

Fernandes/James

Instructors:

Paul F James, *Zoology*; jamespf@muohio.edu
Joyce J Fernandes, *Zoology*; joyce.fernandes@muohio.edu

TA:

Jayanthi Sanjeevi, *Zoology*; sanjeej@muohio.edu

A. COURSE OBJECTIVES

1. To provide an introduction to research in the general areas of cell, molecular and structural biology (CMSB).
2. To gain an appreciation for the overall research theme of “**Signaling mechanisms and cellular responses**”. (How cells respond to their environment by regulation of gene expression, cellular physiology, cell and tissue morphogenesis, as well as behavior).
3. To understand the significance and relevance of research being conducted in individual research labs.
4. To enhance familiarity with routinely used tools and techniques.

B. FORMAT OF THE COURSE Weekly Seminar

Weekly Seminar

Organization: The seminar will be organized into two week modules. Faculty from the participating departments will be responsible for conducting a module. The major components of the seminar include:

- a. Discussion of research topics and their *relevance*.
- b. Gaining an understanding of *the culture and practice of research* (e.g tools and techniques, communicating the science, etc)
- c. Awareness of *career options* stemming from CMSB research
- d. *Writing:* Keep a weekly journal for each topic. 2 Short assignments based on research topics.

Seminar Meeting Time: Mondays, 4-4.50pm

Location: 153, EGB

Readings relevant to each week’s topic will be posted on Blackboard, and will serve as a springboard for discussions.

C. EVALUATION: Students will be evaluated based on

- a. Weekly journal entries (50%)
- b. 2 short assignments based on seminar topics (40%)
- c. In-class discussions (10%)

D. TENTATIVE SYLLABUS

First Semester	
Week 1	Research lab #1 Dr. Luis Actis , Microbiology
Week 2, 3	Research lab #2 Dr Andor Kiss
Week 4, 5	Dr Carolyn Haynes , Honors Program Developing a research mindset
Week 6, 7	Searching Library databases, Dr Kevin Messner , Science Librarian NOTE: Meet at the front desk at Brill
Week 8, 9	Scientific Writing: exploring the popular style Dr Paul Anderson , Center for Writing Excellence
Week 10, 11	Research lab #3 Dr Eileen Bridge , Microbiology
Week 12, 13	Research lab #4 Dr Michael Kennedy , Biochemistry

Fernandes/James

--	--

Second Semester 2009 (TENTATIVE)	
Week 1 - 1/12/09	Introduction to course Start first lab rotation (for 2 credit hr students)
Week 2 - 1/19/09	No Classes - MLK Day
Week 3 - 1/26/09	Research lab #1 <i>Jeff Potteiger, Kinesthiology</i>
Week 4 - 2/2/09	Research lab #2 <i>Rachael Morgan-Kiss, Microbiology</i>
Week 5 - 2/9/09	Writing Instruction Paul Anderson, Center for Writing Excellence
Week 6 - 2/16/09	Library Instruction Searching Library databases, <i>Dr. Kevin Messner</i> , Science Librarian NOTE: Meet at 212 Brill
Weeks 7 - 2/23/09	Library Instruction Searching Library databases, <i>Ms. Meghan Gamsby</i> , Science Librarian NOTE: Meet at 212 Brill
Week 8 - 3/2/09	Research Facilities <i>Dr. Richard Edelman, Imaging and Microscopy Facility</i> Start second lab rotation (for 2 credit hr students)
Week 9 - 3/9/09	No Classes - Spring Break
Week 10 - 3/16/09	Research lab #3 <i>Lori Isaacson, Zoology</i>
Week 11 - 3/23/09	Research based careers - <i>TBA</i>
Week 12 - 3/30/09	Poster Session
Week 13 - 4/6/09	Research lab # 4 <i>Susan Hoffman, Zoology</i>
Week 14 - 4/13/09	Research lab # 5 <i>Quinn Li, Botany</i>
Week 15 - 4/20/09	Student led Discussion of Popular science articles
Week 16 - 4/27/09	Student led Discussion of Popular science articles

Writing Assignments

1. Weekly journal (Informal Writing).....100 pts

Keep a weekly journal for each topic. Write-ups will be due each Monday

A. Faculty Research presentations

- Before coming to class, read through the website of the presenter. Make a note of at least 5 points that were relevant/interesting for you and articulate why.
- After class, spend some time articulating 5 additional points that were relevant for you. *NOTE: In your writing, be sure to convey what you have learned about the broader significance of the research topic. How does it relate to what you may have learned in high school/heard on the news/learned in BMZ or CHM?*
- During the second week of each faculty presentation, a popular science article relating to the topic will be discussed. Read this article and write down 5 points of interest to you. *If the faculty presentation is just one week, only parts a. and b. are required.*

B. In addition to faculty presenters, there will be additional presentations: Developing a Research mindset), Searching Library Databases, Writing Instruction, Research Careers. For each week, write down 5 points that communicate what you found interesting or relevant about each week's presentation

2. Two short essays.....100 pts

(No more than 3 pages, no less than 11-point font, double spaced, 1inch margins)

Identify 2 research labs that you want to choose for the essays. These labs may be from a department in Botany, Chemistry (biochemistry labs), Microbiology or Zoology. Peruse the websites of these departments, choose a research lab that you find interesting and make an appointment to talk with the faculty member or students in the lab.

Some tips for your investigations about the lab's research, which are to be used as starting material. You will work in groups of two to conduct the "investigation"; however, individual reports are expected. *These reports will be used to develop an informational booklet for first year students like yourself.*

General:

1. What are the major goals of the lab? How does the research contribute to progress in the specific scientific field?
2. What is cool (or hot) and exciting about the lab's research? What are the broader impacts (big picture) of the research?
3. How is the research in the lab funded? (National Institutes of Health, American Heart Association, etc). How does the lab's research meet the overall goals of the funding agency?

