NATURAL SCIENCES — M.S.

Program director
Leonard R. Brand

The Natural Sciences Program leads to the Master of Science degree. Coursework is selected from the allied fields of biology, paleontology, geology, earth systems science, and geographic information systems (GIS). Areas of curriculum strength include ecology, genetics, systematics, sedimentary geology, paleontology, environmental geology, environmental science, and GIS.

Program features

The Natural Sciences Program emphasizes ecology-oriented areas of biology and field-oriented geology—particularly sedimentology, stratigraphy, and paleontology. Fieldwork is emphasized because it provides a first-hand experience with biological and geological phenomena that cannot be satisfactorily grasped or understood solely from classroom or laboratory study. Throughout the natural sciences curriculum, students are encouraged to develop an open-minded and investigative approach in the application of the scientific method to the resolution of biological and geologic problems. Multiple working hypotheses are encouraged. The goal is to prepare students for effective careers in teaching or government.

Program learning outcomes

By the end of this program, the graduate should be able to:

1. Articulate the fundamental concepts of biology, geology, GIS, and environmental science.
2. Seek endorsement for subject-teaching in secondary education in either biological science or geoscience.
3. Apply effective written and oral communication to professional practice.
4. Apply the scientific method, hypothesis testing, and deductive reasoning.
5. Discuss key issues related to the integration of faith and science.
6. Seek employment in K-12 teaching, or civil or public service.

Rosario Beach summer courses

In cooperation with the Walla Walla University Marine Station at Anacortes, Washington, facilities are available for marine courses and research by graduate students in the Department of Earth and Biological Sciences.

Admissions

In addition to Loma Linda University (http://llucatalog.llu.edu/about-university/admission-policies-information/#admissionrequirementstext) admission requirements, the applicant must also complete the following requirements:

- Bachelor's degree in biology, geology, chemistry, physics, or other degree with typical biology and geology prerequisites.
- Undergraduate G.P.A. of at least 3.0 is expected.
- Achieve an acceptable score on the general Graduate Record Examination (GRE). The subject GRE is not required.
- Completion of prerequisite courses:
  - College mathematics—two quarters (calculus recommended)
  - Biology—one-year
  - General physics with laboratory—one year
  - General chemistry with laboratory—one year
  - General ecology—one course

Some prerequisite courses may be taken during residence at Loma Linda University, with approval of the admissions committee.

Application

Applications are accepted at any time. Review of applications begins in February for the Autumn Quarter admission. It is highly recommended that the applicant complete the application process by January 31 of the calendar year being considered for admissions, for priority consideration. Research assistantships are competitively awarded. Applicants may contact the department at ebs@llu.edu.

Program requirements

A minimum of 50 quarter units, including 34 at or above the 500 level, constitutes the curriculum for the Master of Science degree program in natural sciences. The following courses are required. Undergraduate courses must be at the 400 level.

Core		
BIOL/GEOL 558	Philosophy of Science	4
GEOL 518	Earth Structure, Process, and History	4
BIOL 607	Seminar in Biology (0.5) [1]	3
or GEOL 607	Seminar in Geology	
BIOL/GEOL 616	Research and Experimental Design	2
BIOL 664	Science Communication Outreach [2]	1
Select one course of the following:		3-4
BIOL 505	Marine Biology	
BIOL 515	Biogeography	
BIOL 517	Ecological Physiology	
BIOL 539	Behavioral Ecology	
BIOL 546	Techniques in Vertebrate Ecology	
BIOL 549	Biodiversity and Conservation	
Select one course of the following:		4
GEOL 512	Invertebrate Paleontology	
GEOL 513	Vertebrate Paleontology	
GEOL 514	Paleobotany	
GEOL 545	Taphonomy	
Religion		
REL_ 5__	Graduate-level Religion	3
Electives		
Selected in consultation with the student's faculty advisor		22-23
BIOL 415	Ecology	
BIOL 437	Animal Behavior	
BIOL 504	Biology of Marine Invertebrates	
BIOL 505	Marine Biology (If not taken to meet a core requirement)	
BIOL 507	Herpetology	
BIOL 515	Biogeography (If not taken to meet a core requirement)	
BIOL 517	Ecological Physiology	

BIOL 518	Readings in Ecology	
BIOL 529	Mammalogy	
BIOL 539	Behavioral Ecology (If not taken to meet a core requirement)	
BIOL 545	Genetics and Speciation	
BIOL 546	Techniques in Vertebrate Ecology (If not taken to meet a core requirement)	
BIOL 549	Biodiversity and Conservation (If not taken to meet a core requirement)	
BIOL 555	Molecular Genetics	
BIOL 566	Multivariate Statistics	
BIOL 588	Current Topics in Biology (If not taken to meet a core requirement)	
BIOL 589	Readings in Biology	
BIOL 618	Writing for Publication	
ENVS 434	The Environmental Context of Community Health	
ENVS 495	Special Projects in Environmental Sciences	
GEOL 416	Sedimentology and Stratigraphy	
GEOL 512	Invertebrate Paleontology (If BIOL 426 not taken to meet a core requirement)	
GEOL 513	Vertebrate Paleontology (If BIOL 427 not taken to meet a core requirement)	
GEOL 514	Paleobotany (If BIOL 444 not taken to meet a core requirement)	
GEOL 526	Introduction to GIS for the Natural Sciences	
GEOL 535	GIS Spatial Analysis for the Natural Sciences	
GEOL 545	Taphonomy (If not taken to meet a core requirement)	
HGIS 422	Principles of Geographic Information Systems	
HGIS 424	Desktop GIS Software Applications	
Research/Project		
BIOL 695	Special Projects in Biology	4
or BIOL 697	Research	
or GEOL 695	Special Projects in Geology	
or GEOL 697	Research	
Total Units		**51**

[1] Registration required for each quarter in residence; 0.5 unit per quarter. Maximum counted toward the degree total is 3 (6 quarters of seminar).

[2] Fulfills service learning requirement.

Noncourse requirements

Seminar attendance requirements

All graduate students in residence must register for and attend Seminars (BIOL 607 Seminar in Biology or GEOL 607 Seminar in Geology) each quarter at Loma Linda University.

Advancement to candidacy

Students may apply for advancement to candidacy by completing Form A, which requires:

- Completing all deficiencies and corequisites.
- Completing an approved written project proposal.
- Passing the written comprehensive examination.
- Being recommended by the program faculty (should be completed by the end of the third quarter of study).

Final examinations

Students are expected to pass a written comprehensive examination during their penultimate quarter in residence.

Project

As part of the core curriculum, the student will complete a project, in consultation with the advisor, involving four units of registration in research or special projects.

Grade requirement for graduation

A grade of B (3.0) or better is required in all courses that count toward the degree.

Normal time to complete the program

Two (2) years — based on full-time enrollment; part time permitted