

We recognize and acknowledge that McMaster University meets and learns on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the "[Dish With One Spoon](#)" wampum, an agreement amongst all allied Nations to peaceably share and care for the resources around the Great Lakes.

BIOCHEM 3G03 – Proteins and Nucleic Acids C01-(4387)

2024 Fall Term

Instructor: Dr. Daniel Yang | **E-mail:** yang@mcmaster.ca | **Office:** HSC 4N20A

Instructor: Dr. Russell Bishop | **E-mail:** bishopr@mcmaster.ca | **Office:** HSC 4H26F

TA: Kelly Kan | **E-mail:** kank8@mcmaster.ca

TA: Sarah Kwok | **E-mail:** kwoks12@mcmaster.ca

Office Hours: Available upon request

COURSE DESCRIPTION

Chemical and conformational properties of proteins and relationships to their function including regulation of enzyme activity. Chemical and physical structure of DNA and RNA relevant to biological function.

COURSE AND LEARNING OBJECTIVES

Learning Objectives

By the end of this course the student should be able to:

- Accurately describe the chemical and conformational properties of proteins
- Explain enzyme reaction mechanisms and understand their structure-function relationships
- Describe the structures of DNA and RNA
- Accurately describe the various factors involved in the execution and regulation of replication, transcription and translation

Course Details

PGCLL B138

Monday & Wednesday 8:30 AM – 9:20 AM

Friday 10:30 AM - 11:20 AM

MATERIALS & FEES

REQUIRED MATERIALS/ RESOURCES

Textbook

Essential Biochemistry, 5th edition. C.W.Pratt and K. Cornely. Wiley & Sons Inc. 2021. (required) This book is available at the Campus Store.

Calculator

Only the McMaster standard calculator (Casio fx-991MS) will be allowed during all tests and exams. It is available at the Campus Store

Software

We will be encouraged to view macromolecules using molecular modelling programs such as PyMol and ChimeraX. We can also employ an artificial intelligence (AI) program known as AlphaFold2 to predict protein structures from amino acid sequences. However, students are not permitted to use generative AI in this course. Use of ChatGPT is prohibited because it is a form of contract cheating. In alignment with McMaster academic integrity policy, it “shall be an offence knowingly to submit academic work for assessment that was purchased or acquired from another source.” This includes work created by generative AI tools. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

VIRTUAL COURSE DELIVERY

While regular lectures will be given in-person, we may occasionally deliver lectures virtually in case instructors need to isolate. For the benefit of students who need to isolate, lectures will be recorded on Echo360. All tutorials will be delivered virtually. To follow and participate in virtual classes it is expected that you have reliable access to the following:

- A computer that meets performance requirements [found here](#).
- An internet connection that is fast enough to stream video.

- Computer accessories that enable class participation, such as a microphone, speakers and webcam when needed.

If you think that you will not be able to meet these requirements, please contact uts@mcmaster.ca as soon as you can. Please visit the [Technology Resources for Students page](#) for detailed requirements. If you use assistive technology or believe that our platforms might be a barrier to participating, please contact [Student Accessibility Services](#), sas@mcmaster.ca, for support

Course Website

All course related materials are posted on Avenue.

COURSE OVERVIEW AND ASSESSMENT

Course Schedule – Subject to Change

Lecture #	Date	Topics-Remarks	Chapter	Instructor:
1	04-Sep	Organization		Yang & Bishop
2	06-Sep	Chemical Basis of Life	Ch 1	Yang
3	09-Sep	Chemical Basis of Life	Ch 1	Yang
4	11-Sep	Test 1	Ch 1	Yang
5	13-Sep	Aqueous Chemistry	Ch 2	Yang
6	16-Sep	Aqueous Chemistry	Ch 2	Yang
7	18-Sep	From Genes to Proteins	Ch 3	Yang
8	20-Sep	From Genes to Proteins	Ch 3	Yang
9	23-Sep	From Genes to Proteins	Ch 3	Yang
10	25-Sep	Test 2	Ch 1 - 3	Yang
11	27-Sep	Protein Structure	Ch 4	Yang
	30-Sep	National Day for Truth and Reconciliation: No classes		
12	02-Oct	Protein Structure	Ch 4	Yang
13	04-Oct	Protein Structure	Ch 4	Yang
14	07-Oct	Protein Function	Ch 5	Yang
15	Oct 9	Test 3	Ch 1 - 4	Yang
16	Oct 11	Protein Function	Ch 5	Yang
	14-Oct	Mid-term recess		
17	21-Oct	How Enzymes Work	Ch 6	Bishop
18	23-Oct	How Enzymes Work	Ch 6	Bishop
19	25-Oct	How Enzymes Work	Ch 6	Bishop
20	28-Oct	Enzyme Kinetics and Inhibition	Ch 7	Bishop

