

Request to Apply for Biology 399 Undergraduate Research

Name _____ Date _____

Local address _____
street/dorm _____ city _____ state _____ zip _____

Telephone No. _____ Cumulative GPA _____

List the biology course(s) that you have completed or that are in progress (designate as "IP"). Write the grade received next to each completed course.

<input type="checkbox"/> 111 _____	<input type="checkbox"/> 242 _____	<input type="checkbox"/> 331 _____	<input type="checkbox"/> 344 _____
<input type="checkbox"/> 112 _____	<input type="checkbox"/> 243 _____	<input type="checkbox"/> 332 _____	<input type="checkbox"/> 345 _____
<input type="checkbox"/> 115 _____		<input type="checkbox"/> 333 _____	<input type="checkbox"/> 346 _____
	<input type="checkbox"/> 311 _____	<input type="checkbox"/> 334 _____	
<input type="checkbox"/> 141 _____	<input type="checkbox"/> 313 _____	<input type="checkbox"/> 335 _____	<input type="checkbox"/> 354 _____
<input type="checkbox"/> 205 _____	<input type="checkbox"/> 321 _____	<input type="checkbox"/> 336 _____	<input type="checkbox"/> 356 _____
<input type="checkbox"/> 206 _____	<input type="checkbox"/> 323 _____	<input type="checkbox"/> 338 _____	<input type="checkbox"/> 357 _____
<input type="checkbox"/> 207 _____	<input type="checkbox"/> 324 _____	<input type="checkbox"/> 341 _____	other _____ (specify)

List the chemistry course(s) that you have completed or that are in progress (designate as "IP"). Write the grade received next to each completed course.

<input type="checkbox"/> 101 _____	<input type="checkbox"/> 281 _____	<input type="checkbox"/> 261 _____	<input type="checkbox"/> 304 _____
<input type="checkbox"/> 103 _____	<input type="checkbox"/> 115 _____	<input type="checkbox"/> 262 _____	<input type="checkbox"/> 323 _____
<input type="checkbox"/> 104 _____	<input type="checkbox"/> 201 _____	<input type="checkbox"/> 271 _____	other _____ (specify)

Do you have field/laboratory experience other than that associated with courses? If so, describe briefly.

What aspect(s) of field/laboratory work appeals to you most?

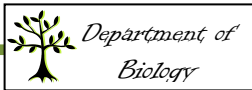
Does the proposed project involve animal research and/or recombinant DNA? _____

If yes, has it been approved by an institutional review board? _____

What precautions will be followed in conducting such research?

What do you see as the long-term benefit of the research project to you?

Please return this form to the Supervising Faculty or to the Department Chairperson



Guidelines Regarding Student Participation in Biology 399 Undergraduate Research (laboratory or field-based research format)

Undergraduate Research Projects

Calvin College provides an opportunity for students to do undergraduate research when they have demonstrated their competence in the academic discipline(s) involved and have shown an ability to work on a research project. Biol 399 includes substantial investigative experience, including experimental design, literature searches, use of experimental techniques and scientific instruments, and collection, analyses, and interpretation of data.

The Biology 399 course is an opportunity for a student to conduct a research project under the supervision of a Biology Department faculty member (the principal investigator). Projects for such study must be defined in advance of registration and must be approved by the instructor directing the study, the departmental chairperson, and the Registrar. Each course must be completed within the term. Because research projects require considerable time of the instructor as well as the student, an instructor is not obligated to approve a project and is expected to limit the number of students accepted.

Biol 399 (4 sem. hrs.) may serve as an alternative to a Biol 354 investigations course for the biology major. It does not normally substitute for Biol 356 in the biotechnology major or for Biol 357 in the biology secondary ed. major.

Eligibility for an Undergraduate Research Project

To be eligible, a student must have completed four courses in biology and must have an overall GPA of at least 3.0 in those courses. Biol 399 shall carry credit of 1 to 4 semester hours. No more than 4 semester hours of Biol 399 may be applied toward a biology or biotechnology major and no more than 8 semester hours of such study may be applied toward graduation requirements.

Expectations of Student Participating in Biol 399

To maximize the benefit of a research project to a student, the Biology Department requires that the following items be included in a course:

1. Preparation. For a project to have significance, it must be well-conceived and tied to the existing knowledge in the field. To assure that a project has such a basis, the student is required to complete:
 - a. a bibliography (a listing of a body of literature appropriate to the project). As an option, a student may be required to complete an annotated bibliography, i.e., a bibliography accompanied by a brief paragraph for each entry indicating the significance of the item. A bibliography may also include a report of the sources searched. The bibliography may be submitted at the end of the semester.
 - b. a project proposal. The proposal should be prepared in rough form for the initial course proposal, but should be prepared in detail at the beginning of the semester in consultation with the supervising faculty member and the literature. A rough project proposal must be completed before the project is undertaken.

2. Project. The heart of any scientific study is the data collected. Securing useful data entails appropriate experiment design, careful data collection and regular recording and review of work in progress. To assure that adequate and appropriate data are collected, the following items will be an ongoing part of the project:

- a. a log of work done on the project, i.e., a laboratory and/or field notebook in which records, dates, times, places, experimental conditions, and data are kept.
 - b. a weekly progress review, i.e., a meeting with the supervising faculty member to review work done in the past week and the work planned for the following week. The log should be clearly labeled and kept up-to-date so that data, sites visited, experimental techniques, data analyses, etc. can be reviewed at the weekly progress sessions. The log will be submitted with the final project report.
3. Report. The proper end of a research project is a report (thesis) on the study and its findings. The report may be a formal paper or a poster presentation. A written report will include the usual components of a scientific paper (title, abstract, introduction, methods and materials, results, discussion, literature cited as well as supporting tables and figures). The style for citations, figures, tables, etc. in the paper will be that of a major journal in the disciplinary area of the study. A thesis is required of students taking Biology 399 for Honors credit.

Instead of, or in addition to the written report, a student may be required to present the study in poster form. The style of the poster will be that which is common to the particular disciplinary area involved in the study and will be arranged in consultation with the supervising faculty member. A student applying for investigations exemption on the basis of his or her Biology 399 experience will present a seminar, paper or poster as the final report of the result of that study.

Students will also be encouraged, but not required, to present a seminar to the Biology Department students and staff if the study and data are appropriate. The principal investigator may also encourage the student to present the work at a scientific conference.

Work completed during the project is legally the intellectual property of the principal investigator, who is primarily responsible for any publication and/or communication of all or parts of the project. Students may not presume this responsibility without the consent of the principal investigator.