Master of Science in Earth and Environmental Sciences

Requirements (45-49 units)

The Master of Science in Earth and Environmental Sciences is designed to provide strong preparation in applied science as well as social, political, and economic aspects needed for critical decision-making for environmental issues. The program has two options, PSM and Geology. The Professional Science Masters (PSM) includes a core curriculum including an internship, and participation in a basic or applied research project related to the internship. To accommodate working professionals, internships may be completed at their place of business if deemed appropriate by their faculty advisor. The program is designed so that it can potentially be completed in two years and every effort will be made to offer courses at times convenient for working professionals. The required internship program will be offered during the summer between the first and second years and the supervised graduate study in the following quarter. Additional internship courses are included as electives, as a number of local companies have expressed an interest in having interns for extended periods. The Geology Option focuses directly on geological study and research. This option is intended for students who wish to pursue graduate level work as a prelude for doctoral studies, or as professional preparation for careers in geological fields.

The culminating experience in the M.S. in Earth and Environmental Sciences is an extended project or a research thesis. At the end of the research a professional-level paper describing the project and its results will be prepared and presented to the student's advisory committee. If appropriate, students will be encouraged to publish their work in a peer-reviewed journal.

Admission to the Program

Specific requirements for admission to classified graduate status are:

1. A baccalaureate degree from an accredited college or university;
2. Completion of an undergraduate major in geology, chemistry or associated fields (e.g., biology or environmental studies with at least 30 quarter units of upper-division course work);
3. One year each of laboratory courses in: general chemistry, organic chemistry, and physics;
4. One full-term course in basic calculus or methods in calculus;
5. A cumulative undergraduate grade point average of at least 3.0 in all courses used for credit in the major;
6. Completion of the graduate entrance writing requirement;
7. Submission of scores from the Graduate Record Examination (GRE) to the earth and environmental sciences graduate committee;
8. Submission to the earth and environmental sciences graduate committee of a one-page, typewritten statement of the student's preparation for graduate study, goals in the graduate program, option (PSM or Geology) applied for, potential area of research and possible advisor (for thesis option) and professional goals following completion of the M.S.;
9. Submission of three letters of recommendation from people who are in a position to make relevant comments on the student's intent and potential for success in the program. At least two of the letters should be from current or former college or university faculty familiar with the student's scholarship and related activities.

Application deadlines for fall, winter and spring quarter admission are May 1, October 1, and January 15, respectively.

Advancement to Candidacy

To be advanced to candidacy, the student must have:

1. Achieved classified status;
2. Been accepted by a major advisor from the earth and environmental science program;
3. Completed at least 15 quarter units of work applicable to the degree program as a graduate student at this university with the approval of the earth and environmental sciences graduate committee, and with a minimum grade point average of 3.0 ("B");
4. Gained a recommendation for advancement to candidacy from the graduate committee;
5. Submitted a formal program of graduate course work prepared in consultation with and approved by the graduate committee;
6. Gained final approval of the program and of the candidacy itself by the Dean of Graduate Studies.

Requirements for Graduation

1. For the Professional Science Master's Option, a minimum of 49 quarter units of acceptable graduate level work included in the formal program, with no less than 35 units completed in residence at this University and with at least 35 units gained from 500- and 600-level courses approved by the program;
2. For the Geology Option, a minimum of 45 quarter units of acceptable graduate level work included in the formal program, with no less than 32 units completed in residence at this University and with at least 32 units gained from 500- and 600-level courses approved by the program;
3. Advancement to candidacy for the degree and approval of the specific program of courses;
4. A grade point average of 3.0 ("B") in all graduate course work fulfilling the requirements of the program and grades of "C" (2.0) or better in each course in the program;
5. Completion and presentation of an extended project or thesis;
6. The graduation writing requirement is met upon successful completion of the project or thesis;
7. Any additional general requirements not cited above and listed in Graduate Degree and Program Requirements (http://bulletin.csusb.edu/graduate-degree-programs/graduate-degree-program-requirements).

Department Graduate Committee and Major Advisor

The Earth and Environmental Sciences Graduate Committee consists of the graduate program coordinator and two or more faculty members. This committee will determine whether students are adequately prepared for graduate study in earth and environmental sciences, and has general supervision over the work of students progressing toward the master's degree.

Each new graduate student should consult with the graduate program coordinator for advice in selection of the appropriate graduate program. All students are responsible for selecting their major advisor and, in turn,
must be accepted by the major advisor. The major advisor in consultation with the student will develop a program of specific courses and an acceptable project research proposal based on the student's interests, abilities and preparation. The major advisor in consultation with the student will develop a program of specific courses and an acceptable project/research proposal based on the student's interests, abilities and preparation. The major advisor will direct the research and, where appropriate, supervise the internship. The program of courses and the project/research topic, as well as any subsequent modification of these, are subject to approval by the earth and environmental sciences graduate committee and the Dean of Graduate Studies.

Students enrolled in the graduate program wishing to take courses off campus and include them in the degree program must petition the earth and environmental sciences graduate committee for approval, otherwise the course may not be accepted as part of the program. Extension courses at the 1000- to 9999-level are not applicable to the graduate program. 300-level courses, other than those specified as possible electives in the program will be accepted only by written approval of the committee. Courses taken to satisfy quantitative or qualitative deficiencies cannot be applied toward a master's degree. Repeat of courses or the comprehensive examination require approval of the earth and environmental sciences graduate committee and will be granted only for serious and compelling reasons.

