

# Biochemistry I: Proteins and Enzyme BIOC12H

Summer 2019  
Course outline

## Instructor:

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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 list of relevant parameters for predicting protein localization

## Communication

**The best way to reach me is to drop by and see me** ( if my door is open I am available, if it is closed it usually means I am not there, but by all means knock) . I prefer to meet with you in person to answer your questions. This is why I have an **open door policy**. **Alternatively come by during my formal office hours**. **I encourage you to come and ask questions about the course material or other issues related to success in your education**. If you wish to see me at a specific time outside of office hours then it is best to email me the request for an appointment. I will respond within the day. I will answer emails when I am on campus. I am on campus generally Monday through Friday. If you send me emails on the weekend, you may not get a response until the following Monday. **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 4 courses in the summer.**

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

**Office hours: These are the hours that I am definitely in my office but I am generally there except when I am in meetings, lecturing and checking on my lab courses**

- Tuesday 10 to 11 am and 2:15 to 3 pm.
- Wednesday 11 to noon
- Thursday 1:00 to 2:00 pm
- If you like come as a group and ask questions as a group

## 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 SW302, Science Wing) 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://academicintegrity.utoronto.ca/>

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(source [http://www.uts.utoronto.ca/~vpdean/academic\\_integrity.html](http://www.uts.utoronto.ca/~vpdean/academic_integrity.html) )

#### **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.

Submitted work may be requested to be submitted turnitin

- *"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”.*

- **If you wish to opt out of turnitin, you must do it in writing to Professor. Brunt and provide an electronic copy of your lab report as well as copies of all rough work and referenced material.**

**Intellectual Property (CTSI)** - <http://teaching.utoronto.ca/teaching-support/course-design/developing-a-syllabus/> - “Recording or photographing 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. For further information on University policies, please refer to the following links for details

### **Lecture material:**

**Lecture aids** will be posted on Quercus prior to lecture. I provide these lecture aids **prior to class** to allow you to more easily follow along in lecture and add additional information without concern for missing major points. **My goal** is that with the aids **you will be able to listen, think and hopefully interconnect the ideas presented in lecture**. I will discuss material in more detail than is presented on the lecture aids. **The material that is covered in the exams will come from the material discussed in lecture**. Material that may appear in an exam includes material I may discuss within the lecture that is not on the lecture aids provided or may not be fully discussed on the lecture aids. Moreover **I will highlight more strongly certain concepts in lecture** that will not be evident from the lecture slides themselves.

- **Attendance at the lectures is very highly recommended** in order for you to get maximum benefit from this course. **I also have in class participation assignments that will aid in your understanding of the concepts. If you wish to opt out of these you must email by the end of the fourth lecture. The percentage will be moved to the final exam**
- Each student is encouraged to ask questions, and participate in class and in office hours. Often times a question can lead to an interesting discussion for all students.

**Your custom textbook serves as an important resource. The textbook I use is the least expensive available and contains background on all concepts I discuss in lecture. It also has excellent example questions following each chapter**

**Textbook:** is a custom text which contains only material that is relevant to this course

**Called:** **Biochemistry I: Proteins and Enzymes from the Pearson custom library for Chemistry. 2013 Person Learning Solutions;**

**It is customized from Moran, Horton, Scrimgeour and Perry Principles in Biochemistry fifth edition Publisher Pearson 2012**

### **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

**7%**

- Given out randomly during class must complete more than 80% of the assignments for full credit (minimum of 4, no maximum given out during term).

**Assignment:** A mini-PowerPoint lecture presentation of approximately 7 slides (not including title slide or References) that addresses the role of protein folding/misfolding in a disease of your choice. Research the topic of choice (use at least 4 primary source papers) and construct your mini lecture.

July 19 2019 electronically by 11:59 pm **7%**

- o For missed assignment deadline see self declaration forms posted to department website. All assignments must be handed in within 5 days of the due date or a mark of zero will be assigned

### **Midterms ( two) (dates to be announced:**

midterm one ( all multiple choice) (in class June 5, 2019) **17%**  
Midterm two ( MC and short answer) (early July-out of class) **29%**

- a UTSC medical certificate(available on the registrars site) will be required for missed midterms due to illness. **You must contact me within 48 hrs of the midterm to confirm that you missed the midterm and will be writing the makeup.** The certificate must be presented prior to any makeup work to Jennifer Campbell in the Biology administrative office
  - o If you cannot attend Friday evening or Saturday Tests/Exams for religious reasons, please notify me in writing within one week of the announced Test / Exam date.
- **Exam format for the second midterm and final:** the majority of the exam will be multiple choice, but a portion (up to 30-35% of the grade) will be short answer, graphs or calculations

### **Final exam (during final exam period)**

(it is **cumulative in concepts**, but covers **specific theory from the material after the second midterm**)

**40%**

- Format will be identical to the second midterm
- Students who miss the Final Exam must petition through the Registrar's Office to take a Deferred Final Exam.

### **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