

# Biochemistry I: Proteins and Enzyme BIOC12H

Summer 2020  
Course outline

## Instructor:

Professor Shelley Brunt

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On-line lecture from 9 to 11 am using blackboard collaborate

The primary **learning objectives of this course are:**

- Expand your understanding of the structure of proteins
- Address the important role proteins play as enzymes, signaling molecules and structural molecules in the cell.

Throughout the term we will discuss and evaluate:

- The importance of primary structure, protein folding and post-translational modifications as it relates to determining tertiary and quaternary protein structure and function.
- The significance of the role amino acid interactions play in protein folding. Specifically, we will address how amino acids influence structure from secondary through quaternary.
- We will evaluate the critical role of protein; protein interactions related to cellular function.

**What is our target goal?** By the end of the course students will have the knowledge and experience to interpret based on primary protein structure potential secondary structure, protein localization and post-translational modifications present, leading to structure and function. This will be valuable as you go forward in all fields of biology and is especially useful in the field of biochemistry, molecular and cellular biology, biotechnology, pharmaceutical, and medically related fields.

**This process will encompass the following learning outcomes:**

- Understand the significance of amino acid structure in primary, secondary and tertiary structure and protein function
- Understand the role of non-covalent interactions in protein folding
- Understand the role of post-translational modification in protein function
- Evaluate primary structure of proteins and apply to protein function
- Analyze the role of protein sequence and folding in non-disease and disease states
- Evaluate the contribution of amino acid composition to enzyme function
- Identify and evaluate the list of relevant parameters for predicting protein localization

## **Communication**

**Please use U of T account for email ( I will not answer emails from non-U OF T accounts ) and please indicate the course in the subject heading as I teach 3 courses this summer. I will answer emails between 9 am and 5 pm in weekdays. I will post an announcement if I am not available on a particular day.**

- General announcements and any material needed for the course will be posted on **Quercus**.

**Office hours: on-line on Wednesdays immediately after lecture for 11 to noon.**

## **Accessibility: AccessAbility statement**

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 approach me and/or the AccessAbility Services Office as soon as possible. AccessAbility Services staff (located in Rm AA142, Arts and Administration Building) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca). The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

## **Academic integrity/plagiarism**

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 in papers and assignments include 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 cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

<http://www.utsc.utoronto.ca/vpdean/academic-integrity>

## Examples of plagiarism

### **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/aacc/academic-integrity> )

## Use of Turnitin (plagiarism software) in BIOC12

All assignments will be deposited to Turnitin via Quercus submission

"Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site".

## Intellectual Property

Recording or photographing or video capture of any aspect of a university course - lecture, tutorial, seminar, lab, studio, practice session, field trip etc. – without prior approval of all involved and with written approval from the instructor is not permitted.

### Course schedule:

Two hours of class on line per week (using blackboard collaborate): Wed 9 am to 11 am

### Grade breakdown:

- **For any assignment that cannot be handed in on time:** late assignments will have a 10% per day deduction- no assignment will be accepted more than 5 days late.
- All assignments are submitted electronically to Quercus

### Self-declaration for illness:

If you are self- declaring you must fill out the self-declaration form and submit it to myself and Jennifer Campbell within three days the assignment is due

### Grade Breakdown

**In class or small out of class assignments** based on one-minute write (individual and group) assignments/summaries, case studies, reflective writing and other lecture participation (you may opt out and the grade will be moved to the final exam (please inform me by the end of the fourth week of lecture). These will be posted or carried out during the lecture

- Given out randomly during class - students will be excused for only one of these s for the purpose of grading (no self declarations) **10%**

### Assignment 1:

Analysis of protein sequence - structural analysis

- **June 22, 10 pm** **12%**

### Assignment 2:

**A PowerPoint lecture presentation** that addresses the role of protein folding/misfolding in a disease of your choice. Research the topic of choice (use at least 6 primary source papers) and construct your mini lecture. (Between 12 and 15 slides -Title slide or Reference slide not included: remember to do in text citation and cite source of figures)

- **July 13 10 pm** **15%**

### **Assignment 3**

**Mini-paper on the role of protein chaperones in protein folding and protein trafficking** ( 3-4 pages double spaced (between 750 and 1000 words 12 pt- 5 references at least 3 of which primary sources, page limit does not include references or figures)

- **July 30** **14%**

### **Assignment 4**

**Analysis of protein sequence for posttranslational modification**

- **August 13** **12%**

### **Final exam**

on line final exam (cumulative in exam period) **37%**

### **Lecture material:**

Lectures will be posted on Quercus prior to lecture and I will provide audio clips to support the text when necessary.

### **Lecture schedule:**

**I have provided topic numbers rather than dates. Some topics will be covered over more than one lecture, others in less than one lecture**

Topic 1: Introduction to biochemistry, basic terms

Topic 2: role of water in biochemical reactions/pH

Topic 3: Primary secondary, tertiary and quaternary Structure of proteins

Topic 4: Protein structure, function and stability as well as purification and related methodologies

Topic 5: enzymes and enzyme kinetics

Topic 6: Role of Coenzymes and vitamins in enzymatic assays

Topic 7: Carbohydrate general structure and mechanisms of glycosylation of proteins, and protein trafficking other forms of post-translational modification

Topic 8: lipids, membrane structure and role of posttranslational modifications of proteins in protein localization and membranes