**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:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>5%</td>
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<tr>
<td>Lecture</td>
<td>10%</td>
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<tr>
<td>Midterm</td>
<td>10%</td>
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<tr>
<td>Research proposal seminar</td>
<td>15%</td>
</tr>
<tr>
<td>Research proposal</td>
<td>50%</td>
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<tr>
<td>Research proposal review</td>
<td>10%</td>
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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).
9. Protein Structure, Branden and Tooze (Garland).
10. Biophysical Chemistry I-III, Cantor and Schimmel (Freeman).

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 02/14, 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:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>January 10</td>
<td>Course Introduction.</td>
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<tr>
<td>January 12</td>
<td>Amino acids and peptide bonds.</td>
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<tr>
<td>January 17</td>
<td>Protein structure I: Secondary structure and prediction methods.</td>
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<tr>
<td>January 19</td>
<td>Protein structure II: Motifs and domains.</td>
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</table>
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 glycan.
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.