

Guidelines for Fulfilling Directed Research

The purpose of the directed research program is to provide undergraduates majoring in the life sciences at the University of Hawai'i at Mānoa an opportunity to work semi-independently on a research project under the mentorship of professionals in the biology community, typically scientists with a Ph.D. in biology or a related field, on or off campus. Your mentor's role is to provide overall guidance and be the principal resource person with the expertise to authenticate the content and quality of the project. Students typically receive their directed research course credits by enrolling in BIOL 499, but it is also possible to take 499 courses through other programs (e.g., OCN 499) or the honors program (HON 496).

Your mentor (often the “Principal Investigator” or PI for the lab) must work with you to develop a project that can be completed in the timeframe of 1-2 semesters. Students working on directed research projects may be trained and have regular day-to-day contact with other members of the lab (e.g., graduate students, postdoctoral researchers), but the mentor is expected to play a significant role in the development of the project and have regular contact with you over the course of the project.

An important outcome of a directed research experience is that, through interactions with an experienced PI, students will gain experience identifying good questions that lead to strong inferences about biological processes. Routine monitoring, internships, or volunteer work in which the student is told what to do each day is not directed research. Instead, students should be working on question-driven research in which they have the potential to make a novel contribution to science.

Before enrolling in Directed Research, you must identify a research mentor. Consider approaching faculty members you have completed coursework with, search the webpages of the departments within the College of Natural Sciences (CNS), the School of Ocean and Earth Science and Technology (SOEST), other suitable faculty members around campus (note: there are research-active biologists housed in many colleges and programs around the University), or talk with other experts in your field of interest at UHM or in the community. **We highly recommend you work on finding a research mentor 1 to 2 semesters before you intend to start your research project.**

Keep in mind that mentorship is service to the university community and that research projects typically require a significant commitment of resources by the PI of a lab. Therefore, you must put your best foot forward when contacting potential mentors by familiarizing yourself with what they do **so that you can make a case for yourself as someone genuinely interested in ongoing projects in the PI's lab.** Students are not expected (and generally not encouraged) to come up with their own project ideas

before meeting with a potential mentor but should be able to explain what kinds of projects interest them and why a particular PI's lab might be a good fit. A willingness to take on part of a larger project already underway in the lab is a plus, as most PIs do not have the time or resources to start new projects for every new student that joins their lab.

Credit Requirements

Students can enroll in directed research even if not required by their degree program and can (with department approval) apply those credits towards their degree as elective credits.

Major	Minimum Required Directed Research Credits	Maximum Directed Research Credits
BS Marine Biology	4	8
BS Biology	0	6
BA Biology	0	6

One credit is considered the equivalent of 4 hours of work per week (and 64 hours over a 16 week semester. For example, a student that enrolls in two credits of BIOL 499 is expected to work 2 credits x 4 hours/week x 16 weeks = 128 hours over the semester.

499 courses are repeatable, allowing for completion of project(s) that may span multiple semesters or for students to undertake multiple projects during their academic career. Pay careful attention to the maximum number of credits that can be applied towards your major requirements, as these vary by major.

Students that work with UHM faculty members that have their own CRN for BIOL 499 (or OCN 499, BOT 499, etc.) should obtain the CRN from the faculty member. Students that work with a mentor that does not have their own CRN for a 499 class (e.g., an off-campus researcher) can enroll in a BIOL 499 section associated with the School of Life Sciences. Students may obtain the CRN for this by following the instructions below. Students in the honors program that are completing directed research using HON 496 should obtain the CRN from the honors program, but must submit their project for approval from the School of Life Sciences following the instructions below in order to apply these credits to their degree.

Important: all students working on research projects at UHM must register and complete the campus Lab Safety Training Course (<http://www.hawaii.edu/ehso/lab-safety-training/>). Students cannot be permitted to register for BIOL 499 until they

