BIO 311 Interdisciplinary Research Skills I

Meeting Times and Room: Fridays, 9-11:40, BBH 323

Participating Faculty:

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Course Description: This course provides an introduction to a set of topics that are at the forefront of research in the sciences. The course is structured around a series of modules, each covering a topic that is among the most significant in the fields of Biology, Mathematics and Psychology (see course schedule below). The modules, while complete in themselves, will also draw connections between scientific disciplines, and explore the inter-relationships between them.

Prerequisites: Junior standing and declared major in Biology, Chemistry, Computer Science Mathematics, Physics, or Psychology.

Research project: It is expected that all students are actively involved in a research project under the supervision of a faculty member in one of departments listed above. You will periodically be asked to discuss your progress on your project in class. All students will be required to give a formal presentation of their research project methodology and, if appropriate, their results.

Texts/Readings:


For all the modules, instructors will make available, through Desire to Learn (D2L), the reading materials or in other cases, provide references to the reading materials, for this course. Some of the materials are available in the library. It is the student’s responsibility to download/copy/photocopy the required materials in advance and to bring all relevant material to class.

Assessment: Coursework, assignments and exams will assess scientific thinking, i.e. assimilation of scientific concepts and the application of these concepts to scientific phenomena.
Assignments will assess scientific literacy and research proficiency as well as reading and writing skills.

**Course Work:** Regular attendance of lectures is strongly recommended. Students are strongly encouraged to read ahead. Reading exercises identifying the material to be covered in the next class will be assigned. Active participation in classroom discussions, learning exercises and oral quizzes is essential for a good grade in this course.

**Assignments:** Course assignments targeted at developing and testing problem-solving skills, reading and writing skills will be assigned on a regular basis. Assignments will include assimilating materials taken from texts, online sources, and scholarly articles from scientific journals and contributing to class discussions. Students will be required to complete four scientific articles/exercises on topics assigned within the modules.

**Exams:** Each module will conclude with an end-of-module test. There are 4 tests, each worth 10% of the final grade.

**Summary of Grading Percentages:**

- 10 % - Attendance and participation
- 40 % - Four written assignments
- 40 % - Tests/Quizzes
- 10% - Presentation of research project

**Course Outline/Schedule:** *this schedule is subject to change as the semester progresses*

**Week 1**

**INTRODUCTION** (All faculty): Introduction to the natural sciences, interrelationships between scientific fields, the scientific method, mathematical background.

**Week 2-3**

**MODULE I: RESPONSIBLE CONDUCT OF RESEARCH** (Dr. Linda Rueckert, Psychology, and guest speaker Dr. Saba Ayman-Nolley, Chair of NEIU IRB)

Ethical issues in biomedical research, ethical treatment of animal and human subjects, mock IRB review.

*All students are required to take and pass the assigned sections of the CITI online training and to read the assigned book by Rebecca Skloot.*

**Week 4-6**

**MODULE II: MACROMOLECULAR STRUCTURE AND FUNCTION** (Dr. Emina A. Stojković, Biology)

Structural biology of proteins and nucleic acids in macromolecular assemblies, involving a broad range of biochemical and biophysical approaches to elucidate molecular interactions. Computer model simulations of atomic-level interactions with emphasis on biological
function. Discussion of recent literature addressing macromolecular structure and function.

*Model building, Nucleic acids and Proteins, discussion, scientific paper, test.*

**Week 7-9**  
**MODULE III: GALVANIC SKIN RESPONSE TO EMOTIONAL STIMULI** (Dr. Linda Rueckert, Psychology).

Background on the physiological basis of GSR, and what it can tell us about thoughts and emotion. Students will learn to use Biopac hardware to replicate a study of the effect of exposure to emotional photographs on the GSR of human subjects. Students will also learn to analyze the data using Acqknowledge software.

*Summary, discussion, scientific paper, test*

**Weeks 10-12**  
**MODULE IV: INTRODUCTION TO QUANTITATIVE MODELING OF EPEDIMILOGICAL PROCESSES** (Dr. Joseph Hibdon, Mathematics)

Models describe our beliefs about how the world functions and help us identify driving mechanisms of relevant features of real complex systems. In mathematical modelling, we translate those beliefs and mechanisms into simple mathematical structure and interpret it using mathematical, and statistical computations. In this module, students will study epidemiological concepts and terminology and learn modeling techniques (Hethcote, 2000) with the help of simulations in the programming language R. The goal of the module will also be to connect other modules of the course through research papers readings of different modeling applications.

*Summary, discussion, scientific paper, test.*

**Weeks 13-14**  
**Student presentations of research projects.**

**Week 15**  
**Review and discussion; Wrap-up and Summary.**

**Electronic Communication:** As much as possible, we will use D2L and email to give you details of the course. These may include assignments, readings, etc. You must check your NEIU email and D2L site every day.

**Link to Emergency Management:** It is recognized that a safe university environment is a shared responsibility of faculty, staff, and students, all of whom are expected to familiarize themselves with and cooperate with emergency procedures. Web links to Campus Safety: Emergency Procedures and Safety Information can be found on NEIUport on the MyNEIU tab.
(right side of page, under Campus Safety) or at:
http://www.neiu.edu/~neiutemp/Emergency_Procedures/MainCampus/ and
http://www.neiu.edu/~police/emergency_management.html

**Accessibility:** If you have a physical, psychological, medical or learning disability that may
impact on your ability to carry out assigned course work, I would urge that you contact the staff
in the Accessibility Center Office, Building D, room 104, phone extensions: 5495, 5496, 5497,
and 5498. The Accessibility Center will review your concerns and determine with you what
accommodations are necessary and appropriate. All information and documentation of disability
are confidential.

**CONDUCT IN THE CLASSROOM**

Students are strongly encouraged to help create an environment during class that promotes
learning and preserves mutual respect for everyone. The classroom setting offers a unique
opportunity to meet and interact with a diverse population of students and faculty as well as a
forum for new learning and a secure place to challenge existing ideas and values.

In order for all of us to benefit from this experience, certain types of conduct must be adhered to:

1. **Students are expected to attend all class sessions.** Excessive absences and/or lateness may
result in a lowering of a student’s grade or an invitation to drop the course.

2. Students (and faculty) are expected to be **on time** for class and to **remain** until the class ends.

3. Cell phones are disruptive to the learning process. **All cell phones are to be turned off
during class.**

4. Students are responsible for **all assignments** and **material covered in class**, whether or not
they attend and regardless of the reasons for any absence.

5. Each student is expected to come to class prepared and to contribute to class discussions.

6. All students are expected to conduct themselves in accord with university policies with respect
to academic honesty as stated in the student handbook. **Anyone engaging in plagiarism,
cheating, or any other form of academic dishonesty will receive a failing grade.**
Furthermore, the incident will be reported to the Office of Student Affairs for further
action.

7. Polite, respectful classroom behavior is expected even when engaging in discussions of
controversial material.

Incomplete grades will only be given in accordance with University Policies as published in the
course catalog.