planetary Science, Engineering and Physics). This allows students to earn the Foundational Science Credential in a blended, 4-year program including both science and credential coursework (125 units). Please be advised that the Foundational Science Credential is intended only for teaching in 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.

**Credential Program:** Entry into the Credential Program requires a separate application. The CSET exam must be passed, and attendance of a Credential information session offered by the Department of Education is required for acceptance into the Credential Program; this will aid in the application process. Both of these should be done by the end of the Junior year. Prerequisite/Foundational credential courses should be taken during the junior year. Please consult an advisor for help with CSET and credential planning.

**Optional Minors:** 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. Please see the appropriate department for minor requirements. Students are especially encouraged to complete a minor in Biology, Chemistry, Geology, Physics, Applied Statistics or Mathematics. For students pursuing science minors, up to eight lower division units from the core, in the same discipline as the minor, may be counted towards the minor, and it is strongly recommended that students select courses from the corresponding concentration, below, to satisfy the upper division requirements for science minors.

## Program Requirements

Code	Title	Units
<b>General Education Requirements</b> <sup>5</sup>		
	First-Year Seminar (FYS)	2
	Lower Division Area A: Foundational Skills	9
	Lower Division Area B: Natural Sciences <sup>5</sup>	0
	Lower Division Area C: Arts and Humanities	6
	Lower Division Area D: Social and Behavioral Sciences	3
	Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) <sup>5</sup>	0
	Lower Division Area F: Ethnic Studies	3
	American Institutions: Government and History	6
	Junior Year Diversity & Reflection (JYDR) <sup>6</sup>	3
	Graduation Writing Assessment Requirement (GWAR) <sup>5</sup>	0
	Upper Division Thematic Area C and D	6
	General Education Capstone <sup>5</sup>	0
	<b>General Education Subtotal</b>	<b>38</b>
<b>Core Coursework</b>		
<i>Life Science</i>		
BIOL 2010	Introductory Biology - Cells	4
BIOL 2110	Introductory Biology - Animals	4
BIOL 2120	Introductory Biology - Plants	4
<i>Chemistry</i>		

CHEM 1000	Foundations of Chemistry	3
CHEM 1001	Foundations of Chemistry Laboratory	2
CHEM 1100	Foundations of Analytical Chemistry	2
CHEM 1600	Foundations of Physical Chemistry	2
CHEM 2300	Foundations of Organic Chemistry	3
<i>Earth and Planetary Science</i>		
GEOL 2010	Physical Geology	4
GEOL 2040	Historical Geology	4
PHYS 1609 or GEOL 3080	Introduction to Astronomy Geomorphology	3
<i>Engineering</i>		
SCI 3210	Fab Lab Teaching Internship	4
<i>Mathematics</i>		
Select one of the following:		4
MATH 1050	Precalculus I <sup>1</sup>	
MATH 1040	Precalculus I and II Combined <sup>2</sup>	
MATH 1060	Precalculus II <sup>2</sup>	
Select one of the following:		4
MATH 2010	Calculus for the Biological and Chemical Sciences I <sup>3</sup>	
MATH 2510	Single Variable Calculus I	
<i>Physics</i>		
Select one of the following:		8-12
PHYS 2110 & PHYS 2120	College Physics I and College Physics II <sup>4</sup>	
PHYS 2210 & PHYS 2220 & PHYS 2230	Physics for Scientists and Engineers I and Physics for Scientists and Engineers II and Physics for Scientists and Engineers III	
<b>Chemistry Concentration</b>		
MATH 2020	Calculus for Biological & Chemical Sciences II	4
CHEM 2110	Foundations of Quantitative Chemical Analysis	3
CHEM 2200	Foundations of Inorganic Chemistry	2
CHEM 2400	Foundations of Biochemistry	2
CHEM 2900	Research Methods in Chemistry	2
CHEM 3300	Intermediate Organic Chemistry	3
CHEM 3301	Organic Chemistry Laboratory I	2
CHEM 3600	Physical Chemistry: Thermodynamics and Kinetics	3
CHEM 3908	Seminar in Chemical Literature	3
CHEM 4830	Instruction in Chemistry	1
CHEM 4840	Service Learning in Chemistry: Leadership	1
CHEM 4908	Senior Seminar in Chemistry	3
<i>Major Subtotal</i>		<i>84-88</i>
<b>Additional Units Needed Towards Graduation</b>		<b>0-1</b>
<b>Total Units</b>		<b>122-127</b>

Laboratory satisfies Area B3; MATH 2010 Calculus for the Biological and Chemical Sciences I satisfies the Quantitative Reasoning Foundational Skill (Area B4), CHEM 3908 Seminar in Chemical Literature satisfies SELF and GWAR, CHEM 4908 Senior Seminar in Chemistry satisfies the GE Capstone.

<sup>6</sup> It is recommended that JYDR be satisfied by EDTE 3308 Socio-Cultural Foundations of Education

See appropriate links at [https://www.csub.edu/ge/Students1/General\\_Education\\_Requirements/index.html](https://www.csub.edu/ge/Students1/General_Education_Requirements/index.html) ([https://www.csub.edu/ge/Students1/General\\_Education\\_Requirements/](https://www.csub.edu/ge/Students1/General_Education_Requirements/)) or current lists of courses satisfying university-wide General Education requirements.

<sup>1</sup> Or Satisfaction of the entry-level Mathematics requirement and a score of at least 70 on the Math Placement Exam

<sup>2</sup> Or Satisfaction of the entry-level Mathematics requirement and a score of at least 80 on the Math Placement Exam

<sup>3</sup> Recommended Chemistry Concentration

<sup>4</sup> Recommended

<sup>5</sup> Some major requirements may be used to satisfy GE: GEOL 2010 Physical Geology satisfies Area B1; BIOL 2010 Introductory Biology - Cells satisfies Area B2; CHEM 1001 Foundations of Chemistry