

CHM 479S (1008S) Biological Chemistry

Course Outline 2021

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Class Location and Time: - Prerecorded lectures posted on Quercus
- Weekly discussion group will be held Thursdays at 11 am EST synchronously on Zoom. Zoom link for synchronous discussion will be posted in Quercus.

Student meetings: Times are flexible, please contact me for an appointment

Prerequisites: BCH210H, CHM347, CHM348. This course assumes you have an understanding of the reactivity of common chemical functional groups, basic enzyme kinetics, general biochemical methods.

Reference text: D. Voet and J. G. Voet, "Biochemistry". Journal articles will also be cited in lecture notes.

Overview: Course covers in-depth examination of bacterial peptidoglycan biosynthesis, how the mechanisms of the enzymes involved were determined and how these enzymes have been targeted for antibiotic discovery.

Learning Outcome: At the end of the course you will be able to apply chemical knowledge to understand, evaluate and speculate on how small molecules may interact with and effect biochemical pathways and enzyme systems. Using your interpretation of biochemical assay results you will be able to propose hypothesis concerning the mechanisms of the enzymes involved and how they relate to the overall biochemical pathway.

Lecture Notes

Event (Date)	Topic
Lecture 1	Course intro Penicillin story, Discovery and isolation
Lecture 2	MurA Peptidoglycan synthesis
<i>Discussion 1 Jan 14th</i>	
Lecture 3	MurB Peptidoglycan synthesis
<i>Discussion 2 Jan 21th</i>	
Lecture 4-5	MurC-F
<i>Discussion 3 Jan 28th (Assignment 1 posted)</i>	
Lecture 6	MraY
Lecture 7, 8	Mur G
<i>Discussion 4 Feb 4th</i>	
Lecture 9	Flippase
<i>Discussion 5 Feb 11th (Assignment 2 posted)</i>	
Reading Week	
Lecture 9	Polymerizing the glycan
Lecture 10	Crosslinking the peptide
<i>Discussion 6 Feb 25th</i>	
Lecture 12	Penicillin mechanism
<i>Discussion 7 March 4th (Assignment 3 posted)</i>	
Lecture 13	Penicillin resistance
Lecture 14	Avoiding Penicillin resistance
<i>Discussion 8 March 11th</i>	
Lecture 15	Metallo-lactamases Vancomycin
Lecture 16	Vancomycin Resistance and other supramolecules
<i>Discussion 9 March 18th (Assignment 4 posted)</i>	
Lecture 17	Non-ribosomal peptide synthesis
<i>Discussion 10 March 25th</i>	
Lecture 18	Vancomycin Biosynthesis
Lecture 19	Lysozyme
Discussion 11 April 1st	
Additional graduate student presentations	
Discussion 12 April 7 th	

Grading Scheme CHM 479

Assignments:	50%
Term Paper:	35%
Discussion Questions:	15%
(Best 9 out of 11)	

CHM 1008

Assignments:	40%
Term Paper:	30%
Presentation:	20%
Discussion Questions:	10%
(Best 9 out of 11)	

Assignments:

These assignments will be based on literature related to the enzymes and topics we cover in the course. You will have two weeks to complete each assignment (reading week doesn't count) once it is posted. The due dates of the take home assignments are below. Assignments are to be submitted via Quercus.

Assignment 1 Due Feb 11th

Assignment 2 Due March. 4th

Assignment 3 Due March 18th

Assignment 4 Due April 7th

Term Paper:

Due April 16th. 10 page written assignment about the discovery and mechanism of an antibiotic, to be submitted via Quercus. Further details will be discussed in mid-January.

Late Policy:

Late assignments and the term paper are penalized by $2^{(\text{days late})}\%$. Assignments more than week late will not be graded.

Discussion Participation:

Due the Tuesday before the class discussion. A written question about the prior weeks material is submitted via Quercus. These questions will be taken up in the subsequent synchronous discussion. The grading of the questions will be taken up in discussion 1. Note there is no question due in the for the first discussion. Late discussion questions will not be accepted. The best 9 discussion question grades out of the 11 possible submissions will count towards your grade.

Technology Requirements:

Specific guidance from the U of T Vice-Provost, Students regarding student technology requirements is available here: <https://www.vicereprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/>

Advice for students more broadly regarding online learning is available here:

<https://onlinelearning.utoronto.ca/getting-ready-for-online/>

This course requires the use of computers, and of course sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, broken printers, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension.

On Academic Integrity:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters

<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1->

[2019](#)) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

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 <https://www.academicintegrity.utoronto.ca/>).

Turnitin:

“Normally, students will be required to submit their final written assignment 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”.

Absences:

If you miss a significant period of class work through illness or a related reason which impacts your submission of one or more assignments, you should request consideration. It is necessary for you to record your absence: details can be found below. After declaring your absence please contact me via email to discuss accommodation.

Look under absence declaration:

<https://www.artsci.utoronto.ca/covid19-artsci-student-faqs#decla>

Email Policy

For a response...

- All emails must contain a full student name and student number.
- Short questions only. Detailed questions especially those referring to chemical structures should be saved for office hours. These are very difficult to answer over email.

All efforts will be made to return emails within 24 hrs.

Accessibility Needs:

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible:

disability.services@utoronto.ca or <http://studentlife.utoronto.ca/accessibility>

Additional Services & Support

The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Academic Success Centre](#)
- Learner support at the [Writing Centre](#)
- Information for [Technical Support/Quercus Support](#)