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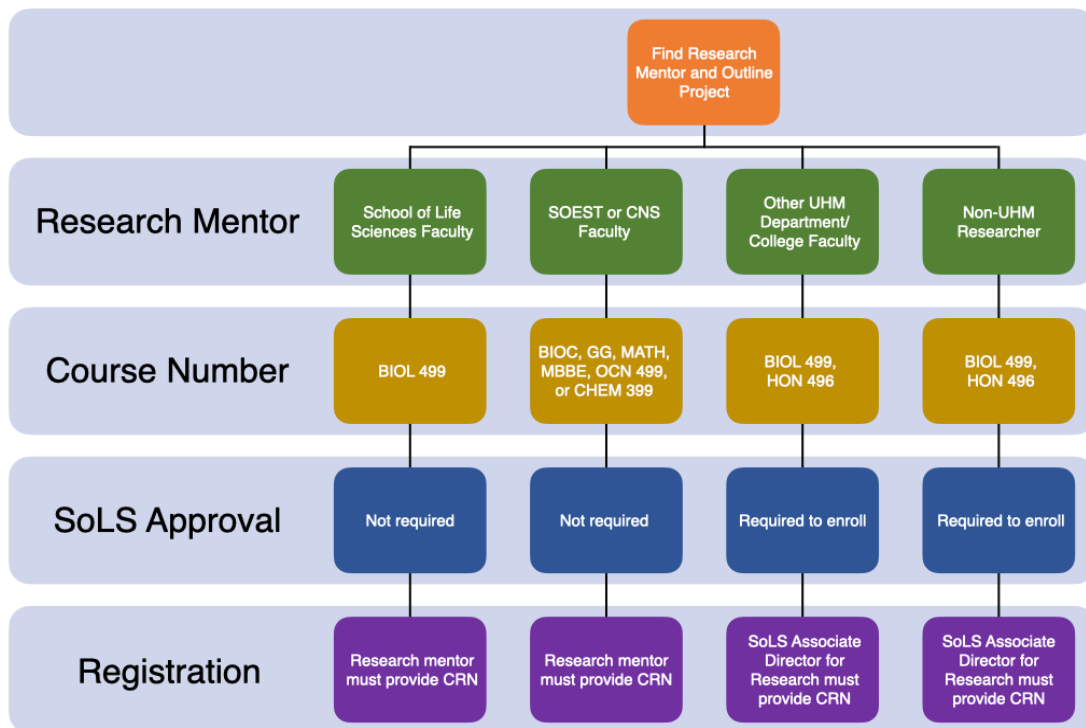
successfully complete this training. Students working with live vertebrate animal subjects (including humans) must be added to an existing campus IACUC protocol (<https://www.hawaii.edu/researchcompliance/iacuc>) and students whose projects require scuba diving must contact the UH Dive Safety Program (<http://www.hawaii.edu/ehso/divingsafety/>).

Grading Option

For Directed Research to apply towards your major requirements it must be completed for a letter grade (A to F) and you must obtain a minimum grade of C (not C-). Under special circumstances, a student may be given a grade of Incomplete, which extends the project completion date to November 1 for Spring and Summer enrollments, and April 1 for Fall enrollment. Be aware that while a grade will be assigned, the incomplete designation may not be removed from the student's final transcript.

Gaining Approval to Register

Your research mentor's affiliation with UHM and/or the School of Life Sciences will affect the steps necessary to register for Directed Research credits. The table below outlines how you acquire the CRN and approval necessary to register. For pathways requiring School of Life Sciences approval, please refer to the "Gaining School of Life Sciences Approval" section for directions on how to seek approval.



Note: If you are completing HON 495 & 496 you may be able to apply those credits towards your Directed Research requirement. To do so, follow the instructions for 'Gaining School of Life Science Approval' below.

Gaining School of Life Sciences Approval

To obtain approval from the School of Life Sciences to register for BIOL 499, apply credits from a SOEST or Nat. Sci. department towards your major, or apply HON 496 credits towards your major, please do the following:

1. Complete the Application for Directed Research Project that you can access at: <https://manoa.hawaii.edu/lifesciences/undergraduate/directed-research/>
2. Ask your research mentor to send a brief email message to lifesci@hawaii.edu with a short (2-3 sentences) description of the research project and confirmation of the number of credit hours you are requesting, acknowledging the number of working hours required, using the conversion described above.

Your application will be evaluated based on the guidelines described in the first section of this document. At the end of the semester a written report must be submitted in the format of a scientific paper. The report is due the last day of instruction for the semester (usually the Wednesday or Thursday before finals week). The written report should not exceed 2500 words (not including references and figure captions) and should include the following:

- Project Title
- Student's name, student ID number, contact information
- Mentor's name, contact information
- Introduction: providing background, significance and objectives of project
- Materials and methods: describing study design and procedures
- Results: including any supporting figures or tables
- Discussion and Conclusions: including future directions based on results and interpretation of findings
- List of references cited

Submit Final Report to: lifesci@hawaii.edu