
BIOL (BIE) (CHEM) 5790/6790: Protein Structure/ Function and Purification Spring 2015
SYLLABUS

General Information:

Location and time:

Instructors: *Randy Lewis*, PhD., BIC 650, Rm 205G, 7-9291, randy.lewis@usu.edu

Justin Jones, PhD., BIC 650, Rm 205D, 7-9292, justin.a.jones@usu.edu

Office Hours: After class and any time by appointment.

Course Objectives:

We will discuss the principles of protein biosynthesis, modification, folding, structure, and stability, as well as methods of protein purification and protein analysis. We will discuss the preparation and review of biomedical research proposals using a National Institutes of Health format. Each student will develop an original research proposal through preliminary oral and final written presentations and the group will hold a mock NIH study section to evaluate and rank the proposals.

Grades and exams:

Homework	5%
Lecture	10%
Midterm	10%
Research proposal seminar	15%
Research proposal	50%
Research proposal review	10%

Although this will not be determined until final grade calculations, a grade of "A" will usually require an overall score of at least 85%. Other grades will be scaled accordingly.

ALL DUE DATES ARE “DROP-DEAD” DEADLINES. NO LATE WORK ACCEPTED.

Lecture Notes:

Some information will be provided ad hoc in the form of handouts and/or course packets.

Textbooks: (To be updated before the start of class)

No textbooks are required. The following is a list of general references for background reading:

1. General Biochemistry texts by Stryer, Zubay, Voet and Voet, and others.
2. Books by T.E. Creighton:
 - Proteins: Structures and Molecular Properties (Freeman).
 - Protein Structure (IRL Press).
 - Protein Function (IRL Press).
3. Enzyme Structure and Mechanism, Ferscht (Freeman).
4. Protein Folding, Gerasch and King, eds. (AAAS Press).
5. Conformations and Forces in Protein Folding, Nall and Dill, eds. (AAAS Press).
6. Protein Engineering Oxender and Fox, eds. (ARL).
7. Biophysical Chemistry I-III, Cantor and Schimmel (Freeman).
8. Protein Purification: Principles and Practice, Scopes (Springer-Verlag).
9. Protein Purification Methods, Harris and Angal (IRL Press).
10. Introduction to Protein Structure, Branden and Tooze (Garland).
11. Essentials of Glycobiology. Varki et al., eds. Second Edition (CSH Press).

Additional Learning Resources:

-In addition to the general background references listed above, specific papers cited in lectures will be listed on the blackboard prior to class.

-On 02/14, you will receive materials associated with the midterm assignment:

- The NIH R21 grant proposal you will review as your midterm assignment.
- Definitions of standard NIH grant proposal review criteria (to facilitate your review).

-On 02/14, you will receive the SF424 (R&R) Instructions for preparation of your grant proposal.

-On 20/14, you will receive additional materials to facilitate your peer review assignment:

- NIH grant proposal review and scoring guidelines.

-Use the internet or library to obtain any other papers you need. Drs. Lewis and Jones can help you access papers unavailable to you on an ad hoc basis.

Lecture schedule:

Date	Topic
January 10	Course Introduction.
January 12	Amino acids and peptide bonds.
January 17	Protein structure I: Secondary structure and prediction methods.
January 19	Protein structure II: Motifs and domains.

January 21	Continued
January 24	Primary structure determination: sample preparation, cleavage methods, sequencing and interpretation, sequence comparisons.
January 26	Techniques: assay, isolation, purification, chemical characterization and post-translationally modified amino acids.
January 31	Continued
February 2	Continued
February 7	Introduction to glycoproteins/Primary structure of gP glycans.
February 9	Methods of glycoprotein and carbohydrate analysis.
February 14	Writing grant proposals (Proposal topic submitted and Midterm out)
February 16	Continued
February 21	Membrane proteins (your lectures)
February 23	Continued
February 28	Continued
March 2	Reviewing grant proposals.
SPRING BREAK March 7 and 9	
March 14	Protein stability and folding: forces, theories, kinetics and pathways.
March 16	Continued
March 21	Continued
March 28	Student seminars (3 per class period)
March 30	Continued
April 4	Continued
April 6	Continued
April 11	Enzymes
April 13	Continued
April 20	No Class; Proposal preparation time
April 18	No Class; Proposal preparation time
April 25	Proposal help session
April 27	No Class; Proposal review time
Finals week	Proposal review session, Time TBA.