BB 483/583 Academic Syllabus Spring 2016

Course Name: Advanced Biochemistry and Biophysics: Capstone
Course Number: BB 483/593
Faculty: Dr. Elisar Barbar **Contact Info:** 2133 ALS (7-4143; barbare@oregonstate.edu)
Credits: 3 **Hours:** MWF 13:00 - 13:50 p.m. (Corvallis, LINC 368)

Office Hours: By appointment

Course Catalog Description: Covers applications of advanced biophysical techniques, and how these fit within the larger context of biochemistry, biology and society. Explores techniques and their applications to macromolecules as well as the scientific process. Techniques discussed include in vitro, in vivo, and in silico methods, with an emphasis on biomolecular interactions. **PREREQS:** BB 482 [D-] or BB 582 [D-]

Course Objectives: This course, the third of the three-term Biophysics sequence, is focused on multidisciplinary biochemical and biophysical approaches and capitalizes on what the students learned in this major. As a capstone course, this class will ensure that students have the opportunity to integrate many of Physics, Chemistry, Mathematics, Biochemistry and Biophysics concepts. Where appropriate, special attention will be given to the practical aspects of the biophysical techniques involved and their applications to macromolecules as well as the scientific process. Techniques discussed include in vitro, in vivo, and in silico methods, with an emphasis on biomolecular interactions.

Course Purpose: To provide an interactive capstone experience that focuses on applying and synthesizing concepts learned in previous Biochemistry & Biophysics courses through collaborative learning by reading the primary literature, addressing real research problems, and acquiring hands on experience in NMR data analysis. Students will be involved in problem solving, critical thinking, reflection, synthesis, teamwork, and professional communication. The course will utilize in part a problem-based learning approach, where most information transfer and preparation occurs via reading and writing assignments done outside the classroom, with class time largely used for discussions.

Learning Resources: Readings will be from Assigned literature. No textbook is required.

Learner Outcomes: When confronted with a biochemical phenomenon, students should be able to examine, model, and analyze the system and effectively communicate the results.
Students. Students will be expected to:

- Intelligently analyze, interpret and appraise the soundness of the findings obtained.
- Identify and address sources limitations of techniques and alternative approaches.
- Demonstrate the ability to produce quality critical analysis.

Targeted Learning Outcomes: The intention of the course is that by its end students will …

1. Acquire the technical language and concepts for understanding molecular interactions,
2. Become familiar with hybrid methods for characterization of macromolecular complexes
3. Understand and apply biophysical concepts to specific problems,
4. Recall key elements of advanced molecular biophysical techniques, including the concepts behind the experiments and the types of results obtained,
5. Learn how to assign protein resonances using triple resonance NMR spectroscopy and NMR-specific software,
6. Know how to apply their knowledge of biochemistry and biophysics to directly assess the

primary literature in this discipline and assimilate information from it; this includes recognizing, understanding, and critically evaluating the key content of primary publications especially distinguishing results from interpretations;
7. Learn the basics of writing a successful fellowship proposal,
8. Work in groups to investigate a real research problem and communicate key results both orally and in writing. *Specific for BB 583*

Learning expectations: Students in this course will …
1. come prepared for class time having carried out assigned readings, written responses, and exercises;
2. attend class sessions and actively participate in small group and large group discussions;
3. participate with teammates to carry out the cooperative project

Evaluation of Student Performance: Fulfillment of the student learning outcomes will be assessed through classroom participation, a major project, and final presentations as follows:

Project	40% Due May 13th, 2016
Class participation/exercises	30%

(attendance, preparation for and participation in classroom sessions)
(full credit can still be obtained for up to one class missed)

Presentations	30%

Course Content:

Week 1–Protein NMR Assignment Strategies
Week 2 – Project overview
Resonance assignments/Biochemistry/Biophysics
Week 3 – Hybrid techniques: NMR/ITC
Exercise: Instructions to Authors
Week 4 – Paper discussion/presentations
Exercise: Submission of cover letter
Week 5 – Mapping protein interfaces
Paper evaluations: in vivo/Biochemical/ biophysical approaches
Week 6 – Intrinsically disordered proteins
Exercise: Paradigm shifts
Week 7 – Pre-doctoral fellowships/careers
Exercise: Specific Aims
Week 8 – Hybrid techniques: SAXS
Paper evaluations: NMR/SAXS/Modeling
Week 9 – Hybrid techniques: Electron Microscopy
Paper evaluations: NMR/Crystallography/ EM/Mass spec /mutagenesis
Week 10–Project presentations

GENERAL OSU AND DEPARTMENTAL POLICIES

Statement Regarding Students with Disabilities: Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

The Department of Biochemistry/Biophysics follows the university policies on student conduct. These can be found at **Statement of Expectations for Student Conduct**, i.e., cheating policies

Cheating or plagiarism by students is subject to the disciplinary process outlined in the Student Conduct Regulations. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

* cheating- use or attempted use of unauthorized materials, information or study aids
* fabrication- falsification or invention of any information
* assisting- helping another commit an act of academic dishonesty
* tampering- altering or interfering with evaluation instruments and documents
* plagiarism- representing the words or ideas of another person as one's own

The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office.

Student Evaluation of Courses: The online Student Evaluation of Teaching system opens to students the Monday of dead week and closes the Monday following the end of finals. Students will receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the learning experience of future students. Responses are anonymous (unless a student chooses to "sign" their comments agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.