

**Physical Biochemistry**  
**Chemistry 4712**  
**Spring 2007**

Lecture: 9:30 - 10:45, TR

Instructor: Dr. John E. Hansen

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Office Hrs: MW 10:00 - 1:00, T 10:50 – 2:50

Text: Proteins: Structures and Molecular Properties, Second Edition

**Course Objectives**

CHEM 4712 is a course in physical biochemistry intended to introduce to students the fundamental principles that govern the behavior of biological macromolecules, as well as the methods used to measure the properties of those molecules. Specific topics to be covered in this course include molecular structure and function relationships, protein stability and folding, behavior of proteins in solution and membranes, protein-protein interactions, enzyme kinetics, electron transfer processes, spectroscopy of biological molecules, and x-ray diffraction.

**Course Outcomes**

Students will demonstrate their understanding of the physical basis for the behavior and properties of biological molecules. They will be introduced to the modern scientific literature and demonstrate their understanding of the problems that presently confront scientists in the field. They will also demonstrate their ability to interpret the significance of experimental results obtained from the scientific literature.

**Expectations**

At this point in your academic careers you have attained a level of maturity in which you should be considering yourselves scholars and not merely students. An important part of scholarship is having the discipline and motivation of using library resources; in particular, you should be regularly browsing professional journals. This should not be a painstaking activity, but rather an activity that brings you satisfaction and enjoyment. Some of the journals that you should find useful in this course are the following: Journal of Biological Chemistry, Biochemistry, Biophysical Chemistry, European Journal of Biochemistry, Journal of Molecular Biology, Nature, Science, Journal of Physical Chemistry, and Journal of the American Chemical Society.

**Grading**

There will be a total of three take home exams. Each Exam is worth 100 points. Grades will be calculated based on a maximum of 300 points.

Grade Scale: > 90% = A; 80 - 90% = B; 70 - 80% = C; 60 - 70% = D; < 60% = F

### **Policies**

1. You are responsible for all material covered and all announcements made in class. Absence from class does not excuse or relieve you of this responsibility.
2. Cheating will not be tolerated. It will result in a grade of zero. All out of class assignments will be done in the **absence** of any collaboration. All questions, clarifications, or requests for assistance should be directed only to me.
3. No make-up exams will be given. Anyone not able to take an exam on the day scheduled must contact me before the exam.
4. Your attendance at all class times is critical to your success in this course. I reserve the right to withdraw you from class roles due to flagrant absences or tardiness.
5. **NO CELL PHONES!!** They need to be placed completely out of my sight and turned off during my class. I do mean put away (not left on your belt). Place them in your packs or leave them in your vehicle. If you violate this rule you will be asked to leave my class, and you will be considered absent for that day. If you violate this rule during an exam it will be considered as an incident of cheating.
6. If you contact me by email you are expected to use your UWG account.

### **TENTATIVE SCHEDULE**

<b>Date</b>	<b>Topic</b>	<b>Chapters</b>
1/09	Properties of Amino Acids & Polypeptides	1
1/11	Detection and Size Determination of Proteins	1
1/16	Protein Structure	1
1/18	Protein Biosynthesis	2
1/23	Protein Engineering	2
1/25	Posttranslational Modifications	2
1/30	Physical Interactions & Protein Structure	4
2/01	Physical Interactions & Protein Structure	4
2/06	Spectroscopic Methods & Protein Structure	handout & 5
2/08	Spectroscopic Methods & Protein Structure	handout & 5
<b>Exam I</b>		
2/13	X-ray Crystallography & Structure of Globular Proteins	handout & 6
2/15	X-ray Crystallography & Structure of Globular Proteins	handout & 6
2/20	X-ray Crystallography & Structure of Globular Proteins	handout & 6
2/22	X-ray Crystallography & Structure of Globular Proteins	handout & 6

2/27	Properties of Proteins in Solution	7
3/01	Protein Folding	handout & 7
3/06	Protein Folding	handout & 7
3/08	Protein Folding	handout & 7
3/13	Protein Folding	handout & 7
3/15	Protein Folding	handout & 7
<b>Exam II</b>		
3/27	Membrane Proteins	7
3/29	Membrane Proteins	7
4/03	Membrane Proteins	7
4/05	Membrane Proteins	7
4/10	Enzyme Kinetics	9 & handout
4/12	Enzyme Kinetics	9 & handout
4/17	Enzyme Kinetics	9 & handout
4/19	Enzyme Kinetics	9 & handout
4/24	Electron Transfer	handout
4/26	Electron Transfer	handout

### **Exam III**

#### **SUPPLEMENTARY TEXTS** (recommended, not required):

BIOCHEMISTRY by Voet and Voet  
 PHYSICAL BIOCHEMISTRY by van Holde, Johnson, and Ho  
 THE PHYSICAL BASIS OF BIOCHEMISTRY by Bergethon  
 BIOPHYSICAL CHEMISTRY, Volumes I - III, by Cantor and Schimmel  
 INTRODUCTION TO PROTEIN STRUCTURE by Branden and Tooze  
 PROTEIN STRUCTURE by Creighton  
 PROTEIN FUNCTION by Creighton  
 STRUCTURE IN PROTEIN CHEMISTRY by Kyte  
 MECHANISMS IN PROTEIN CHEMISTRY by Kyte  
 PROTEIN STABILITY AND FOLDING by Shirley  
 PROTEIN FOLDING by Creighton  
 PRINCIPLES OF PROTEIN X-RAY CRYSTALLOGRAPHY by Drenth  
 PRACTICAL PROTEIN CRYSTALLOGRAPHY by McRee  
 ENZYME STRUCTURE AND MECHANISM by Fersht

ENZYME KINETICS by Segel  
PROTEIN INTERACTIONS by Weber