

**CEDAR CREST COLLEGE**  
**INDEPENDENT RESEARCH (BIO 243/353)**  
**FALL 2009**

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**Office Hours:** Monday 10-12, Wednesday 10-12, and by appointment

**Course Information**

**Prerequisites for BIO 243:** Permission of the faculty supervising the research, sophomore standing, and successful completion of Principles of Biology I (BIO 121) and Principles of Biology II (BIO 122)

**Prerequisites for BIO 353:** Permission of the faculty supervising the research, junior standing, and successful completion of Principles of Biology I (BIO 121), Principles of Biology II (BIO 122), and Junior Colloquium (BIO 350)

**Required Texts:** None

**Description:** Participation in a faculty research program that may contribute to fulfillment of the major research requirement. May be repeated.

**Goals:** The goal of the course is to prepare you for either graduate studies in molecular biology or a technician position in a research lab as you learn to work independently to develop a research project, conduct research, trouble-shoot problems, and draw conclusions.

**Objectives:** At the completion of this course, students will be able to:

- 1) Understand basic laboratory techniques in molecular biology.
- 2) Apply basic molecular biology concepts to original research problems.
- 3) Design basic experiments to answer questions in molecular biology, understand many molecular laboratory techniques used in biotechnology, and analyze data obtained from basic molecular experiments.
- 4) Present current research, including background and experimental information, in both oral and written communications.

**Outcomes and Assessment:**

- 1) Students will demonstrate critical thinking in the design and analysis of molecular experiments. This ability will be assessed through the evaluation of progress reports, lab presentations, and lab notebooks.
- 2) Students will demonstrate the ability to understand new concepts in molecular biology and be capable of explaining these concepts to others. Students will be assessed through two presentations in which they will be asked to 1) select a current research paper that they will read, understand, criticize, and present to labmates and 2) describe, in detail, their research project and the progress they have made.

- 3) Students will be capable of following basic molecular biology protocols and drawing conclusions from these experiments. Students will be introduced to many basic techniques and they will be expected to use these techniques in their research project. Students will be assessed through their participation in lab meeting discussions and the evaluation of their progress reports, lab presentations, and lab notebooks.

### **Requirements:**

- Research update at all lab meetings (2 minute data blitz)
- Submit a progress report at all individual meetings
- One paper presentation at assigned lab meeting
- Active participation in all lab meetings (Q&A for other students)
- Annotated bibliography, 1 reference per week (15 total)
  - Citation
  - A few sentences regarding methods
  - A few sentences regarding the conclusions
  - A few sentences regarding the paper's relevance to your project
- Minimum of six hours lab time per week
- Maintain and upkeep a detailed lab notebook
- Maintain an orderly workspace and clean-up at the end of the semester
- Complete your weekly assigned lab job

### **Grading**

#### **Attendance:**

Each student is required to be in attendance, both physically and mentally, at all lab meetings. She is required to read papers prior to the lab meeting and is expected to ask questions of the presenter, either to clarify points made during the presentations or to put the presentation in a broader context. Following the presentation, if there is any time remaining, the presenter may ask questions of the student audience. Each student will be expected to respond appropriately, demonstrating her ability to assimilate information. Failure to participate in these questions and answer sessions will result in the reduction of up to 10% of your total grade.

#### **Lab Notebook:**

Each student is required to keep her own lab notebook, with a separate entry for each day of lab work. Each entry should be written in pen, dated, and include 1) the purpose of the day's experiment, 2) a detailed protocol or reference to a reliable source, 3) details of the procedure that might vary (i.e. concentration of DNA, amount used, etc.), 4) notes regarding the storage of materials (RT, 4°C, -20°C, or -70°C) and labeling used (i.e. APOpBR3 = third miniprep of apoLp gene on pBR13 plasmid), 5) end point for the day's experiments, and 6) plan for next lab day. The lab notebook will be collected at the end of the semester to account for 10% of your research grade, but may be collected an earlier time point if clarification is needed regarding your progress reports.

#### **Progress Reports:**

Each student will be responsible for submitting weekly, one-page progress reports that 1) summarize accomplishments made over the past week, 2) explain any problems encountered with your project, 3) strategies used for trouble-shooting these problems, and 4) plans for the next two weeks. These reports are designed to supplement your lab notebooks, and should include page references so that data might be easily located in your notebook, should this be necessary. See the

form enclosed in this packet for format. In addition to submitting this report, each student will also meet with the instructor three times during the semester to discuss her progress. The meetings and reports will account for 5% of your grade.

**End Summary:**

At the conclusion of the semester, you will need to write a brief end summary that describes your accomplishments during this semester. If you have been diligent in writing your progress reports, this should be a simple task. This report will account for 10% of your grade.

**Presentations:**

Each student will be required to make two formal presentations during a lab meeting. The presentation should be a fifteen minute research presentation. This talk should include 1) background information of the project, 2) detailed description of the experiments conducted, 3) results for experiments, and 4) future directions of the project. After the talk, the presenter will take questions from the audience. If time remains, the presenter may ask questions of the student audience to assess the level of attentiveness of the other students☺. This presentation will account for 20% of the final grade.

**Other Items:**

Some students will have additional responsibilities this semester. For example, those students who plan to go to PAS or ESA will need to prepare their posters and all seniors who wish to graduate this semester will need to write a senior thesis. A timeline has been prepared, and it is expected that appropriate students submit necessary documents as requested. Tardy materials will result in a reduction of up to 15% of your final grade.