More specific:

4. How can you connect basic concepts learned in your courses (BMZ/CHM) with the research topic being investigated?
5. Examine a poster presentation from the lab- these are usually posted outside the research lab, and represent work done by current or previous lab members. Write down a few things you learned from this experience.
6. Identify one technique that the lab uses? Why is this technique useful? What is the principle behind this technique?

3. Library Instruction

Assignments after library instruction #1

- A) Find two research articles relating to a faculty member's research area from any of the following 4 departments. Botany, Chemistry/Biochemistry, Zoology, Microbiology
 - B) Peruse the online journals of the discipline of the faculty member you are interested in and identify two research articles relating to the research area.
 - C) Find one popular science article relating to the topic.
 - D) Cite the five articles you have found.
1. Science news www.sciencenews.com <<http://www.sciencenews.com/>>
 2. Scientific American www.sciam.com <<http://www.sciam.com/>>
 3. American Scientist www.amsci.org <<http://www.amsci.org/>>
 4. Discover magazine (<http://discovermagazine.com>)
 5. Additionally use the library databases

4. Peer Review

Evaluate the essay you have received- Examine how well each of the 6 questions has been addressed. Write a line or two about each.

Write a paragraph about what you learned about from the essay (no more than 10 sentences).

5. Additional (Research) option for Spring 103

You will have the opportunity to rotate through 2 labs for 8 weeks each (1 credit hr)

Laboratory Rotations will be an important aspect of your introduction to research. For each lab that you rotate through, you will do the following:

- (1) Keep a lab journal (different from lab notebook) and make weekly entries that include
 - a. What did I accomplish this week
 - b. What is my plan for next week
 - c. What did I learn this week
 - d. Literature searches conducted in your research area
 - e. Summary of any readings (*at least once every two weeks*)
- (2) Write a short report discussing
 - a. the goals of the lab,
 - b. Description of one routinely used technique
 - c. It is expected that you will have participated in an ongoing experiment. Use this experience to report on the following: purpose of the experiment, how it was conducted, results obtained and outcomes of the study.

Assignment
Chapter for Booklet on Research Labs in the URM Program

Learning Outcomes

The goals of this assignment are to enable you to do the following:

1. Use a variety of research methods to gather information about a research lab.
2. Explain accurately the lab's area of study and the significance of this study to science and the general public.
3. Write your explanation in a way that a specific audience will find to be intriguing and understandable.

Assignment

Your assignment is to write a chapter for a booklet that will be given to high school students whom Miami would like to attract to the URM program. The purpose of your chapter is to describe one lab's work in a way that will appeal to these high school students. The students have an interest in science and would be attracted by an opportunity to conduct research in one of the labs that is part of the URM project.

For this assignment, you will write about a lab led by a professor who has not visited our class.

Your chapter is to be between 750 and 1,000 words.

Process

1. Contribute to the class discussion about the contents and structure of the chapters.
2. From the list on pg 3, choose two or more labs you'd like to write about. You may choose other labs, provided their research deals with Cellular, Molecular and Structural Biology, and has relevance for Cellular Signaling. *Send your choices to Jayanthi Sanjeevi (sanjeej@muohio.edu). She will confirm your final choice.*
3. Collaborating with your partner, learn about the lab through the following activities:
 - a. Interview the faculty member or graduate students in the lab
 - b. Find two research articles relating to the lab's research area. Use PUBMED
 - c. Find one review article using the library databases.
 - d. Find one popular science article relating to the topic. Possible sources include:
 - i. Science news www.sciencenews.com <<http://www.sciencenews.com/>>
 - ii. Scientific American www.sciam.com <<http://www.sciam.com/>>
 - iii. American Scientist www.amsci.org <<http://www.amsci.org/>>
 - iv. Discover magazine (<http://discovermagazine.com>)
4. The assignment should have the following sections:
 - a. General Overview of the lab's research. This will include
 - i. Brief description of the lab's research topic (the biology of..)
 - ii. Significance of the lab's research
 - iii. Goals of the lab
 - b. Recent findings in the lab
 - c. Equipment and techniques
 - d. Current projects available for undergraduates
 - e. Expectations for undergraduate involvement in research
 - f. Literature review (based on a-d and anything else that the lab can provide you)

Questions identified in class are listed on the next page. Insert them into appropriate sections. Create a new section for any questions that are not represented in the above sections.

Fernandes/James

5. Turn in the following individually written assignments on the designated days. This schedule will help you make steady progress on your chapter.
 - Identify your faculty research lab and complete the literature search.
 - First draft of your interview report
 - 2nd draft of your interview report
 - Exchange drafts for peer review. Peer reviews must be typed up, and must include the name of the student who has written the assignment. Evaluate using the criteria listed below.
 - Submit final versions along with peer review

Criteria for Evaluation

Accuracy

Understandability for target readers

Interest level for target readers (have all the sections been addressed adequately?)

Editing

Examples of QUESTIONS that you might consider addressing

Relevance of the work to your current status of knowledge

1. How does the research relate to me and the world?
2. How does the research relate to science and technology as I currently know it?

What is in it for me?

3. What exactly do I have to do on a day-to-day basis?
4. What is the time commitment?
5. How do undergraduates participate in the lab's research?
6. How will this experience be relevant to my resume/future career?
7. What knowledge will I gain?
8. What will I get by working in the lab?
9. Do I work for pay or credit?
10. How much responsibility/control will I have in the lab?
11. How do I go about finding a lab to work in?
12. How do I know which lab is right for me?
13. How do I qualify for working in a lab?

Project specific questions

14. What does the lab hope to achieve?
15. What is the tissue/animal of choice for the lab's research?
16. What techniques will I learn?