

GEOLOGY, MS

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

Department of Geological Sciences (<https://catalog.csub.edu/general-information/csub-information/school-natural-sciences-mathematics-engineering/department-geological-sciences/>)

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

Program Description

The Department of Geological Sciences offers a comprehensive graduate program leading to the Master of Science in Geology degree. Thesis or non-thesis tracks with optional concentrations in Petroleum Geology and Hydrogeology are available for the MS degree. A post-baccalaureate Certificate in Hydrogeology is also offered. The program is intended to prepare students for professional positions in the petroleum industry, the environmental and geotechnical consulting industries, government agencies, and for graduate studies at the doctoral level. A broad range of faculty research interests; the proximity of the campus to government regulatory agencies, hydrogeology and environmental firms, the petroleum industry; easy access to diverse geological environments; and a range of modern research facilities permit the student to select from a wide spectrum of research topics.

Research facilities include:

1. a Hitachi S-3400 variable pressure scanning electron microscope equipped with Oxford Inca energy-dispersive and wavelength-dispersive x-ray spectrometers, iXRF micro-X-Ray fluorescence source and Gatan ChromaCL live-color cathodoluminescence imaging system;
2. a geochemistry lab with a ThermoFisher iCAP RQ ICP-MS-;
3. complete facilities for rock-sample cutting and crushing, mineral separation, and sample preparation,
4. petrographic microscopes including luminescence and epifluorescence;
5. geophysics equipment;
6. a PANalytical Empyrean x-ray diffractometer;
7. a PC lab with ArcGIS software for geographical information systems (GIS) based digital mapping and spatial analysis as well as specialized petroleum industry software and industry-provided datasets for petroleum reservoir modeling;
8. a sediment core laboratory with a Costech 4010 CNOSH Elemental Analyzer and a Malvern Mastersizer 2000 particle size analyzer;
9. a refrigerated core storage and sampling laboratory;
10. a -80 freezer;

11. a wide range of field hydrology equipment; and
12. micropaleontology reference collection and binocular microscopes for microfossil work, including photography and epifluorescence.

The California Well Core Sample Repository, containing cores and samples from more than 5,000 wells from both on-and-offshore California is located on campus.

Admission Requirements Application Process and Program Requirements

Application for the Master of Science in Geology

Persons seeking a Master of Science in Geology degree must apply to both the University and to the Department of Geological Sciences for admission to the MS in Geology graduate program. Students will receive a single letter from the University indicating admission to CSUB and acceptance into the MS in Geology graduate program. Accepted students will be classified as either a Conditionally Classified Graduate Student or a Classified Graduate Student. Applicants with only minimal prior academic preparation in the geological sciences are encouraged to apply for a second-baccalaureate degree in Geology.

Admission Requirements for the Master of Science in Geology

An acceptable baccalaureate degree in geological sciences or a related field with a minimum of 30 semester units of upper level geology course work that includes courses equivalent to:

| Code | Title | Units |
|--------------------|--------------------------------|-----------|
| GEOL 3000 | Mineralogy and Petrology | 4 |
| GEOL 3010 | Fundamentals of Geochemistry | 4 |
| GEOL 3040 | Sedimentology and Stratigraphy | 4 |
| GEOL 3070 | Structural Geology | 4 |
| GEOL 3090 | Principles of Geophysics | 4 |
| GEOL 4090 | Field Course in Geology | 5 |
| Total Units | | 25 |

Completion of minimum course work in cognate areas equivalent to:

| Code | Title | Units |
|------------------------------|---|-----------|
| CHEM 1000 | Foundations of Chemistry | 3 |
| | or CHEM 1010 Preparation for College Chemistry | |
| Select one of the following: | | 4 |
| MATH 2010 | Calculus for the Biological and Chemical Sciences I | |
| MATH 2310 | Single Variable Calculus I for Engineers | |
| MATH 2510 | Single Variable Calculus I | |
| PHYS 2110 | College Physics I | 4 |
| | or PHYS 2210 Physics for Scientists and Engineers I | |
| Total Units | | 11 |

An undergraduate GPA of at least 3.0 in the last 60 semester units (90 quarter units) of course work or other evidence of adequate prior academic preparation.

Submission of three letters of recommendation.

Formal decision by the Geological Sciences Graduate Committee to accept the student into the graduate program. The decision will be based on a formal application procedure, which includes evaluation of GPA, letters of recommendation, *Curriculum Vitae* (CV), and other materials which may be required by the Committee and/or offered by the student.