21	30-Oct	Test 4	Ch 1 - 6	Bishop
22	01-Nov	Enzyme Kinetics and Inhibition	Ch 7	Bishop
23	04-Nov	DNA Replication and Repair	Ch 20	Bishop
24	06-Nov	DNA Replication and Repair	Ch 20	Bishop
25	08-Nov	DNA Replication and Repair	Ch 20	Bishop
26	11-Nov	Transcription and RNA	Ch 21	Bishop
27	13-Nov	Test 5	Ch 1 - 20	Bishop
28	15-Nov	Transcription and RNA	Ch 21	Bishop
29	18-Nov	Transcription and RNA	Ch 21	Bishop
30	20-Nov	Protein Synthesis	Ch 22	Bishop
31	22-Nov	Protein Synthesis	Ch 22	Bishop
32	25-Nov	Protein Synthesis	Ch 22	Bishop
33	27-Nov	Test 6	Ch 1 - 22	Bishop
	29-Nov	No Class		
	02-Dec	No Class		
	04-Dec	No Class		

Online Tutorials (Teams):

3 pm - 5 pm on Thursday, Friday, Monday & Tuesday before every test.

EVALUATION

It will be based on six tests (*all multiple choices*). The final grade will be calculated with the sixth test plus the best 4 out of the first five tests. No make-up tests except the 6th test will be offered. If you miss a test (with or without filing **MSAF**), the test will be dropped automatically. Students are responsible for materials covered in the textbook and lectures. Percentage grade will be converted to a final letter grade (see Table below).

%	Letter	%	Letter	%	Letter	%	Letter	%	Letter
100-90	A+	79 - 77	B+	69 – 67	C+	59-57	D+	49-0	F
89 – 85	A	76 - 73	B	66 – 63	C	56-53	D		
84 – 80	A-	72 - 70	B-	60-62	C-	52-50	D-		

All percentage grades within 0.5% of the next letter grade will be reviewed.

You have **one week** after a test has been completed and the results released to contact the course instructor, to report an issue, *i.e.* incorrect addition. Please make sure to take a good look at your test results once they are released.

Final Exam

This course has no final exam.

3G03_ID

In order to protect your identity, the right 4 digits of your student id (i.e. 400214283 => 4283) will be used for communication in this course. If there is more than one student with the same right 4 digits, you'll be identified as 4283a, 4283b, etc. Students involved in such cases will be notified by email. In addition to your 4-digit ID, you will also be given a unique version number between 1-700 (see table at the end of this document), e.g. 4283 => version 212. Your assigned version number is used for all tests. Please make sure you remember your version number.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

[McMaster Student Absence Form \(MSAF\)](#): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

Policy Regarding Missed Work

If you are absent from the university for a minor medical reason, lasting fewer than 5 days, you may report your absence, one per term, without documentation, using the McMaster Student Absence Form (<http://www.mcmaster.ca/msaf/>). Absences for a long duration or for other reasons must be reported to the Associate Dean of Science office, with documentation, and relief may not necessarily be granted. After filling out the MSAF you must immediately contact your course instructor (normally within 2 working days) by email to learn what relief may be granted for the work you have missed and relevant details for submission or location of make-up test. Please note that the MSAF may not be used for term work worth 25% or more, nor can it be used for the final exam.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact [Student Accessibility Services \(SAS\)](#) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program

Coordinator. For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

The various accommodations obtained through the SAS office will only be honored if you write your test at the SAS facilities.

The SAS office will provide you with a printed copy of the test and you'll enter your answers to a scantron.

You can still write your test online but no accommodations will be allowed.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office *normally within 10 working days* of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
- improper collaboration in group work.

- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

In this course, we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities \(the "Code"\)](#). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

RESEARCH ETHICS – N/A

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.