CHEM 4923 (Senior Project – Capstone course)  
Protein Structure and Function  
Fall 2016  
MWF 12:30 – 1:20 pm, PHSC 115  

Instructor: Dr. Ann H. West  
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Email: awest@ou.edu  
Office: SLSRC 2590  
Office hours: MWF 11:00 am - 12:00 pm in ChBA 220  
or by appointment in SLSRC 2590  

New course website (Canvas): oucanvas.com  

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:  
London, U.K.  
Diego, CA. (also available on-line at Bizzell Library)  

Other Useful References (most of them available at Bizzell Library):  
Co., New York.  
Rupp, B. (2010). Biomolecular Crystallography, Principles, Practice, and Applications to  
Structural Biology, Garland Science, Taylor & Francis Group, New York, NY.  
England.  
Publishing, Inc., New York, NY  

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>
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<th>Points (Percentage)</th>
<th>Grade Cut-offs (Guaranteed)</th>
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<tbody>
<tr>
<td>Computer exercise</td>
<td>100 pts (25.0%)</td>
<td>A = 360 pts (90%)</td>
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<tr>
<td>Exam I</td>
<td>100 pts (25.0%)</td>
<td>B = 320 pts (80%)</td>
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<tr>
<td>Exam II</td>
<td>50 pts (12.5%)</td>
<td>C = 280 pts (70%)</td>
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<tr>
<td>Oral presentation</td>
<td>75 pts (18.75%)</td>
<td>D = 240 pts (60%)</td>
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<tr>
<td>Final written report</td>
<td>75 pts (18.75%)</td>
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<td></td>
<td>400 pts total</td>
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UNIVERSITY POLICIES AND CODES OF BEHAVIOR:
See "University policies regarding instruction" downloadable from the Provost's website, [http://www.ou.edu/content/provost/memos.html](http://www.ou.edu/content/provost/memos.html) under the heading Instructional and Curricular Issues, “Honoring our commitment to our students”.

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 Disability Resource Center (DRC) ([http://www.ou.edu/content/drc.html](http://www.ou.edu/content/drc.html)) prior to receiving accommodations in this course. The DRC is located in Goddard Health Center, Suite 166, phone (405) 325-3852 or TDD only (405) 325-4173; email: drc@ou.edu.

Adjustments for Pregnancy/Childbirth Related Issues: Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact me as soon as possible to discuss. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see [http://www.ou.edu/eoo/faqs/pregnancy-faqs.html](http://www.ou.edu/eoo/faqs/pregnancy-faqs.html)

Religious Observance: It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays. Schedule conflicts such as these should be brought to the instructor's attention at the beginning of the semester.

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.
**Title IX Resources:** For any concerns regarding gender-based discrimination, sexual harassment, sexual misconduct, stalking, or intimate partner violence, the University offers a variety of resources, including advocates on-call 24/7, counseling services, mutual no contact orders, scheduling adjustments and disciplinary sanctions against the perpetrator. Please contact the Sexual Misconduct Office (405) 325-2215 (8 am – 5 pm) or the Sexual Assault Response Team (405) 615-0013 (24/7) to learn more or to report an incident.

**Academic Integrity:** All students are expected to conform to college-level standards of ethics, academic integrity, and academic honesty. By enrolling in this course, you agree to abide by the Academic Misconduct Code published in the University of Oklahoma Student Code (http://www.ou.edu/studentconduct/). Please see http://integrity.ou.edu/ for more information.

All members of the community recognize the necessity of being honest with themselves and with others. Cheating in class, plagiarizing, lying and employing other modes of deceit diminish the integrity of the educational experience. None of these should be used as a strategy to obtain a false sense of success. The need for honest relations among all members of the community is essential.

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>
<thead>
<tr>
<th>Topic</th>
<th>Recommended Reading</th>
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<tbody>
<tr>
<td>Overview of course;</td>
<td>Petsko &amp; Ringe, Ch. 1</td>
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<tr>
<td>Basic principles; 1° structure</td>
<td>P&amp;R, Ch. 1-0 to 1-4</td>
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<tr>
<td>2° structure; super-2° structure (motifs)</td>
<td>P&amp;R, Ch. 1-5 to 1-8 and 1-16</td>
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<td>Protein Data Bank (PDB)</td>
<td><a href="http://www.rscb.org">http://www.rscb.org</a></td>
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<tr>
<td>3° structure (domains, folds, topologies)</td>
<td>P&amp;R, Ch. 1-10 to 1-18</td>
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<td>4° structure; protein-protein interactions</td>
<td>P&amp;R, Ch. 1-19 to 1-22; Ch. 3-1</td>
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<tr>
<td><strong>Exam 1 (Protein architecture)</strong></td>
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<tr>
<td>X-ray crystallography (overview)</td>
<td>P&amp;R Ch. 5; Rhodes, Ch. 1 &amp; 2</td>
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<tr>
<td>Crystal growth &amp; characterization (Guest lecturer: Dr. Len Thomas)</td>
<td>P&amp;R Ch. 5; Rhodes, Ch. 1-3</td>
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<tr>
<td>Tour of Macromolecular Crystallography Lab in SLSRC (TBA)</td>
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<tr>
<td>X-ray data collection &amp; data processing</td>
<td>Rhodes, Ch. 4 &amp; 5</td>
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<td>Phase determination (MR)</td>
<td>Rhodes, Ch. 6</td>
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<tr>
<td>Phase determination (MIR)</td>
<td>Rhodes, Ch. 6</td>
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<td>Model building &amp; refinement</td>
<td>Rhodes, Ch. 7</td>
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<tr>
<td>Structure validation &amp; interpretation</td>
<td>Rhodes, Ch. 8; P&amp;R, Ch. 5</td>
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<tr>
<td><strong>Exam 2 (X-ray crystallography)</strong></td>
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<tr>
<td>Contemporary topics in structural biology</td>
<td>Student presentations - TBA</td>
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**Dates to remember:**

1) Labor Day Holiday is Mon. Sept. 5th
2) Computer graphics exercise due [Mon. Sept. 26th]
3) Exam 1 in-class is scheduled for Mon. Oct. 3rd
4) Fall Holiday is Fri. Oct. 7th
5) Exam 2 in-class is scheduled for Fri. Oct. 28th
6) Thanksgiving break is Nov. 23-27, 2016
7) Student presentations will begin Oct. 31st
8) Final written report is due one week after oral presentation.