**Lab Cleaning:**

Each semester, I am amazed by the amounts of materials (solutions, microfuge tubes, plates, cultures, etc.) that are left behind by students. Any supplies that you plan to use next semester should be labeled as such. Any materials that have not been designated as “items to keep” that remain after the deadline indicated in the enclosed schedule will be discarded. If I have to clean up after you, you can expect to see a reduction of up to 10% of your final grade.

**Grade Tally:**

Attendance:	10%
Lab Notebook	10%
Progress Reports	25%
End Summary	10%
Presentation (s)	20%
Other Items	15%
Lab Cleaning	10%

**Grading Scale:**

90.0 – 100	A	Excellent: Performance <i>exceeds</i> expectations
80.0 – 89.9	B	Very Good: Performance meets <i>all</i> expectations
70.0 – 79.9	C	Fair: Performance meets <i>most</i> expectations
60.0 – 69.9	D	Unsatisfactory: Performance meets <i>some</i> expectations
less than 59.9	F	Performance fails to meet most expectations

# **PROGRESS REPORT**

**NAME:**

**DATE:**

**ITEMS ACCOMPLISHED SINCE PREVIOUS REPORT**  
(Reference lab notebook pages where necessary)

**PROBLEMS ENCOUNTERED AND METHODS USED TO TROUBLE-SHOOT**  
(Reference lab notebook pages where necessary)

**GOALS FOR NEXT REVIEW PERIOD**

**RESEARCH SELF-EVALUATION**  
**BIO 243/353**  
**FALL 2008**

**Name:**

**Based on the following scale, grade yourself on each item.**

- A Excellent: Performance *exceeds all* expectations
- B Very Good: Performance meets *all* expectations
- C Fair: Performance meets *most* expectations
- D Unsatisfactory: Performance meets *some* expectations
- F Performance fails to meet most expectations

**Attendance**


- Present at all lab meetings
- Paid attention to my colleagues' presentations
- Asked questions following research presentations
- Contributed to discussions following my colleagues' presentations
- Routinely spent >6 hours in the lab doing quality research
- Routinely spent time doing library research for my project

**Lab Notebook**


- Entries written in pen as I did the research
- All entries are dated
- All entries include a purpose
- All entries reference protocols
- All protocols contain detailed info about DNA conc., amount used, etc
- I included notes regarding storage of materials and tube labels
- All of my entries include an end point for the day's experiments

**Progress Reports**


- I submitted all required progress reports in a timely fashion
- Quality of my progress reports

**End Summary**


- Quality of my end summary
- Did I accomplish all of my goals for the semester?
- Do I know what my goals are for next semester?

### **Presentations**


Dedicated quality time to the preparation of my presentations

Quality of my presentations

Comprehension of my colleagues to my presentations

### **Other Items**


Submitted all required materials (intro, bibliography, etc.) in a timely fashion

Quality of submitted items

### **Lab Cleaning**

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Did I clean up after myself and leave my materials neatly in their places?

### **Grade**

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Based on the above information and the grading scale provided below, what grade do I feel I have earned for research credit this semester?

### **Comments and/or Justifications (REQUIRED):**

#### **I have done all of the following:**

- Given a research update at all lab meetings (2 minute data blitz)
- Submitted a progress report
- Given two paper presentations at assigned lab meetings
- Actively participated in all lab meetings (Q&A for other students)
- Completed an annotated bibliography with 1 reference per week (15 total), including:
  - A citation
  - A few sentences regarding methods
  - A few sentences regarding the conclusions
  - A few sentences regarding the paper's relevance to your project
- Spent a minimum of six productive hours in lab each week
- Maintained a detailed lab notebook
- Maintained an orderly workspace
- Cleaned up all messes at the end of the semester
- Fulfilled my weekly job responsibilities

**Karnas Research  
Fall 2009  
Tentative Lab Schedule**

<b>Date</b>	<b>Data Blitz</b>	<b>Activity</b>	<b>Due</b>
Aug 25		Individual Meetings	
Sept 1	All	Group Meeting: Karnas presents a paper	
Sept 15	All	Group Meeting: Kim presents her research	<b>Juniors:</b> one page summary of research project
Sept 22	All	Group Meeting: Nyssa presents her research	<b>Juniors:</b> Annotated bibliography with >10 papers and outline of proposal introduction
Sept 29	All	Group Meeting: Rachel presents her research	<b>Juniors:</b> Introduction for proposal with >10 papers cited and outline of methods section
Oct 6	All	Group Meeting: Kim presents a research paper	<b>Nyssa:</b> Methods due Friday
Oct 13	All	Group Meeting: Nyssa presents a research paper	<b>Nyssa:</b> Intro and Lit Cited due Friday
Oct 20	All	Group Meeting: Rachel presents a research paper	<b>Juniors:</b> Entire proposal
Oct 27	All	Group Meeting: Emily presents a research paper	<b>Nyssa:</b> Abstract and Results due Friday
Nov 3	All	Group Meeting: Aarti presents a research paper	<b>Rachel:</b> Annotated bibliography with >20 papers and outline of thesis introduction
Nov 10	All	Group Meeting: Emily presents her research	<b>Nyssa:</b> Discussion and Lit Cited due Friday
Nov 17	All	Group Meeting: Aarti presents her research	<b>Rachel:</b> Introduction for thesis with >20 papers cited and outline of methods section
Nov 24	All	No Meetings...Give Thanks	<b>Nyssa:</b> Thesis draft due next Monday
Dec 1	All	Group Meeting: Nyssa presents ESA poster and BIO 354 talk	<b>Nyssa:</b> BIO 354 talk draft due Friday
TBD			<b>All:</b> Attend Nyssa's talk
End			<b>Sophomores, Juniors, and Seniors:</b> Summary of semester's accomplishments and goals for next semester