F 0'01

BI 499 Directed Senior Research (3 credits)
Chaminade University of Honolulu
Fall 2001
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Directed Senior Research is a requirement for the bachelor's degree in biology at Chaminade University and is a culmination of your 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 presenting results to other scientists (including those at granting agencies) either through a publication and/or a public presentation.

This semester you will select your own research project, investigate literature on the topic, write a proposal for an experiment, conduct an investigation of the topic and collect results.

As you select research topics, be advised that the Biology Department has adopted a moratorium on human, bird and mammal studies.

GOALS: The goals of the course are:

1. **to give you experience in organizing and performing biological research;**
2. **to gain experience in the library search of biological literature;**
3. **to give you further insight into problems associated with conducting research in biology;**
4. **to improve you ability to critically analyze data;**
5. **to increase your knowledge of and ability to use biological techniques and** instrumentation;
6. **to provide experience in writing a scientific research paper;**
7. **to gain experience in planning and presenting an oral presentation on original scientific research;**
8. **to increase your knowledge of a biological topic in detail.**

STUDENT **OBJECTIVES:** At the completion of the course, you should be ablc to:

1. **do a literature search of a research topic using primary, secondary and tertiary sources;**
2. **design and conduct a research project pertaining to that topic;**
3. **write a scientific research paper using acceptable style and format;**
4. **present a scientific report, using appropriate visual aids;**
5. **answer questions posed about your research project during and after an oral presentation.**

TEXT: There is no text for this course. Biology 490, Coordinating Seminar, is the prerequisite for this course. Materials presented in Biology 490 will serve as supporting materials for Biology 499.

NOTEBOOK: **You will be required to keep a bound laboratory notebook.**

1. **Pages are to be completely numbered before anything is recorded in it.**
2. **Permanent ink must be used.**
3. **A Table of Contents must be included at the beginning of your notebook and all experiments should be dated and page numbers indicated.**
4. **Any mathematical calculations should be entered in the appropriate places.**

5. **Recording errors should be crossed out and never erased or covered over with something like Liquid Paper.**
6. **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.**
7. **Data should be recorded directly into the bound laboratory notebook and not on loose scraps of paper. Pages should never be torn from the notebook.**
8. **The notebook will be checked periodically and will be submitted with your final research paper.**

RESEARCH PAPER: The research paper will contain the following components:

1. **Title page that includes the title of your research project, your name, course and date of submission.**
2. **Abstract that is in standard abstract form that presents your paper in less than 150-200 words. Always include results in the abstract.**
3. **Introduction including a review of literature, hypothesis and rationale for the research projects.**
4. **Methods and materials including detailed description of techniques, instruments, experimental and control groups and flow-charts if needed.**
5. **Results including data tables, figures and photographs.**
6. **Discussion and conclusion that includes a careful analysis of results, error analysis and proposals for additional work.**
7. **References that provides a reference list of work cited. Comply with the style of a biological journal (such as Genetics kept in HH 17) or AIBS Style Manual (AIBS is the American Institute of Biological Science).**

Additionally,

8. **The research paper must comply with the Chaminade University Writing Across the Disciplines standards.**
9. **The research paper and seminar presentation (presumably in PowerPoint) must be submitted on a diskette or CD.**

SEMINAR PRESENTATION: Your seminar presentation must include a PowerPoint presentation. It should be roughly 25-30 minutes in length, including 5-10 minutes for questions from the audience. You will be required to provide outlines and key references for the audience. A videotape will be taken of your presentation that will be kept on file with your research presentation. Usually an outline of your talk is also generated to be handed out to the attendees of your presentation.

MEETINGS: **There will be group and individual meetings throughout the semester. These meetings are mandatory. Excessive absence of these meetings will result in reduction of your grade.**

Please note that individual meetings are to be formally scheduled and that is the student's responsibility to arrange these meetings.

POLICIES:

1. **Assigments must be turned in as scheduled. Unless otherwise noted, assignments are due no later than 4 P.M. on the day they are due. 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.**
2. **Incompletes are highly discouraged.**
3. **Students will be responsible for maintenance and cleanup of laboratory equipment and supplies. There are multiple users of the laboratory space and equipment in the Biology Department so it is**

important that you clean up and report any malfunctioning equipment as soon as possible as a courtesy to other students.

4. Please read all MSDS sheets that accompany reagents prior to using them. If you have any doubt about mixing or handling certain reagents get some input from one of us.
5. Last day to withdraw from class is NOVEMBER 9, 2001.

GRADE DETERMINATION:

Group and individual meetings	20%
Notebook	15%
Protocol, progress reports, rough drafts, assignments	30%
Research paper	20%
Seminar	15%

DUE DATES: Materials/meetings are due on or before the following dates

Date	Assignment
Aug 29 (W)	Group Meeting
Sep 7	Proposals due
Sep 19	Complete ordering materials
Oct 5	Progress Report #1, individual meeting
Oct 19	Progress Report #2, individual meeting
Nov 2	First draft (Introduction, materials and methods) due

By November 2, each student will be informed whether sufficient progress has been made. Those that are not making sufficient progress will be asked to withdraw from the course.

Nov 9	Last day to withdraw from course
Nov 26	Complete experiments/second draft of introduction, materials and methods due/first draft of results and discussion
Dec 3- Dec 7	Presentations (to be scheduled at 12:00 and 12:30 on M W F)
Dec 7	Research paper due by 4 PM