**Degree Requirements (45-49 units)**

**Professional Science Masters (PSM) Option (49 units) (Program Code: EESP)**

**Core Courses (41)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 610</td>
<td>Advanced Environmental Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>GEOG 470</td>
<td>Hydrology and Water Resources</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 610</td>
<td>Environmental Geosciences</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 690</td>
<td>Graduate Seminar in Environmental Sciences</td>
<td>2</td>
</tr>
<tr>
<td>GEOL 690</td>
<td>Graduate Seminar in Environmental Sciences</td>
<td>2</td>
</tr>
<tr>
<td>HSCI 612</td>
<td>Public Health Statistics</td>
<td>4</td>
</tr>
<tr>
<td>PA 620</td>
<td>Regulatory Structure, Policies, and Process in Water Law</td>
<td>4</td>
</tr>
</tbody>
</table>

Four units chosen from:

- ECON 360  Economics of the Environment
- IST 309  Information Systems and Technology
- IST 474  Advanced Data Base Management and Information Assurance

A minimum of nine units, including one internship and one graduate study, chosen from:

- CHEM 575A-E Internship in Chemistry
- CHEM 695D-E Supervised Graduate Study in Chemistry
- GEOL 575B-D Internship in Geology
- GEOL 695D-E Supervised Graduate Study in Geology

Choose one of the following courses:

- CHEM 696D Graduate Project
- CHEM 699 Graduate Thesis
- GEOL 696D Graduate Project
- GEOL 699 Graduate Thesis

**Elective Courses (8)**

A minimum of 8 units; at least one course must be graduate level.

**Undergraduate Electives:**

(Some of these elective courses have prerequisites that must be satisfied before the course can be taken)

- BIOL 320  Microorganisms
- BIOL 349  Biology of Ecosystems
- BIOL 450  Ecology
- BIOL 455  Marine Biology and Ecology
- CHEM 345  Modern Quantitative Analysis
- GEOG 306  Remote Sensing of the Environment
- GEOG 308  Advanced Geographic Information Systems
- GEOG 350  Conservation and Natural Resources
- GEOG 402  Geographic Information Systems Applications
- GEOL 375  Groundwater Hydrology
- GEOL 376  Field Methods in Hydrology
- GEOL 430  Engineering Geology
- HSCI 380  Toxicology
- HSCI 478  Environmental Health Management
- MGMT 335  Business, Ethics, and Society
- PA 315  Government-Business Relations

**Graduate Electives:**

- CHEM 501A  Advanced Laboratory Techniques
- CHEM 545  Instrumental Analysis
- CHEM 691B-D Graduate Independent Study
- CHEM 697  Advanced Internship
- GEOG 650  Environmental Issues of Land Management
- GEOL 510  Scientific Issues in Surface and Groundwater Management
- GEOL 550  Earth Resources
- GEOL 551  Neotectonics and Seismic Hazard Analysis
- GEOL 554  Geochemical Thermodynamics
- GEOL 555  Site Investigation Methodologies in Engineering Geology
- GEOL 556  Case Histories in Engineering Geology Practice
- GEOL 591  Digital Mapping and GIS for Scientists
- GEOL 621  Graduate Geological Mapping
- GEOL 630  Environmental Geochemistry
- GEOL 635  Low-temperature Geochemistry
- GEOL 691B Graduate Independent Study
- GEOL 697  Advanced Internship
- HSCI 557  Hazardous Material Control
- HSCI 558  Management of Water Quality
- HSCI 651  Air Quality Management
- PA 672  Administrative Regulation

**Total Units:** 49

**Geology Option (45 units minimum) (Program Code: EESG)**

**Core Courses (20-21)**

<table>
<thead>
<tr>
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<td>Graduate Seminar in Environmental Sciences</td>
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</tr>
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<td>GEOL 699</td>
<td>Graduate Thesis</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 695D-E</td>
<td>Supervised Graduate Study in Geology</td>
<td>4-5</td>
</tr>
</tbody>
</table>

**Elective Courses:**

**Undergraduate Electives:**
### Electives (25)

A minimum of 25 units, at least 12 of which are graduate level courses.

Undergraduate Electives:

(Some of these elective courses have prerequisites that must be satisfied before the course can be taken)

<table>
<thead>
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<tbody>
<tr>
<td>CHEM 345</td>
<td>Modern Quantitative Analysis</td>
</tr>
<tr>
<td>GEOG 402</td>
<td>Geographic Information Systems Applications</td>
</tr>
<tr>
<td>GEOL 375</td>
<td>Groundwater Hydrology</td>
</tr>
<tr>
<td>GEOL 376</td>
<td>Field Methods in Hydrology</td>
</tr>
<tr>
<td>GEOL 430</td>
<td>Engineering Geology</td>
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Graduate Electives:

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<td>CHEM 501A</td>
<td>Advanced Laboratory Techniques</td>
</tr>
<tr>
<td>CHEM 501B</td>
<td>Advanced Laboratory Techniques</td>
</tr>
<tr>
<td>CHEM 545</td>
<td>Instrumental Analysis</td>
</tr>
<tr>
<td>GEOL 540</td>
<td>Advanced Topics in Geology</td>
</tr>
<tr>
<td>GEOL 545A</td>
<td>Laboratory for Advanced Topics in Geology</td>
</tr>
<tr>
<td>GEOL 545B</td>
<td>Laboratory for Advanced Topics in Geology</td>
</tr>
<tr>
<td>GEOL 550</td>
<td>Earth Resources</td>
</tr>
<tr>
<td>GEOL 551</td>
<td>Neotectonics and Seismic Hazard Analysis</td>
</tr>
<tr>
<td>GEOL 552</td>
<td>Volcanology and Volcanic Hazard Assessment</td>
</tr>
<tr>
<td>GEOL 553</td>
<td>Advanced Structural Geology</td>
</tr>
<tr>
<td>GEOL 575B-D</td>
<td>Internship in Geology</td>
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<tr>
<td>GEOL 696A-F</td>
<td>Graduate Project</td>
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</tbody>
</table>

Total Units: 45-46