Graduate Student Classification

Conditionally Classified Graduate Student

Applicants that do not meet all of the admission requirements for the Master of Science in Geology may be provisionally admitted to the MS in Geology graduate program as a Conditionally Classified Graduate Student if, in the judgment of the Geological Sciences Graduate Committee, the applicant has the potential to successfully complete all requirements within a reasonable timeframe (usually one calendar year). These requirements (or approved substitutions) will be determined by the Geological Sciences Graduate Committee and specified in the admission letter from the University. Upon successful completion of all requirements, the student can apply for full acceptance to the MS in Geology graduate program as a Classified Graduate Student. Failure to satisfactorily complete all requirements in the specified timeframe will result in dismissal from the MS in Geology graduate program. **Note:** Conditionally Classified Graduate Students may not enroll in more than 10 semester units of coursework for graduate credit prior to advancing to Classified Graduate Student status.

Classified Graduate Student

Classified Graduate Student status indicates that the minimum admissions requirements for the Master of Science in Geology have been satisfied and that space has been made available in the MS in Geology graduate program. Specific requirements for Classified Graduate Student status are listed below.

- An acceptable baccalaureate degree in geological sciences or a related field with a minimum of 30 semester units of upper level geology course work that includes courses equivalent to:

| Code | Title | Units |
|-----------|--------------------------------|-------|
| GEOL 3000 | Mineralogy and Petrology | 4 |
| GEOL 3010 | Fundamentals of Geochemistry | 4 |
| GEOL 3040 | Sedimentology and Stratigraphy | 4 |
| GEOL 3070 | Structural Geology | 4 |
| GEOL 3090 | Principles of Geophysics | 4 |
| GEOL 4090 | Field Course in Geology | 5 |

- Completion of minimum course work in cognate areas equivalent to:

| Code | Title | Units |
|---|---|-------|
| CHEM 1000 | Foundations of Chemistry | 3 |
| or CHEM 1010 Preparation for College Chemistry | | |
| Select one of the following: | | 4 |
| MATH 2010 | Calculus for the Biological and Chemical Sciences I | |
| MATH 2310 | Single Variable Calculus I for Engineers | |
| MATH 2510 | Single Variable Calculus I | |
| PHYS 2110 | College Physics I | 4 |
| or PHYS 2210 Physics for Scientists and Engineers I | | |

- An undergraduate GPA of at least 3.0 in the last 60 semester units (90 quarter units) of course work or other evidence of adequate prior academic preparation.
- A faculty member in the Department of Geological Sciences who has agreed to serve as thesis research advisor (thesis track only).
- A Plan of Study approved by the Program Director.

Advancement to Candidate Status

Candidate status indicates that the student has completed at least 20 semester units (30 quarter units) within the approved Plan of Study and that there is a reasonable expectation that the student will complete all remaining degree requirements within one year. Classified Graduate Students will be advanced to Candidate status when they have met the following criteria:

- Completion of all requirements for Classified Graduate Student status.
- Completion of at least 20 semester units (30 quarter units) toward the Master of Science in Geology degree with a graduate GPA of at least 3.0 and grades of "C" or better in all courses on the approved Plan of Study.
- Successful defense of the MS Thesis Proposal and approval by the Program Director and the MS Thesis Committee (thesis track only).

Time Limits

Time limits have been set for completion of requirements at each level of status. Advancement to Classified Graduate Student status must be accomplished within one calendar year after admission as a Conditionally Classified Student. No more than 10 semester units may be taken for graduate credit until all requirements for Classified Graduate Student status have been satisfied. Advancement to Candidate status must be attained within two years after acceptance as a Classified Graduate Student.

All requirements, and graduation, must be completed within five calendar years after admission to the MS in Geology graduate program. The five-year time limit may be extended by an approved petition to the Geological Sciences Graduate Committee.

Completion of all requirements for the Master of Science in Geology degree requires satisfactory completion of all courses in an approved Plan of Study, a minimum 3.0 GPA in those courses, and either satisfactory completion of a thesis (including oral examination and any revisions required by the MS Thesis Committee) or completion of the non-thesis track described below.

Continuous Enrollment

Graduate students in the MS in Geology graduate program must enroll each Fall and Spring semester until degree completion. This continuous enrollment requirement can be met through enrollment in courses identified in the specified plan of study or by enrollment in a special low-cost, 7000-level, 0-unit course through Extended University, with the program director as the instructor of record. Unless granted an approved leave of absence, a graduate student who fails to enroll each semester will need to resubmit a plan of study for the graduate degree program and may be subject to dismissal from the MS in Geology graduate program. Summer or winter enrollment in the 7000-level continuous enrollment course may be required for students planning to complete their culminating experience (thesis defense or culminating examination) during those terms.

