University of Wisconsin-Madison
CRB 630 / CHEM 630
Course Title: Proteomics Approaches for Biologists
Spring 2018

Course Instructor:
Professor Ying Ge, Office, WIMR II 8551; Phone: 608- 265-4744. email: ying.ge@wisc.edu
Lecture time: Wed. and Fri. 8:50- 9:40 am (2 credits)
Office hours: 1:30-3:30 PM on Fridays or by appointment
Classroom: WIMRII 8th floor conference room (Room 8571)

Course Designations: Advanced level; physical science breadth; counts as L&S credit (for CHEM 630)
Instructional mode: face-to-face

How Credit Hours are met: This class meets each week for two 50-minute lectures or presentations. Over the course of the semester, students are expected to do at least 90 hours of learning activities, which includes class attendance, reading, studying, preparation, problem sets, and other learning activities.

Requisites: Graduate student standing or BIOCHEM 501 or BIOCHEM 507

Course description and overview:
Proteomics and metabolomics are playing an increasingly important role in biology and medicine. Many biology labs are now starting to use proteomics and metabolomics in their research projects. This course is designed specifically for students in biological sciences who have interests to learn proteomics and metabolomics. It will integrate formal classroom lectures with one-on-one consultation. Lectures include the essential fundamentals and applications in mass spectrometry-based proteomics and metabolomics to address biological/medical problems. Meanwhile, one-on-one consultation will be offered to respond to students' individual needs, including the design of proteomics/metabolomics experiments, troubleshooting, and proper interpretation of the results.

Topics to be covered in the course include:

- Introduction to mass spectrometry-based proteomics
- Proteomics for decoding signaling network
- Proteomics for structural biology
- Top-down proteomics
- Sample preparation for proteomics experiments
- Proteomics strategy for identification of kinase substrate
- Proteomics in clinical applications
- Mass spectrometry based metabolomics

The class will meet twice a week (Wed. and Fri. 50 min). Classroom sessions involve one of two formats: 1) traditional lectures interspersed with classroom discussion; 2) student presentation. The essential knowledge and practical application of proteomics and metabolomics will be taught during the traditional lectures. Towards the end of the course, the students will present a specific topic of interest on proteomics/metabolomics and discuss their specific proteomics/metabolomics needs in their thesis

projects. The student can also choose to write a proposal on a specific proteomics/metabolomics subject which is not related to their thesis project. Along with the regular classroom instruction, students are offered ample one-on-one individual consultations with the course instructor to discuss their specific proteomics/metabolomics needs. Major goals of the course include accruing fundamental knowledge and understanding of proteomics/metabolomics, developing confidence in proteomic/metabolomic experimental design and data interpretation as well as critical thinking and oral presentation skills.

Grades: Grading will be based on the three course components; attendance and participation in the discussion (40%), two homework sets (30%), and final presentation on a proteomics/metabolomics related project or a proposal on a proteomics/metabolomics topic (30%). Grading scale for the course, A-F (92-100=A, 89-91=AB, 82-88% = B, 79-81% = BC, 72-78% = C, 69-71% = CD, 60-68% = D, Below 60% = F.)

Below is a schedule of topics:

Week	Lecture Topics
1 (Jan. 24)	Course Overview
2 (Jan 26, Jan. 31)	The Nuts and Bolts of Mass Spectrometry-based Proteomics (Part I)
3 (Feb. 2, Feb. 7)	The Nuts and Bolts of Mass Spectrometry-based Proteomics (Part II) *Homework #1 handout*
4 (Feb. 9, Feb. 14)	Proteomics for Decoding Signaling Network (Part I)
5 (Feb. 16, Feb. 21)	Proteomics for Decoding Signaling Network (Part II) *Homework #1 Due*
6 (Feb. 23, Feb. 28)	Proteomics for Structural Biology (Part I)
7 (Mar. 2, Mar. 7)	Proteomics for Structural Biology (Part II) *Homework #2 handout*
8 (Mar. 9, Mar.14)	Top-down Proteomics (Part I)
9 (Mar. 16, Mar. 21)	Top-down Proteomics (Part II)
10 (Mar. 23, Apr. 4)	Sample preparation for MS-based proteomics *Homework #2 handout*

11 (Apr. 6, Apr. 11)	Identification of Kinase Substrate by Mass Spectrometry-based Proteomics
12 (Apr. 13, Apr. 18)	Proteomics in Clinical Applications
13 (Apr. 20, Apr. 25)	Mass Spectrometry-based Metabolomics
14 (Apr. 27, May 2)	Student Presentation
15 (May 4, May 9)	Student Presentation
16 (May 11)	Student Presentation