CHEM 4923 (Senior Project – Capstone course)  
Protein Structure and Function  
Fall 2014  
MWF 12:30 – 1:20 pm, PHSC 222

Instructor: Dr. Ann H. West  
Phone: 325-1529  
Email: awest@ou.edu  
Office: SLSRC 2590  
Office hours: Mon. 3:00-4:00 pm, Wed. 2:00-3:00 pm  
or by appointment

Course website (Desire2Learn): http://learn.ou.edu

Course Objectives:  
This course is intended to provide students with: 1) a comprehensive discussion of protein structure and architecture; 2) an overview of the primary method by which protein structures are elucidated, i.e. macromolecular X-ray crystallography; and 3) an opportunity to make use of interactive molecular graphics computer programs for the visualization and analysis of three-dimensional protein structures.

Prerequisites:  
CHEM 3653 (Introduction to Biochemistry) or permission of the instructor.

Recommended Textbooks:  

Other Useful References (most of them available at Bizzell Library):  

Other resources:  
Each student will need access to a computer and the internet for the take-home computer graphics assignment.
Useful Aids (highly recommended but optional):

Biochemistry 3D Model Kits (e.g. Cochrane's Minit Molecular Model Kit for Biochemistry available from Aldrich, Z15317-6); stereoviewing aids are available upon request.

Grading:

The final grade for the course will be determined based on the following: (i) Computer graphics exercise; (ii) Two in-class examinations; (iii) in-class oral presentation (peer-evaluated) and (iv) final written report on an approved topic.

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<tr>
<th></th>
<th>Points</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Computer exercise</td>
<td>100</td>
<td>25.0%</td>
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<tr>
<td>Exam I</td>
<td>100</td>
<td>25.0%</td>
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<tr>
<td>Exam II</td>
<td>50</td>
<td>12.5%</td>
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<tr>
<td>Oral presentation</td>
<td>75</td>
<td>18.75%</td>
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<tr>
<td>Final written report</td>
<td>75</td>
<td>18.75%</td>
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<td>400</td>
<td>100%</td>
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Grade cut-offs (guaranteed):

- A = 360 pts (90%)
- B = 320 pts (80%)
- C = 280 pts (70%)
- D = 240 pts (60%)

UNIVERSITY CODES AND POLICIES OF BEHAVIOR:

See "University policies regarding instruction" downloadable from the Provost's website, http://www.ou.edu/content/provost/memos.html

Each student should acquaint her or his self with the University's codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on physical handicap.

University Policy Regarding Reasonable Accommodations:

The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the instructor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Disability Resource Center is located in Goddard Health Center, Suite 166, phone (405) 325-3852 or TDD only (405) 325-4173.

University Policy Regarding Codes of Behavior:

Each student should acquaint himself or herself with the University's codes, policies, and procedures involving academic misconduct, grievances, sexual and ethnic harassment, and discrimination based on physical handicap. Students engaging in academic misconduct (including cheating, plagiarism, and any other action that may improperly affect evaluation) will be subject to sanctions in accordance with the Norman Campus Academic Misconduct Code. Grade sanctions could range from a zero for the specific assignment to an "F" for the course. University sanctions can be severe, i.e., expulsion from the University. Any form of academic misconduct, as specified in the Student Code at OU and in the Chemistry Department's Graduate Student Handbook, will be reported to the Department and the Dean for appropriate action.
PLEASE NOTE:
This syllabus is a guide. The instructor reserves the right to change by addition and/or subtraction any and/or all materials contained in this syllabus. This includes, but is not limited to, course content, assignments, due dates, and portion(s) of the grade assigned to individual items within this course.

<table>
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<tr>
<th>Lecture and exam schedule (subject to change)</th>
<th>Topic</th>
<th>Recommended Reading</th>
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| **Week 1**
(8/18 – 8/22) | Overview of course; | Petsko & Ringe, Ch. 1 |
| | Basic principles; 1° structure | P&R, Ch. 1-0 to 1-4 |
| **Weeks 2-6**
(8/25 – 9/16) | 2° structure; super-2° structure (motifs) | P&R, Ch. 1-5 to 1-8 and 1-16 |
| | Protein Data Bank (PDB) | http://www.rscb.org |
| | 3° structure (domains, folds, topologies) | P&R, Ch. 1-10 to 1-18 |
| | 4° structure; protein-protein interactions | P&R, Ch. 1-19 to 1-22; Ch. 3-1 |
| **Week 7**
(9/29 – 10/3) | **Exam 1 (Protein architecture)** | |
| | X-ray crystallography (overview) | P&R Ch. 5; Rhodes, Ch. 1 & 2 |
| **Weeks 8-11**
(10/6 – 10/31) | Crystal growth & characterization (Guest lecturer: Dr. Len Thomas) | P&R Ch. 5; Rhodes, Ch. 1-3 |
| | **Tour of Macromolecular Crystallography Lab in SLSRC (TBA)** | |
| | X-ray data collection & data processing | Rhodes, Ch. 4 & 5 |
| | Phase determination (MR) | Rhodes, Ch. 6 |
| | Phase determination (MIR) | Rhodes, Ch. 6 |
| | Model building & refinement | Rhodes, Ch. 7 |
| | Structure validation & interpretation | Rhodes, Ch. 8; P&R, Ch. 5 |
| **Week 12 (11/3)** | **Exam 2 (X-ray crystallography)** | |
| **Weeks 12-16**
(11/5 – 12/5) | Contemporary topics in structural biology | Student presentations - TBA |

**Dates to remember:**
1) Labor Day Holiday is Mon. Sept. 1st
2) Computer graphics exercise due Mon. Sept. 22nd
3) Exam 1 in-class is scheduled for Mon. Sept. 29th
4) Fall Holiday is Fri. Oct. 10th
5) Exam 2 in-class is scheduled for Mon. Nov. 3rd
6) Thanksgiving break is Nov. 26-28, 2014
7) Student presentations will begin Nov. 5th
8) Final written report is due one week after oral presentation.