Course Syllabus
CH3540 – Biophysical Chemistry
Department of Chemistry
Spring 2016

Instructor Information
Instructor: Dr. Ashutosh Tiwari, Associate Professor
Office Location: 402B ChemSci
Telephone: Office – (906) 487-1840
E-mail: tiwari@mtu.edu
Office Hours: W 3:00pm to 4:30pm and by appointment
Web site http://www.mtu.edu/chemistry/department/faculty/tiwari/

Course Identification
Course Number: CH3540
Course Name: Biophysical Chemistry
Course Location: 104A Chem Sci
Class Times: MWF 12:05pm to 12:55pm
Prerequisites: (BL 1020 or BL 1040) and CH 1120 or CH 1122 or (CH 1160 and CH 1161) and MA 2160 and PH 2200

Course Description/Overview
The goal of this course is to examine fundamental physical principles underlying complex biological systems in order to understand the interactions and behaviors found in biological, biochemical, and physical systems. Topics include macromolecules in aqueous environments, spectroscopy and structure determination, kinetics, membranes, and transport phenomena.

Course Learning Objectives
After completing the course, the students should be able to do the following.

1. Should have broad knowledge and understanding about the physical principles underlying biological phenomena.
2. Have understanding of how solution dynamics, thermodynamics, kinetics, and spectroscopy can be applied to biological problems.
3. Have understanding of proteins, its role in cells and its function at molecular level.
4. Have ability to identify and formulate strategies to characterize biochemical and biophysical properties of macromolecules such as DNA and proteins.
**Course Resources**

**Course Website(s)**

**CAMPUS Learning Management System (LMS):** Michigan Tech is using LMS called CANVAS. To access CANVAS, go to [http://mtu.instructure.com](http://mtu.instructure.com) and enter your Michigan Tech ISO username and password. Once logged in, you can select your course from the “courses & groups” menu. Select the one that is labeled “CH3540 Biophysical Chemistry (tiwari)” for access to class related materials.

**REDINOTES:** The class PowerPoint slides will be made available on CANVAS for you to download and print. These notes are NOT designed to replace taking good notes, but they will allow you to pay closer attention to classroom discussion, and write down any additional information.

**Required Course Text**

**BOOK:** *Biophysical Chemistry* by James P. Allen.

**Publisher:** Wiley-Blackwell; **ISBN:** 978-1-4051-2436-2

Other additional readings as required.

**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>87% – 92%</td>
<td>3.50</td>
<td>Very good</td>
</tr>
<tr>
<td>B</td>
<td>82% – 86%</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></td>
<td></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>
</tr>
<tr>
<td>X</td>
<td></td>
<td></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>
</tr>
</tbody>
</table>
Grading Policy
Grades will be based on the following percentage distribution:

<table>
<thead>
<tr>
<th>Grading Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework/assignment</td>
<td>25</td>
</tr>
<tr>
<td>Hour Exams (3 mid-term exams × 10% each)</td>
<td>30</td>
</tr>
<tr>
<td>Quizzes/i-clicker</td>
<td>15</td>
</tr>
<tr>
<td>Class participation</td>
<td>10</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total percent</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**i-clicker**: Studies have shown that it is extremely important for students to be engaged in the classroom experience if they are to maximize their learning. In an attempt to engage all of you and get you thinking about the problem posed in class we will use **i-clicker** in class. The **i-clicker** is a response system that allows you to respond to questions I pose during class, and you will be graded on your responses, and your participation. The purpose of i-clicker remotes is to help guide your learning rather than simply acting as a measure of attendance. You will be able to accumulate maximum of 10 points per lecture (1 point for answering the question and 2 points for answering the question correctly). In addition, I will drop up to 10% of the lowest scores so that you can “have bad days” or absences without significant penalty. We will begin accumulating points in Week 2.

In order to receive this credit, you will need to register your i-clicker remote using Canvas within the first **TWO WEEKS** of class as follows:

1. Before registering, you must come to class and vote on at least one question in order to complete this registration properly. This should, hopefully, have happened on the first day.

2. Once you have voted on a question in my class, go to LMS
   Logon to Canvas and select the ‘CH3540 Spring 2016’ from ‘my course’ menu.
   a. Click on the ‘i-clicker’ in the menu on the left side and complete the registration by filling in the remote ID of your i-clicker.
   b. Your remote ID is the series of numbers and sometimes letters found on the bottom of the back of your i-clicker remote. See instructions for registering on i-clicker page on Canvas.
i>clicker will be used every day in class, and you are responsible for bringing your remote daily. After the first two weeks I will upload scores on a weekly basis and do not backdate for people who forget to register.

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

**Course Policies**
Active class participation is required e.g. asking and answering questions, presenting thoughts/ideas relevant to the topic of the day. For homework/assignment individual study is encouraged.

Attendance at all of the class session is mandatory unless you are sick. You are responsible for announcements made in class.

**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.mtu.edu/deanofstudents/academic-policies/integrity/](http://www.mtu.edu/deanofstudents/academic-policies/integrity/)

**Affirmative Action:**
[http://www.mtu.edu/equity/](http://www.mtu.edu/equity/)
Student Support Services:
http://www.mtu.edu/catalog/undergraduate/overview/student-life/

Equal Opportunity Statement:
http://www.admin.mtu.edu/admin/boc/policy/ch5/ch5p2.htm

Course Schedule

Homework: Assignments will be due on Monday before the class starting week 3.

Quizzes: Short quizzes will be given in class.

Exam Schedule:

Mid-term Exam 1: February 8, 2016
Mid-term Exam 2: March 2, 2016
Mid-term Exam 3: April 13, 2016
Final Exam: During the week of April 25, 2016

Final exam dates are located at www.mtu.edu/registrar (look under Most Viewed Pages)

Course Outline

Note: The exact order in which topics are covered may be different than presented below.

Thermodynamics and kinetics:

Quantum Mechanics and spectroscopy:

Understanding biological systems using physical chemistry: