Instructor Information

Part 1 (First half of semester (seven weeks) to be taught by Dr. Tiwari)
Instructor: Ashutosh Tiwari, PhD, Assistant Professor
Office Location: 402B ChemSci
Telephone: Office – (906) 487-1840
E-mail: tiwari@mtu.edu
Office Hours: by appointment
Web site http://www.chemistry.mtu.edu/pages/faculty/faculty.php?fac=tiwari

Part 2 (Second half of semester (seven weeks) to be taught by Dr. Dam)

Course Identification

Course Number: CH6790
Course Name: Special Topics in Biochemistry: Protein Folding & Modification
Course Location: 104 B ChemSci
Class Times: 4:00pm to 5:20pm
Prerequisites: Course Instructor’s permission required

Course Description/Overview

Part 1 (First half of semester (seven weeks) to be taught by Dr. Tiwari)
Dr. Tiwari will be teaching this course for the first half of the fall semester (week 1 to week 7) which will give students a strong foundation in physical and thermodynamical principles of folding and stability of globular proteins and their role in health and disease. Briefly, the topics will include molecular interactions, forces and structural hierarchy in proteins and their significance. The course will also focus on protein stability and conditions leading to instability and misfolding of proteins. General methods and approaches to purify the proteins and characterize their unique biochemical and biophysical properties of proteins will be discussed.

Part 2 (Second half of semester (seven weeks) to be taught by Dr. Dam)
Course Learning Objectives

Part 1 (First half of semester (seven weeks) to be taught by Dr. Tiwari)

After completing the part 1 of the course, the students should be able to do the following.

1. Should have broad knowledge and understanding about structure and functions of proteins and their role in health and disease.
2. Have ability to systematically troubleshoot a protein expression and purification process when minimal information is provided
3. Have ability to identify and formulate strategies to characterize biochemical and biophysical properties of proteins.
4. Have ability to present and defend the findings of a scientific peer reviewed article and also critically evaluate the scientific findings.

Course Resources

Required Course Text: None

For part 1 (taught by Dr. Tiwari) there are no required text books. The topics covered in this course will be from peer reviewed literature/books. Please do not buy any text book. Most of the information can be gathered from web or references cited in the presentation. For reference purpose one can use any of the following books if available (no need to buy)-

Thomas E Creighton  Proteins: Structures and Molecular Properties
Alan Fersht  Enzyme Structure and Mechanism
Gregory A. Petsko and Dagmar Ringe  Protein Structure and Function

Grading Scheme

Grading System

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
<th>Grade points/credit</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93% &amp; above</td>
<td>4.00</td>
<td>Excellent</td>
</tr>
<tr>
<td>AB</td>
<td>88% – 92%</td>
<td>3.50</td>
<td>Very good</td>
</tr>
<tr>
<td>B</td>
<td>82% – 87%</td>
<td>3.00</td>
<td>Good</td>
</tr>
<tr>
<td>BC</td>
<td>76% – 81%</td>
<td>2.50</td>
<td>Above average</td>
</tr>
<tr>
<td>C</td>
<td>70% – 75%</td>
<td>2.00</td>
<td>Average</td>
</tr>
<tr>
<td>CD</td>
<td>65% – 69%</td>
<td>1.50</td>
<td>Below average</td>
</tr>
<tr>
<td>D</td>
<td>60% - 64%</td>
<td>1.00</td>
<td>Inferior</td>
</tr>
<tr>
<td>F</td>
<td>59% and below</td>
<td>0.00</td>
<td>Failure</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control. A grade of incomplete may be given only when approved in writing by the department chair or school dean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up within the next semester in residence or the grade becomes a failure (F). A (X) grade is computed into the grade point average as a (F) grade.</td>
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Grading Policy

For part 1 (taught by Dr. Tiwari) grades will be based on the following:

<table>
<thead>
<tr>
<th>Homework/assignment</th>
<th>20</th>
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</thead>
<tbody>
<tr>
<td>Exams (2 exams x 20 % each)</td>
<td>40</td>
</tr>
<tr>
<td>Paper presentation</td>
<td>25</td>
</tr>
<tr>
<td>Class attendance/participation</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total Percent</strong></td>
<td><strong>100</strong></td>
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Late Assignments

Any assignment which is delayed more than 1 day will have 10% marks cut; upto 3 days 20% marks cut. Any assignment late by one week or more will not be used for grading.

Course Policies

For homework/assignment individual study is encouraged; but for paper presentation students can work in groups.
Collaboration/Plagiarism Rules

While collaboration is encouraged students should not copy work from each other and should read and follow the academic policies and procedures as governed by the University (see below).

University Policies

Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance the University's policies.

If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see me as soon as possible so that we can make appropriate arrangements. The Affirmative Action Office has asked that you be made aware of the following:

Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at 487-2212. For other concerns about discrimination, you may contact your advisor, department head or the Affirmative Action Office, at 487-3310

Academic Integrity: http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html

Affirmative Action: 
http://www.admin.mtu.edu/ao/

Disability Services: http://www.admin.mtu.edu/urel/studenthandbook/student_services.html#disability

Equal Opportunity Statement: 

Course Schedule

Homework: Assignments will be due on Monday before the class starting week 2.

Quizzes: Short quizzes will be given in class.

Exam Schedule:

Exam 1: Week 3

Exam 2 (Final for Part 1): Week 7
**Course Schedule**

**Week 1 (Aug. 29 to Sep. 2) Part 1: Instructor Dr. Tiwari**
--- **Course introduction:** Overview on proteins
--- Why study proteins? Diversity! Proteins in daily life!
--- Chemical forces and molecular interactions; common structural motifs.

**Week 2 (Sep. 5 to Sep. 9)**
--- Proteins structural hierarchy, and determinants of protein folding.
--- Protein folding, stability, and proteostasis.
--- Paper assignment: for presentation/discussion by students in week 4.

**Week 3 (Sep. 12 to Sep. 16)**
--- Analysis of Protein structure 1 (Biochemical methods)
--- Analysis of Protein structure 2 (Biophysical methods)

**Week 4 (Sep. 19 to Sep. 23)**
--- Protein expression and purification strategies.
--- **Exam 1 (Part 1).**

**Week 5 (Sep. 26 to Sep. 30)**
--- Protein folding, stability, and proteostasis.
--- Protein misfolding, functional amyloid, and human disease
--- Discussion of the test paper.

**Week 6 (Oct. 3 to Oct. 7)**
--- Paper presentation by group 1 (20 to 25 min presentation summarizing the salient feature from paper; followed by questions and answers by the rest of class).
--- Paper presentation by group 2 (20 to 25 min presentation summarizing the salient feature from paper; followed by questions and answers by the rest of the class).

**Moderator: Dr. Tiwari**

**Week 7 (Oct. 10 to Oct. 14)**
--- Protein misfolding, functional amyloid, and human disease
----- **Final Exam (Part 1)**

**END OF PART 1**

Part 2 taught by Dr. Dam (contact him for details)