Biology 499 Directed Senior Research Spring 2009

1. Meetings and Faculty

1.1. Meetings

Tuesdays 830-920 am, Henry 106

1.2. Faculty

Coordinator	Dr Helen Turner	(hturner@chaminade.edu)
Research Mentors	Dr Helen Turner	
	Professor Ron Iwamoto	(riwamoto@chaminade.edu)
	Dr Teena Michael	(tmichael@chaminade.edu)
	Dr Michael Dohm	(mdohm@chaminade.edu)
	Dr Joel Kawakami	(jkawakami@chaminade.edu)
	Dr Bulent Terem	(bterem@chaminade.edu)
	Dr Alexander Stokes	(astokes@hawaii.edu)
	Dr Abby Collier	(acollier@hawaii.edu)
Internship coordinator	Professor Patti Lee-Robinson	(plrobins@chaminade.edu)

1.2. Office Hours.

Office hours with Dean Turner are by appointment. Office hours for research mentors should be established individually.

2. The Course.

2.1. Overview.

Directed Senior Research is a requirement for the bachelor's degree in biology at Chaminade University and is a culmination of the course of study in biology. The steps that you follow here are quite similar to steps taken by biologists in a wide variety of research labs, from generating ideas and research proposals to collection and analysis of data and finally to the presentation of results to other scientists (including those at granting agencies) through a written publication and or a public presentation. The weekly meetings with the facilitator, Dr Turner, will be used to review project progress and to perform exercises that aim to increase your knowledge of topical issues in the realms of biological discovery, scientific ethics and recent technical advances.

2.2. Types of acceptable research project.

Three types of research project are acceptable, and the selection of a suitable type and topic of project will be carried out in consultation with Dr Turner. These types of project are (a) a directed research project based on literature analysis and evaluation of primary data from public sources (e.g. a clinical epidemiology project), (b) *in silico* projects involving the use of publically-available bioinformatics resources to test specific biological questions, and (c) wet-lab experiences conducted at the bench.

2.3. Project selection process

Each faculty mentor has defined projects available. Students must perform research that is within the field of expertise of the mentor, and the mentor may refuse to supervise a topic that is not within their field. Students will select a research project, investigate literature on the topic, write a proposal for an experiment, conduct an investigation of the topic, collect and analyze the data and consider the results and the study itself in a final paper that follows the format of a scientific publication. Students will also present a poster based on their work in an open session at the end of the semester. These posters will be scored by a committee composed of the facilitator, research

mentors and internship coordinator. As you select topics, please be advised that the Biology Department has adopted a moratorium on bird and mammal studies including humans.

2.4. Learning Outcomes.
Successful completion of this course should provide students with the following learning outcomes:

1. Demonstration of the ability to organize and perform biological research using the scientific method.
2. Demonstration of the ability to complete a library search of biological literature.
3. Demonstration of understanding problems involved in conducting research in biology.
4. Demonstration of the ability to critically analyze data.
5. Demonstration of competency in using biological techniques and instruments
6. Completion of writing up research as a scientific paper formatted for submission to a peer-reviewed journal.
7. Completion and presentation of a poster documenting the research project for an audience of peers and professional scientists.

3. Requirements and Grading

3.1. Grading Scheme

Attendance and participation in weekly meetings	100 points
Final Poster Presentation	200 points
Final Written Paper	100 Points

3.2. Requirements for Summer Internship Students
The Biology department is aware that some students registering for the BI499 course will have performed on- or off-campus research during the summer. Where these experiences culminated in a poster presentation, that poster may be used in the BI499 session. Students are also free to modify and upgrade their posters if they wish, based on their experiences during BI499 and on the input they received during their summer presentations. If students did not produce a poster during their summer experience they are required to do so during the BI499 period. The written paper, and meeting attendance requirements also apply to Summer Internship Students. This means that even if you produced a research poster as part of your summer experience, you must also produce a research paper and attend the weekly meetings in order to obtain a passing grade in this course.

3.3. Course requirements.

The course is composed of:

1. Weekly discussion meetings with some assignments
2. You should aim to spend at least 10 hours per week on your research project. Be aware that this is a minimum and the nature of biological research means that it is sometimes time-consuming and unpredictable.

The required PRODUCTS of this course are:

1. A **POSTER** documenting your literature research project which you are required to present in our mini-symposium. A single sheet poster will be required. The poster will include title, authors and affiliations, abstract, background, methods, results and data, discussion, literature cited and acknowledgements. Powerpoint templates for poster design are recommended and will be provided on request by Dr Turner. At the mandatory poster presentation session you should be prepared to give a brief oral presentation of your poster and answer questions from faculty and your peers. This will be held on campus in week 12/13 of the semester. The date of this symposium will be announced in class.

