

Syllabus

**Integration of Computational and Experimental Biology
BIEN 249, cross-listed with CEE 249
Part of online MS (MSOL) in Bioengineering
Graduate Bioengineering Core Course
Winter 2017**

Lectures: Tuesdays & Thursdays 3:40 – 5:00 PM @ MSE 11

Computer Labs and Term project: extra readings and computer labs leading to term paper.

Midterm Exam 1: Tuesday, 1/31/2017

Midterm exam 2: Tuesday, 2/21/2017

Final exam: Friday, 3/24/2017 at 11:30 AM – 2:30 PM 2:30 PM

Description: BIEN 249 Integration of Computational and Experimental Biology, 4 units, Lecture, 3 hours; laboratory, 3 hours. Prerequisite(s): BIOL 005B; MATH 010B, MATH 046, PHYS 040C; graduate standing. A multidisciplinary introduction to computational methods used to analyze experimental biological data. Introduction to mathematical concepts needed to understand protein structure and dynamics, protein-protein interactions (structures and networks), gene regulatory networks, signal transduction networks, metabolic networks, and kinetic modeling of cellular processes. Also covers techniques used to derive experimental data. May be taken Satisfactory (S) or No Credit (NC) with consent of instructor and graduate advisor. Cross-listed with CEE 249. Credit is awarded for only one of BIEN 249/CEE 249.

Video Recording: The class will be recorded for the students of the online MS (MSOL) in Bioengineering, but not for any other use. If you have any concerns about the recordings, please inform the instructor.

Instructor: Dimitrios Morikis, Professor of Bioengineering

Office: 223 MSE Building

BioMoDeL (lab): 225 MSE Building

Tel #: 827-2696

E-mail: dmorikis@ucr.edu

Website: <http://biomodel.engr.ucr.edu>

Office hours: Wednesdays 2:00 – 4:00 PM, or by appointment

Teaching Assistant: Reed Harrison, 225 MSE (BioMoDeL)

Teaching Assistant office hours: Monday 1:00 – 3:00 PM, or by appointment

E-mail: rharr009@ucr.edu

MSOL students: Teaching Assistant will be available to answer questions regarding computer lab projects

Textbook

- *A First Course in Systems Biology*
by Eberhard O. Voit
Garland Science (2013).

Other resources

- Lecture-related material provided by the instructor.
- Publications, tutorials, and other material provided by the instructor.

Computer lab material

- Matlab (you can get access through BCOE license)
- Chimera: <http://www.cgl.ucsf.edu/chimera/>
- Swiss-PdbViewer (a.k.a. DeepView): <http://spdbv.vital-it.ch/>
- Cytoscape: <http://www.cytoscape.org/>
- String: <http://string.embl.de/>
- KEGG database: <http://www.genome.jp/kegg/kegg1.html>
- PDB: <http://www.rcsb.org/pdb/home/home.do>
- ExPASy: <http://expasy.org/>
- NCBI: <http://www.ncbi.nlm.nih.gov/>
- EMBL-EBI: <http://www.ebi.ac.uk/>
- ZINC: <http://zinc.docking.org/>
- ZINCPhamer: <http://zincpharmer.csb.pitt.edu/>

The UCR **iLearn** environment will be used to post class news, information, and assignments. Each student should have iLearn access.

Assignments

- Homework assignments (not graded, but will be used for extra credit). Each student will be assigned problems to present to the rest of the class.
- Computer lab assignments (graded). The computer lab assignments are part of the term project (40%). A report for each computer lab assignment will be due approximately every two weeks.
- Midterm exams (30%). There will be two midterm exams (15% each). The midterm exams will be based on lecture and homework material.
- Final exam (30%). The final exam will be based on lecture, homework, and/or term project/computer lab material material.

Grading scale:

100%, A+*	95-99.9%, A	90-94.9, A-
85-89.9%, B+	80-84.9%, B	75-79.9%, B-
70-74.9%, C+	65-69.9%, C	60-64.9%, C-
55-59.9, D+	50-54.9, D	45-49.9, D-
< 45, F		

*A+ represents extraordinary achievement. In the absence of 100%, per instructor's discretion, the student who receives highest grade in the 95-100% range may receive an A+.

Topics

To be covered in 10 weeks of classes, one topic per week. The emphasis on the topics to be covered may change, depending on the class progress.

1. Introduction and overview of biological systems (Instructor's material and Chapter 1)
2. Gene systems (Chapter 6)
3. Protein systems (Chapter 7)
4. Introduction to mathematical modeling (Chapter 2)
5. Static network models (Chapter 3)
6. Mathematics of biological systems (Chapter 4)
7. Parameter estimation (Chapter 5)
8. Metabolic systems (Chapter 8)
9. Signaling systems (Chapter 9)
10. Topic of the Instructor's choice (e.g. drug discovery)

Academic integrity

The UCR Academic Integrity Policy & Procedures are described at the website <http://conduct.ucr.edu/Pages/default.aspx>, and will be strictly followed. Academic integrity issues will be referred to the UCR Student Conduct and Academic Integrity Office.

Emergencies and Environmental Health & Safety

Who to call:

- In an Emergency: UC Police: 951-827-5222 (from cell) or 911 (from campus phones).
- Department Lab Safety Officer phone: 951-403-0932.
- Hazardous spills: EH&S: 951-827-5528 or 2-5528 from campus phones.
- Utility problems: Physical Plant: 951-827-4214 (days) or 951-827-4677 (evenings).
- If there is an emergency in the building such as a fire, pull one of the building fire alarm pulls.
- If the building alarm sounds go immediately to the building's emergency assembly area (EAA). EAA for MSE is outside the building, in front of the soccer field.

If injured:

- Inform your TA or Professor.
- If life-threatening, call 911 (from a campus phone) or 951-827-5222 (from cell).
- If non-emergency treatment is needed:
 - Undergraduate students: go to the Campus Health Center (daytime) or your plan's urgent care or emergency room (evenings).
 - Graduate students should contact Bioengineering Department 951-827-5025 for medical center information.