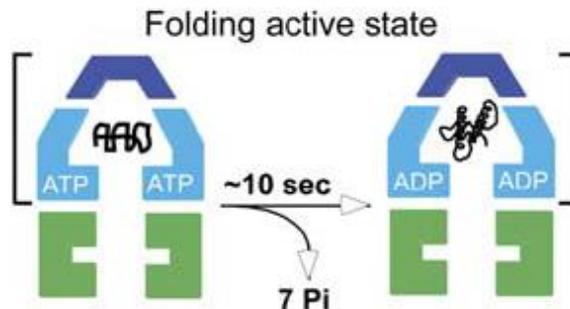


# BIOD12H: Protein Homeostasis

Winter 2019

Professor Rongmin Zhao; TA: Bona Mu



This is a lecture/seminar course focusing on mechanisms of the cellular protein quality control systems. Animal and plant models will be used to highlight selected protein folding and degradation machineries critical to cell functions. Primary literature in protein homeostasis and possible consequence of malfunction in eukaryotic cells will be discussed.

**Prerequisite:** BIOC12 or BIOC10

**Professor office hours:** Monday 5-6pm or by appointment; location: SY248, Email: [rzhao@utsc.utoronto.ca](mailto:rzhao@utsc.utoronto.ca). Please use E-mail ONLY when it is critical for you to get in touch with me and use BIOD12H-Protein Homeostasis in the subject line. Your student name and number must be included in your email.

## Teaching Assistant

One teaching assistant, Bona Mu, is helping the course delivery. The TA will participate in the class and may lead tutorials if needed.

## Lecture Materials

The University of Toronto QUERCUS system will be used to support the course. You can log in from the website [q.utoronto.ca](http://q.utoronto.ca) with your UTORid. Lecture notes and related materials will be posted in the course website. All important information related to this course will be announced in the Quercus and you are required to check the announcement regularly.

**Textbooks:** No assigned textbook. Lecture notes and research articles will be provided and circulated. **However**, most Biochemistry textbooks have certain chapters related to protein folding and degradation, e.g. Chapter 32 in Biochemistry (First Canadian Edition by Garrett et al., 2013 Nelson Publisher, available at the UTSC library), and can be used as resources for general background information.

**Lectures:** Tuesday 3-5pm. During this two-hour (mandatory) lecture time, the professor will give lectures on relevant foundation topics and methodology (first 2-3 weeks depending on the enrolment). Or it will be a student group presentation on one selected article and followed by discussions.

**Tentative schedule (may be revised)**

Weeks 1-3: Professor lectures on foundation topics in protein homeostasis and methodology.

Week 4: Professor lecture on how to critically read primary research articles and how to make effective presentations.

Weeks 5-12: Student presentation on research articles.

- Student presentation and the assignments will be based on a small group. Depending on the total enrolment, groups will be formed by the end of the second week, and the number of students for each group will be determined and announced in the first class. It is expected that each group has not more than 4 students, ideally three. The students are encouraged to find partners and form groups themselves. Otherwise, the professor will assign a group for the student.

**Tutorials**

Wednesday (4-5pm), led by the professor or teaching assistant. Tutorials start from week 2. It is mainly a discussion section and the professor or TA will answer questions related to chosen papers. The focus will be on technical issues including but not limited to materials and methods of the articles. No formal lectures, office hour like, and it also depends on student participation and questions. Students need to bring their own questions to the tutorial sections.

**Course Evaluation**

Participation: 15%

Assignment (part 1 as group): 5%

Assignment (part 2 as group): 10%

Assignment (part 3 individual): 5%

Presentation: 30%

Final examination: 35%

Bonus on early presentation: (maximum of 5%)

**Participation (15%)**

Participation mark is given based on your attendance to lectures, tutorials. It is also graded based on your active participation in class discussion. During the student presentation weeks, each non-presenting group needs to read the same article and submit a list of at least three (3) questions one day before (before midnight of Monday) to the professor by email. These questions will be discussed by the group after the student presentation on Tuesday. Depending on the complication of the question and available time, not all questions may be discussed.

### **Presentation (30%)**

The presentation is expected to be 35-40 min long. Everyone in the team needs to present and all parts are combined as a complete oral presentation. The presentation format is expected normally in the following order: General introduction, research goals/rationale, results, discussion and possible future direction. Materials and methods are not necessarily presented in a separate section and could be integrated into the results section.

During the student presentation weeks, the presenting group must email the presentation slides to the professor before 12pm on Monday. The group then come to meet with the professor during the office hour (5-6pm) on Monday. That is to say, if you are scheduled to present on Tuesday Feb 5<sup>th</sup>, you must submit your presentation on Feb 4<sup>th</sup> then meet with the professor during the office hour on Feb 4<sup>th</sup>. As an alternative, you can send the presentation slides to the professor and meet with the professor during the tutorial session the week before the presenting week. For example, if you are scheduled to present on Feb 5<sup>th</sup>, you can email the slides before 12pm on Jan 30<sup>th</sup> and meet with the professor during the tutorial on Wednesday Jan 30<sup>th</sup>. Please note, as a group, you can send a representative to meet with the professor, not everyone needs to be present in the meeting. However, everyone needs to participate in the presentation and will be graded.

