Learning outcomes

• Demonstrate advanced breadth and depth of biological knowledge.
• Plan and carry out independent research.
• Demonstrate professional writing and oral communication skills, and develop the ability to publish research findings.
• Demonstrate the ability to analyze and synthesize previous knowledge.
• Develop a professional aptitude and attitude.
• Develop critical evaluation skills in relation to faith, science, and public interest issues.

Student financial aid

Assistantships for research and/or teaching are available in the Department of Earth and Biological Sciences on a competitive basis. Further information can be obtained, including contact information, from the department web page at <http://www.llu.edu/medicine/ebs/index.page?>. Qualified students are also encouraged to seek fellowships from federal and private agencies with the help of their advisor.

General requirements

For information about requirements and practices to which all graduate students are subject, the student should consult the relevant sections of this CATALOG and of the school in which this program is housed.

Seminar attendance requirements

All graduate students in residence must register for and attend Seminars (BIOL 607) at this University each quarter.

Research proposal

Students are urged to select a research project early in their program, in consultation with a faculty member approved by the department. A written research proposal and oral defense of the student’s proposed research should be completed early in the third quarter of study. A comprehensive plan for completion of the degree will be approved at this time.

Registration and tuition after normative time

Our program design is for M.S. degree students to finish within the normative time of two years. In certain circumstances, students may require slightly more time for completion. Students who are past the normative time for completing their degree must register for two units without a tuition waiver each quarter until they complete their degree. After their normative time, students may request a one-year grace period that must be approved by the department faculty.

Thesis

The written thesis must demonstrate the completion of significant, original research and must be written in the format of an appropriate scientific journal where the manuscript is likely to be submitted for publication.

Admissions

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

• Expected undergraduate preparation includes a bachelor’s degree with a biology major or equivalent from an accredited college or university, including the following corequisite courses:
  • Precalculus (required)
  • Calculus (recommended)
  • Statistics (one course)
  • General biology (one year)
  • General chemistry (one year)
  • Genetics (one course)
  • Organic chemistry (one year)
  • Biochemistry (recommended)
  • General physics (one year)
  • Some of these courses may be taken during residence at this University, with the approval of the EBS admissions committee.

• An undergraduate G.P.A. of at least 3.0 is expected.
• an acceptable score on the general Graduate Record Examination (GRE) (the subject GRE is not required).

It is also recommended that applicants contact the department at <ebs@llu.edu>.

Application time

Applications are accepted at any time, although students are usually admitted for Autumn Quarter. Review of applications begins in February for Autumn Quarter admission. Research assistantships are competitively awarded.

Program requirements

A total of 48 units of courses and research is required, including at least 36 at or above the 500 level. See below for a list of courses.

All values below are in quarter units

Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 502</td>
<td>Orientation to Graduate Biology (Orientation to</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Graduate Biology)</td>
<td></td>
</tr>
<tr>
<td>BIOL 545</td>
<td>Genetics and Speciation</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 558</td>
<td>Philosophy of Science</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 607</td>
<td>Seminar in Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 616</td>
<td>Research and Experimental Design</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 617</td>
<td>Proposal Writing and Grantsmanship</td>
<td>2</td>
</tr>
</tbody>
</table>

Select one or more course(s) from any of the following areas for at least 6 units

Biological systems

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 517</td>
<td>Ecological Physiology</td>
</tr>
<tr>
<td>BIOL 555</td>
<td>Molecular Genetics</td>
</tr>
<tr>
<td>MICR 540</td>
<td>Physiology and Molecular Genetics of Microbes</td>
</tr>
<tr>
<td>MICR 570</td>
<td>Mechanisms of Microbial Pathogenesis</td>
</tr>
</tbody>
</table>
### Ecology
- **BIOL 444** Paleobotany
- **BIOL 505** Marine Biology
- **BIOL 515** Biogeography
- **BIOL 539** Behavioral Ecology
- **BIOL 546** Techniques in Vertebrate Ecology
- **BIOL 549** Biodiversity and Conservation

### Organismal
- **BIOL 409** Mammalogy
- **BIOL 426** Invertebrate Paleontology
- **BIOL 427** Vertebrate Paleontology
- **BIOL 504** Biology of Marine Invertebrates
- **BIOL 539** Behavioral Ecology
- **GEOL 444** Paleobotany
- **GEOL 545** Taphonomy

### Religion
- **REL_5__** Graduate-level Religion 3

### Electives
Additional courses required by the student’s guidance committee to complete the total units required for the degree 8
- **ANAT 516** Neuroscience GS
- **ANAT 542** Cell Structure and Function GS
- **BCHM 515** Introduction to Bioinformatics

### Research
Typically research units will be graded each quarter and can be repeated for additional credit
- **BIOL 698** Thesis Research 15

**Total Units** 48

1. **BIOL 559** Philosophy of Science and Origins required for students who have taken **BIOL 475** Philosophy of Science and Origins or equivalent
2. Each quarter in residence; 0.5 unit per quarter (Total units required may vary depending on the number of quarters a student is on campus.)
3. In addition to this list, courses may also be chosen from unused courses listed above for biological systems, ecology, and organismal biology. When choosing elective, keep in mind that a minimum of 44 units for the M.S. degree must be numbered 500 or above.

### Noncourse requirements

#### Advancement to candidacy
Students may apply for advancement to candidacy by completing Form A, which requires:
- Completing all deficiencies and corequisites.
- Selecting a research committee.
- Completing an approved written research proposal.
- Passing the oral defense of the research proposal.
- Being recommended by the program faculty (should be completed by the end of the third quarter of study).

#### Defense of thesis
An oral presentation and defense of the thesis, including final oral examination on the student’s field of study, are required.

### Grade requirement for graduation
All courses applied toward a graduate degree must have a grade of B or higher.

### Length of program
2 years based on full-time enrollment; part time permitted