Syllabus

Biomolecular Engineering
BIEN 165 – Spring 2016
Undergraduate technical elective course
Prerequisite: BIEN 135

Lecture: TR 3:40 – 4:30 PM @ MSE 103
Discussion: W 12:10 – 1:00 PM @ BOYHL 1471

Instructor: Dimitrios Morikis, Professor of Bioengineering
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Office hours: W 2:00 – 4:00 PM, or by appointment

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Teaching Assistant office hours: MF Noon – 1:00 PM

The focus of this class is on modeling of biomolecules and biomolecular interactions, principles of protein function and design, and drug discovery.

The UCR iLearn environment will be used for announcements, class news, and to submit projects. Each student should have access.

Assignments
- Homework will be assigned but not graded. Homework assignments are part of the preparation for the midterm exam.
- Term project (60%). The term project consists of three computer lab projects and reports. The computer labs will cover biomolecular modeling and analysis, and will incorporate the use of software/webservers and concepts from class material. All project reports should be typed with figures and tables embedded within the text. Standard file formats are acceptable (pdf, doc, ppt, xls, etc). **Assignment type: individual work (no collaboration).**
- Midterm exam (20%). The midterm exam will be based on lecture and homework material.
- Final project/exam (20%). The final project will be similar to computer lab projects.
- Extra credit for class participation at the discretion of the Instructor.

Assignment and exam timeline and due dates

Project 1	April 14
Project 2	April 28
Midterm exam	May 10
Project 3	May 17
Project 4 – Final exam	June 4

Grading system: Letter Grade.

Grading scale:

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

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

Academic Integrity
Academic integrity issues will be referred to the UCR Student Conduct and Academic Integrity Office. The guidelines at the website http://conduct.ucr.edu/Pages/default.aspx will be strictly followed.

Course material
- *The Molecules of Life, Physical and Chemical Principles (Chapters 5, 12-16)* (2012) by John Kuriyan, Boyana Konforti, and David Wemmer, Garland Science, Taylor & Francis group. ISBN: 9780815341888. Paperback. Chapters can be purchased individually, as needed, from the publisher.
- Manuals and tutorials of:
    i. Chimera: http://www.cgl.ucsf.edu/chimera/
    ii. Swiss-PDBViewer: http://spdbv.vital-it.ch/
- Familiarity with the following databases/webservers:
    i. KEGG database: http://www.genome.jp/kegg/kegg1.html
    ii. PDB: http://www.rcsb.org/pdb/home/home.do
    iii. ExPASy: http://expasy.org/
    iv. NCBI: http://www.ncbi.nlm.nih.gov/
    v. EMBL-EBI: http://www.ebi.ac.uk/
    vi. ZINC: http://zinc.docking.org/
    vii. ZincPharmer: http://zincpharmer.csb.pitt.edu/

Invited lectures
- There will be one invited lecture on biomolecular engineering topics of research involving computational and experimental approaches in protein and drug design. **Date: 4/14/2016.**

Class Work
1. Review of material from BIEN 135 (Chapters 1-9)
2. Chemical potential (Chapter 10).
3. Biomolecular recognition and the thermodynamics of binding (Chapter 12).
4. Specificity of biomolecular recognition (Chapter 13).
5. Allostery (Chapter 14).
6. The rates of biomolecular processes (Chapter 15).
7. Principles of enzyme catalysis (Chapter 16).
8. Structure-based drug design (Instructor's material).
9. Ligand-based drug design (Instructor's material).
10. Prodrug design and stability, ADME, regulatory processes (Instructor's material).

Projects
The projects include topics from the following list:
- Database and software exploration
- Sequence and structural analysis.
- Analysis of protein-protein and protein-ligand interactions
- Analysis of protein-drug interactions.
- Search of chemical space and analysis of chemical similarity
- Pharmacophore design and virtual screening.

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. EAA for CHUNG Hall is outside and across the building, at the intersection between North Campus Drive and Aberdeen Drive.

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.