Application for the Post-Baccalaureate Certificate in Hydrogeology

Persons seeking a post-baccalaureate Certificate in Hydrogeology must apply to both the University and to the Department of Geological Sciences. Applicants will receive a single letter from the University indicating admission to CSUB and acceptance into the post-baccalaureate Certificate in Hydrogeology program.

Admission Requirements for the Post-Baccalaureate Certificate in Hydrogeology

Applicants must be accepted as post-baccalaureate students at CSUB. Applicants should have a BA or BS in Geology or a directly related field. Applicants in related fields should have completed course work equivalent to:

| Code | Title | Units |
|------------------------------|---|-----------|
| GEOL 2010 | Physical Geology | 4 |
| GEOL 2040 | Historical Geology | 4 |
| GEOL 3010 | Fundamentals of Geochemistry | 4 |
| GEOL 3040 | Sedimentology and Stratigraphy | 4 |
| GEOL 3070 | Structural Geology | 4 |
| CHEM 1000 | Foundations of Chemistry | 3 |
| or CHEM 1010 | Preparation for College Chemistry | |
| Select one of the following: | | 4 |
| MATH 2010 | Calculus for the Biological and Chemical Sciences I | |
| MATH 2310 | Single Variable Calculus I for Engineers | |
| MATH 2510 | Single Variable Calculus I | |
| PHYS 2110 | College Physics I | 4 |
| or PHYS 2210 | Physics for Scientists and Engineers I | |
| Total Units | | 31 |

Some of the courses in the certificate program may have additional prerequisites.

Program Requirements Thesis Track (30 units)

| Code | Title | Units |
|---|---|-------|
| GEOL 5100 | Research Methods and Strategies | 2 |
| GEOL 5200 | Advanced Professional Development for MS Students | 2 |
| GEOL 6090 | MS Thesis Proposal Defense | 1 |
| GEOL 6100 | MS Thesis Research | 4 |
| GEOL 6200 | MS Thesis Defense | 1 |
| A minimum of 20 units selected from 4000-level, 5000-level, and 6000-level courses (with at least 8 units from 5000-level or 6000-level courses). Relevant graduate-level courses in other fields may be substituted with prior Program Director and Thesis Committee approval. | | 20 |

GEOL 4060 Fundamentals of Petroleum Exploration and Production

and 8 additional units in approved petroleum geology focused courses are required for the optional concentration in Petroleum Geology

GEOL 4010 Hydrogeology

and 8 additional units in approved hydrogeology focused courses are required for the optional concentration in Hydrogeology

Total Units 30

Non-Thesis Track (30 units)

| Code | Title | Units |
|-----------|---|-------|
| GEOL 5100 | Research Methods and Strategies | 2 |
| GEOL 5200 | Advanced Professional Development for MS Students | 2 |
| GEOL 6300 | MS Non-Thesis Culminating Experience | 1 |

A minimum of 25 units selected from 4000-level, 5000-level, and 6000-level courses (with at least 13 units from 5000-level or 6000-level courses). Relevant graduate-level courses in other fields may be substituted with prior Program Director approval.

GEOL 4060 Fundamentals of Petroleum Exploration and Production

and 8 additional units in approved petroleum geology focused courses are required for the optional concentration in Petroleum Geology

GEOL 4010 Hydrogeology

and 8 additional units in approved hydrogeology focused courses are required for the optional concentration in Hydrogeology

Total Units 30

Requirements for the Certificate in Hydrogeology

The certificate requires at least 16 semester units of credit and shall be composed of the following required and elective courses:

| Code | Title | Units |
|---------------------------------------|--|-----------|
| GEOL 4010 | Hydrogeology | 4 |
| Select 12 credits from the following: | | 12 |
| GEOL 4020 | Environmental Geochemistry | |
| GEOL 4770 | Special Topics in Geology ¹ | |
| GEOL 4771 | Special Topics in Geology 2 ¹ | |
| GEOL 5020 | Applied Hydrogeochemistry | |
| GEOL 5030 | Contaminant Hydrogeology | |
| GEOL 5810 | Advanced Research Participation ¹ | |
| GEOL 6050 | Groundwater Modeling | |
| GEOL 5770 | Advanced Topics ¹ | |
| GEOL 5771 | Advanced Topics 2 | |
| GEOL 6770 | Advanced Topics in Geology ¹ | |
| Total Units | | 16 |

¹ when pertinent to hydrogeology as determined by the Program Director