2. A **RESEARCH PAPER** formatted in accordance with the guidelines for submission to the Journal of Biological Chemistry (see http://www.jbc.org/misc/ifora.shtml#_Organization_of_the_Manuscript). Required elements of the paper are:

- **Title page**: title of your research project, your name, course and date of submission.
- **Abstract**: standard abstract form that presents your research (including results) in less than 200 words.
- **Introduction**: a review of literature, hypothesis and rationale of your research project. What is known about your area of interest and about your specific question(s)? What is not known? Where does your work fit in and contribute?
- **Methods and Materials:** a detailed description of techniques, instruments, experimental and control groups and flow-charts if needed.
- **Results:** data tables, figures, photographs and brief narrative of each.
- **Discussion and Conclusion:** a careful analysis of results, error analysis and proposals for additional work.
- **Literature Cited:** provides a complete list of work cited. Comply with the style of the Journal of Biological Chemistry.
- *The research must comply with the Chaminade University *Writing Across the Disciplines* standards.
- *The research paper and poster presentation (Power Point) must be submitted on a diskette or CD.

4. Policies.

- Class begins each time exactly at 8AM – please be on time. Chronic tardiness will be viewed as absence from class. If you miss or are tardy for class, please note that we will proceed without you and you will miss material; it is your responsibility to obtain missed lecture topics from your classmates who were in attendance.
- Please show respect to your fellow classmates: turn off cell phones and other electronic devices. Please respect classroom policies regarding food and other potential distractions.
- No make up time will be granted in the event the student fails to present a poster at the end of the semester at the appointed time. In the event of illness, a Doctor's note will be expected and accommodations will be made on a case-by-case basis.
- You are also expected to have read and to abide by the "Student Rules of Conduct" which are available in your copy of Chaminade University's Student Handbook.
- Regarding ADA accommodations for extra time on exams and quizzes; Please be aware that I can only accommodate your requests if you have a documented ADA agreement with Chaminade University on file at the Counseling Center.

- Turn in your assignments as scheduled. The Biology Department's policy of one grade level reduction for lateness within 24 hours of due date and failure after 24 hours will be followed.

. How to keep a laboratory notebook

- Completely number pages before recording data/writing in it.
- Use permanent ink.
- Include a complete Table of Contents at the beginning; all experiments should be dated and page numbers indicated. Include your mathematical calculations.
- Cross out errors—do not erase or use Liquid Paper.
- If data for a given experiment is to be collected periodically, leave sufficient space to enter the data over time. A data table might be appropriate in this case.
- Record data directly and do not tear pages out.
- The notebook is the property of the supervising investigator and should be surrendered to them upon completion of the project.

5. Approximate Timeline.

Week	Topic	What you should be doing during the week	Deadlines
1	Introduction and pre-test Elements of the publication process, different types of publication	Identify a mentor and discuss a proposed project	
2	Navigating literature databases, provision of suggested topics for research projects	Check out suggested database websites and familiarize yourself with them Choose a research topic of interest. Work with your mentor to state a hypothesis for your project. Start research. Download review papers in your field of research, read them.	
3	Discussion of students' selected research topics	Perform research	Provide Dr Turner with a one line title and paragraph of description for your project by 10 am Tuesday..
4	How to read a paper	Download primary papers in your field, read them. Perform research	
5	Judging scientific data	Download primary papers in your field, read them. Perform research.	
6	Discussion of research	Download primary papers in	

	topics	your field, read them. Perform research.	
7	Discussion of research topics	Download primary papers in your field, read them. Perform research.	
8	Discussion of research topics	Download primary papers in your field, read them. Perform research. Draft paper outline.	
9	Discussion of research topics	Perform research. Draft poster outline. Develop paper.	Meet with Dr Turner to review ideas and poster.

10	Discussion of research topics	Perform research. Develop poster. Develop paper.	
11	Discussion of research topics	Finalize research. Finalize poster.	Meet with Dr Turner to work on poster.
12	Discussion of research topics	Get poster printed. Practice poster presentation. Develop paper.	Draft of poster due by 9am Wednesday.
13	Poster presentations this week	Develop paper.	
14	Fun exercise	Finalize paper.	
15	Submit final paper to Dr Turner, wrap –up and evaluation		Submit hard-copy of paper to Dr Turner by 9am Friday. Submit CD of Poster and Paper to Dr Turner by 9am FRIDAY

6. Laboratory Guidelines.

General Guidelines for use of all Division of Natural Science and Mathematics Laboratories at Chaminade University.

1. Come to lab properly dressed. Bare feet, flip-flops, or sandals are NOT ALLOWED. You must wear a lab coat.

2. Do not eat, drink, apply cosmetics or chew gum in the lab. Do not place pencils, pens, labels, fingers (or any other objects) in your mouth. Keep your hands away from your face.

3. Never mouth pipette any liquid in any laboratory.

4. Keep cuts or open wounds covered. Gloves are available.

5. Work on the lab bench, not on your notebook, over the floor, or in your lap.

6. Keep your work area organized, to reduce confusion, chance of error, or chance of spilling. Put away unneeded notebooks, papers, and personal electronics.

7. If you work in a laboratory outside Chaminade you are required to follow all safety, dress and behavior regulations applicable in that institution.

Note: Every effort has been made to insure that the material in this syllabus is accurate and complete. However, occasionally changes must be made in the printed schedule. Thus the instructor reserves the right to make any changes in the contents of this syllabus that she deems necessary or desirable. These changes, if any, will be announced as soon as the need for them becomes apparent.

7. Important Note.

If you intend to undertake a project with Drs Collier, or Stokes you MUST attend a biosafety course held at the University of Hawaii School of Medicine. The courses are offered monthly. COntact the Uh faculty for details.