**Syllabus**
**Macromolecular Structure & Protein X-ray Crystallography 396/465 Fall 2019**

**Instructor:** Dali Liu, PhD
Department of Chemistry and Biochemistry
Office: FH422
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**Class Meetings:** Locations: FH105
Time: Monday & Wednesday 4:15 PM- 5:30 PM

**Office Hours:** 1:00 PM-3:00 PM, Mon
Can also be arranged at other times via appointments.

**Objectives:** The class will cover understanding and on-hands practice on protein crystallography.

**Requirements:** No Textbook will be required; the instructor will provide other course materials as handouts. the followings are the suggested general reading:

1. Crystallography Made Crystal Clear: 3rd Edition, A Guide to Users of Macromolecular model. By Gale Rhodes
2. Principles of Protein X-ray Crystallography: 3rd Edition, By Jan Drenth

For the hands-on practice, students should either bring in **a laptop**.

**Grades:** Midterm 40 %, Final (comprehensive) 40 %, Computational Assignments 10%, Oral Presentation (15 + 5 min) 10%

**Grade Table**

| Letter | Range (%) |
|---|---|
| A | 90 or more |
| A- | 85-89 |
| B+ | 80-84 |
| B | 75-79 |
| B- | 70-74 |
| C+ | 65-69 |
| C | 60-65 |
| D+ | 55-59 |
| D | 50-54 |
| F | Below 50 |

*Please be aware that the C- and D- will not be given as a grade in this class.
*Details of the assignments and oral presentation will be finalized in classes during semester.

**Class Schedule:**

| # | Day | Date | Topic |
|---|---|---|---|
| 1 | Mon | 8/26 | Syllabus & Review on Protein Structure |
| 2 | Wed | 8/28 | Introduction to Protein Crystallography & Structural Biology. |
| | *Mon* | *9/2* | *Labor Day* |
| 3 | Wed | 9/4 | Crystals and Symmetry Unit Cells, Point Groups, Space Groups |
| 4 | Mon | 9/9 | Protein Purification, Crystallization, and Crystal Soaking. |
| 5 | Wed | 9/11 | X-ray Diffraction: Theory and Hardware. |
| 6 | Mon | 9/16 | ***On hands session, crystallization.*** *(Schedule could change!)* |
| 7 | Wed | 9/18 | Reciprocal Lattice, Miller Index and Fourier Transfer. |
| 8 | Mon | 9/23 | Reciprocal Lattice, Miller Index and Fourier Transfer |
| 9 | Wed | 9/25 | Data Collection and Processing |
| 10 | Mon | 9/30 | Phasing-Structure Solution |
| 11 | Wed | 10/2 | Phasing-Structure Solution |
| | *Mon* | *10/7-8* | *No Class Mid-Semester Break* |
| 12 | Wed | 10/9 | Review |
| **13** | **Mon** | **10/14** | **Midterm** |
| 14 | Wed | 10/16 | Model Building & Refinement Cycles |
| 15 | Mon | 10/21 | Model Building & Refinement Cycles |
| 16 | Wed | 10/23 | Diffraction pathologies and solutions |
| 17 | Mon | 10/28 | CCP4, Coot, UCSF Chimera Installation (Computer Required) |
| 18 | Wed | 10/30 | CCP4 & Coot (Computer Required) |
| 19 | Mon | 11/4 | CCP4 & Coot (Computer Required) |
| 20 | Wed | 11/6 | UCSF Chimera (Computer Required) |
| 21 | Mon | 11/11 | Model Errors, Crystallography artifacts and Quality Control |
| 22 | Wed | 11/13 | ***On hands crystal handling/Data Collection (Schedule could change)*** |
| 23 | Mon | 11/18 | Mechanistic Crystallography and Drug Design |
| 24 | Wed | 11/20 | Advance Crystallography and Cryo-EM |
| 25 | Mon | 11/25 | Oral Presentations |
| | *Wed* | *11/27-30* | *Thanksgiving* |
| 25 | Mon | 12/2 | Oral Presentations |
| 26 | Wed | 12/4 | Oral Presentations |
| **27** | **Mon** | **12/9** | **Final** |

**Academic integrity**

Academic integrity is essential for the academic life; for that reason, and students are expected to adhere to the highest ethical standards in the course. Anything less, will not be accepted. Dishonest behavior such as cheating may cause to fail an assignment or examination. This *"0"* score will not be dropped. A second instance of academic dishonesty may be reported and cause to fail the entire course. In addition, the course will deserve an F if the first instance of dishonesty is severe. Please refer to the official policy of the *College of Arts and Sciences* regarding academic integrity:

http://www.luc.edu/cas/pdfs/CAS_Academic_Integrity_Statement_December_07.pdf

There will be no expiration time for the enforcement of rules against acts of dishonesty. When an act of academic dishonesty is found, rules may be enforced even if the grade of an exam or assignment has already been given.

**Student Accommodations**

If you have any special needs, please let me know in the first week of classes. The university provides services for students with disabilities. Any student who would like to use any of these university services should contact the Student Accessibility Center (SAC), Sullivan Center, (773) 508-3700. Further information is available at http://www.luc.edu/sac/.

**Accommodations for Religious Reasons**

If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor ***within 10 calendar days of the first class meeting of the semester*** to request special accommodations, which will be handled on a case by case basis.

**Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC):**

Students missing classes while representing Loyola University Chicago in an official capacity (e.g. intercollegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes.

Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation (develop standard form on web) describing the reason for and date of the absence.

This documentation must be signed by an appropriate faculty or staff member, and it must be provided as far in advance of the absence as possible. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to give the student the opportunity to take the examination at another time. (https://www.luc.edu/athleteadvising/attendance.shtml)

**Syllabus amendments**

There is the possibility that unintended inaccuracies exist. In case that the student finds a contradiction or an error, particularly in the dates of the exams or classes, the student should immediately contact the instructor. The instructor of the course reserves the right to revise the syllabus. Amendments will be made in case mistakes are found or if the instructor believes they will improve the learning process for everybody. Amendments, if they ever exist, will be announced in class, by e-mail, or on blackboard.