

## Intro to Biological Research

WC 130, 1:00 – 3:30 pm

Faculty office hours:

Matthew DeGennaro: AHC1-319A Tues 3-6pm and by appointment

Phillip Stoddard: AHC1-219C, Thurs 2-4pm and by appointment

**Objective:** This introductory course for graduate students is designed to give an understanding of the fundamentals of biological research. You will learn how to interpret, present, and discuss data from the primary literature. Close attention will be paid to science as a visual language use to communicate information in a clear, engaging, and objective fashion. You will also learn how to construct a logical set of experiments to address a biological question.

### **Course Requirements:**

#### Departmental seminar attendance

- Mondays at 3pm in WC130
- Be prepared to discuss the seminar in depth when you come to class

#### Weekly journal club

- Read the paper and be prepared to discuss figure details with group
- Students will be chosen at random to present a figure from the paper
- Please print the paper(s) or have an electronic version to view during class

#### 10 Best Journals Assignment

Every scientific journal is happy to email you the table of contents (TOC) and links to abstracts every time a new issue comes out. Subscribing to these TOC email services, and reading them when they arrive, is a great way to keep up with new developments in your field.

- In consultation with your advisor, select the 10 journals that are most important in your field.
- The first three are probably Science, Nature, and PNAS.
- Ask your advisor to review the other 7 with you.
- Look these up online, and subscribe to their TOC email services.
- Copy the URL for the TOC sign-up page, and add it to your list below the journal name.
- Submit your list with the URLs to us for credit.

#### Fictitious abstract project summary

- In your assigned groups, you will construct a series of experiments to prove what the abstract proposes
- Each member of the group will produce at least one figure with a figure legend and a referenced section of the methods that describes the techniques used in the figure
- Figures should have more than one panel

- Groups will present their figures as a cohesive narrative in a PowerPoint presentation in the final two course meetings

### Midterm exam

The exam will consist 10 written questions about a published paper that you get to read in advance. The questions will focus on the paper's experimental design, hypotheses, and interpretation of results including the meaning of the statistics.

## **Course Schedule:**

### **Week 1 - Aug 23<sup>st</sup>**

#### **Part 1**

- Introduction to your colleagues
- Discussion of course objectives, goals, and requirements
- Discussion of abstracts for class project

#### **Part 2**

- Organization of groups for class project
- PowerPoint fundamentals

### **Week 2 - August 30<sup>th</sup>**

#### **Part 1**

Discussion of this week's seminar

#### *Journal Club*

Stephens, P. A. *et al.* Consistent response of bird populations to climate change on two continents. *Science* **352**, 84–87 (2016).

Yeaman, S. *et al.* Convergent local adaptation to climate in distantly related conifers. *Science* **353**, 1431–1433 (2016).

#### **Part 2**

- Designing Studies 1: The nature of evidence & differences between disciplines.

### **Week 3 - September 20<sup>th</sup>**

#### **Part 1**

#### *Journal Club*

Knop, E. *et al.* Artificial light at night as a new threat to pollination. *Nature* **548**, 206–209 (2017).

#### **Part 2**

Designing Studies 2: hypotheses, predictions, procedure diagrams, alternate outcomes, "experimental controls" vs. "controlled experiments", statistics

### **Week 4 - September 27<sup>th</sup>**

#### **Part 1**

Discussion of this week's seminar

#### *Journal Club*

Prüfer, K. *et al.* The complete genome sequence of a Neanderthal from the Altai Mountains. *Nature* **505**, 43–49 (2014).

## **Part 2**

- Review of great figures
- Figure design: Inkscape and Illustrator
- Literature searches with Web of Knowledge
- Replicates vs Pseudoreplicates

Small groups: Discuss Hurlbert (1984) to understand different types of pseudoreplication.  
Pseudoreplication Challenge

## **Week 5 - October 4<sup>th</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Shipman, S. L., Nivala, J., Macklis, J. D. & Church, G. M. CRISPR-Cas encoding of a digital movie into the genomes of a population of living bacteria. *Nature* **547**, 345–349 (2017).