A brief meeting with the professor is intended to ensure the proper presentation on the next day and some comments can be provided if the professor think it is critical regarding the format. The presentation will be graded by both professor and TA and the rubrics will be provided before the presentation week.

**Bonus on early presentation:** Because all articles are given at the beginning of the course, it is understandable that those groups presenting early will have relatively shorter time to prepare the talk. The following schema will be used to determine bonus mark for the first four group presentation. 5% bonus on final grade to the first group, 3% bonus on final grade to the second group, 2% to the 3<sup>rd</sup> and 1% to the 4<sup>th</sup> group to present their talks.

***Rubrics of grading on oral presentation and class participation will be posted on the course website in the third week.***

### **Assignment**

The assignment will be to write a short proposal to address some critical questions related to the research article the group choose. The final product will be a five-page proposal (the format will be announced later in class). The assignment will be finished with three steps, submitted as two partial and one complete assignment. Every student in the group will receive the same mark for the part 1 and part 2. Before handing in part 2 and part 3, some feedback comments may be given back to the groups and the group or individual may revise accordingly together with the submission of the next part. Example proposal will be given as a reference. The following highlights the specific requirement for the assignment.

**Part 1 (5%):** Due on Feb 8<sup>th</sup>. It will be in 1 to 1.5 pages. It should include the title, the general background information about the topics you choose and may also include the update after the research article you have chosen was published. At the end of the

background information, list up to three unsolved questions you may want to address further. References should be treated as extra, not part of the 1 to 1.5 pages.

**Part 2 (10%):** Due on March 15<sup>th</sup>. It is a 4-page proposal. It should include the part 1 you submitted earlier, but it is not necessarily exact the same. You could revise the general background information. This part will be mainly updated with possible experiments you want to do to address the questions you laid out earlier. Again, you can even revise the questions. You only need to strategically explain the experiments, expected results etc. No need to include any experimental details such as the reagent names, volumes, times etc. References should be treated as extra, not part of the 4 pages.

**Part 3 (5%):** Due on April 5<sup>th</sup>. Based on the parts 1 and 2, each student will submit their final five-page proposal. This part is intended to fine-tune the previously handed work and make the proposal more readable and more eye-catching. It is expected each student revises the previous 4-page proposal, while not change the overall structure and main theme of the work. A short paragraph of possible significance of the work can be included. A contribution statement indicating how each member of the group contributes to the proposal can be added too (for format only, the exact weight of contribution will not be graded).

### **Policy on late assignment**

Assignments must be submitted on time in both electronic version and hard copy. Late assignment will be penalized by 20% each day.

### **Final examination (35%)**

The schedule of the final exam will be arranged by the Registrar's office. It covers general concepts discussed in the professor's lecture and the student presentation. Focus will be given to those questions submitted and discussed in lectures.

### **Research articles**

Research articles used for class discussion will be posted on the course website in the first week. It is expected students download all articles at the beginning and have a quick scan of the article, at least on the abstract. This should help you to choose the article to present in class at the later time. The choice of papers will be finalized in the second week in a first come first service style. If students cannot appropriately form groups or pick research articles, the groups and articles will be assigned by the professor on a random basis. One or two more articles will be given to ease your choice. Unless with extreme circumstance, the student is not allowed to work alone and he or she must work as a group. Once you choose the article, you need to stick to it and it is generally not allowed for you to change the article after the third week without the instructor's permission.

Research articles may include but not limited to the following topics:

- Structure and function of the 26S proteasome
- Polyubiquitination pathways
- Regulated protein degradation in plants (plant hormone response pathways)
- Protein aggregation in animal cells.

- Protein folding: HSP90 structure and function in animal models
- Protein folding: HSP90 structure and function in plant models.
- Protein folding: HSP60 structure and functions
- Protein folding: HSP70 structure and functions

### **Information Regarding AccessAbility Services at UTSC**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to contact with me and/or the AccessAbility Services Office as soon as possible. The UTSC AccessAbility Services staff (located in Room SW-302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. You can contact AccessAbility Services at 416-287-7560 or [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca).

### **Academic Integrity**

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

- IN PAPERS AND ASSIGNMENTS: Using someone else's ideas or words without appropriate acknowledgement; submitting your own work in more than one course without the permission of the instructor; making up sources or facts. Obtaining or providing unauthorized assistance on any assignment.
- ON TESTS AND EXAMS: Using or possessing unauthorized aids; looking at someone else's answers during an exam or test; misrepresenting your identity.
- IN ACADEMIC WORK: Falsifying institutional documents or grades; Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <http://www.utoronto.ca/academicintegrity/resourcesfor students.html>).