Modell, J. W., Jiang, W. & Marraffini, L. A. CRISPR-Cas systems exploit viral DNA injection to establish and maintain adaptive immunity. *Nature* **544**, 101–104 (2017).

### **Part 2**

Chalk talks: Groups 1 & 2

## **Week 6 - October 11<sup>th</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Viswanathan, V. S. *et al.* Dependency of a therapy-resistant state of cancer cells on a lipid peroxidase pathway. *Nature* **547**, 453–457 (2017).

### **Part 2**

Chalk talks: Groups 3 & 4

## **Week 7 - October 18<sup>th</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Dias, B. G. & Ressler, K. J. Parental olfactory experience influences behavior and neural structure in subsequent generations. *Nature Neuroscience* **17**, 89–96 (2013).

### **Part 2**

Chalk talks: Groups 5 & 6

## **Week 8 - October 25<sup>th</sup> (Phil away)**

**Midterm Exam**

## **Week 9 – November 1<sup>st</sup> (Matt away)**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Albright, R. *et al.* Reversal of ocean acidification enhances net coral reef calcification. *Nature* **531**, 362–365 (2016).

### **Part 2**

Ethical issues for grad students: IACUC, IRB, honesty, authorship, fraud, romance, etc.

## **Week 10 - November 15<sup>th</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Yan, H. *et al.* An engineered orco mutation produces aberrant social behavior and defective neural development in ants. *Cell* **170**, 736–742.e9 (2017).

### **Part 2**

Figure critiques & Presentation Practice: Groups 1 & 2

## **Week 11 - November 22<sup>nd</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Oren-Suissa, M., Bayer, E. A. & Hobert, O. Sex-specific pruning of neuronal synapses in *Caenorhabditis elegans*. *Nature* **533**, 206–211 (2016)

### **Part 2**

Figure critiques & Presentation Practice: Groups 3 & 4

## **Week 12 - November 29<sup>th</sup>**

### **Part 1**

Discussion of this week's seminar

*Journal Club*

Funato, H. *et al.* Forward-genetics analysis of sleep in randomly mutagenized mice. *Nature* **539**, 378–383 (2016).

### **Part 2**

Figure critiques & Presentation Practice: Groups 5 & 6

## **Week 13 - December 6<sup>th</sup>**

**Group Presentations Part 1**

## **Week 14 - December 13<sup>th</sup>**

**Group Presentations Part 2 (During our scheduled Final exam time)**

## Grading scheme

Dept seminar & class attendance (-2 for each missed without prior approval)	10
10 Journal List	5
Literature search & formatted bibliography for methods section of abstract project	5
Midterm	15
Class paper discussion	10
Figures from abstract project	30
Presentation of abstract project	25

**Grading Scale:** A 100-93, A- 92-90, B+ 89-87, B 86-83, B- 82-80, C+ 79-77, C 76-73, (grades below C do not count for graduate credit).

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Full handbook and information can be found at:

<http://www.fiu.edu/~oabp/misconductweb/1acmisconductproc.htm>

**DEFINITION OF ACADEMIC MISCONDUCT:** Academic Misconduct is defined as the following intentional acts or omissions committed by any FIU student:

- 1.01 Cheating: The unauthorized use of books, notes, aids, electronic sources; or assistance from another person with respect to examinations, course assignments, field service reports, class recitations; or the unauthorized possession of examination papers or course materials, whether originally authorized or not. Any student helping another cheat may be found guilty of academic misconduct.
- 1.02 Plagiarism: The deliberate use and appropriation of another's work without any indication of the source and the representation of such work as the student's own. Any student who fails to give credit for ideas, expressions or materials taken from another source, including internet sources, is guilty of plagiarism. Any student helping another to plagiarize may be found guilty of academic misconduct.
- 1.08 Academic Dishonesty: In general, by any act or omission not specifically mentioned above and which is outside the customary scope of preparing and completing academic assignments and/or contrary to the above stated policies concerning academic integrity.

If found cheating, YOU WILL RECEIVE AN "F" FOR THE CLASS, NO EXCEPTIONS.