

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 2BB3 – PROTEIN STRUCTURE AND ENZYME FUNCTION

2024 Winter Term

Instructor: Dr. Daniel Yang | **Email:** yang@mcmaster.ca | **Office Hours:** Upon request | **Office:** HSC 4N20A

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Lectures: Tuesday, Wednesday & Friday: 9:30 - 10:20; MDCL 1105

COURSE OBJECTIVES

Our goal in delivering Biochemistry 2BB3 is to NOT BORE YOU with disjointed facts that will likely be memorized and then quickly forgotten soon after examination periods. Instead I want to get you TURNED ON to the amazing world of proteins and for you to walk away from this course with a set of KEY CONCEPTS that govern a true understanding and appreciation of why it is that PROTEINS RULE! In addition, these concepts will serve you well for your future courses and research within Biochemistry and Biomedical Sciences. Students will be exposed to these concepts in both traditional lecture and small group inquiry environments. Some of the key concepts I want you to take away, include: 1) understanding basic protein structure and the forces that govern its formation, 2) methods for protein structure prediction and experimental determination, 3) protein folding, 4) enzyme mediated chemical reactions and their associated kinetic parameters.

6 weeks (weeks 1, 2, 3, 4, 5 and 6) will be lecture format. Weeks 8, 9 and 10 (i.e. weeks starting Feb 26, Mar 4, Mar 11) are being made available for students to undertake more self-directed learning. During these three weeks, students will be placed into small groups and then given the opportunity to ask and answer questions regarding aspects of proteins that have or have not been already touched on during

lectures. Inquiry courses emphasize both process and content, and therefore a secondary objective of this course is to develop your inquiry skill set. Throughout this course, with guidance from your TA and the course instructors, you will refine your verbal and written communication skills, your ability to find and critically evaluate information, and your ability to work effectively as a member of a group.

MATERIALS & FEES

Required 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.

VIRTUAL COURSE DELIVERY

To follow and participate in virtual tutorials 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 OVERVIEW AND ASSESSMENT

Lecture Schedule

	Tu	We	Fri		ASSIGNMENTS	Week	Tu	Wed	Fri	Tests	Tu	Wed	Fri
2024	9	10	12	Jan		1	Int	Ch1	Ch2				
2024	16	17	19			2	Ch2	Ch4	Ch4	Ch1&2			
2024	23	24	26			3	Ch4	Ch4	Ch5	Ch4			
2024	30	31	2	Feb	Jan 31: Ass1	4	Ch5	Ch5	Ch5	Ch5			
2024	6	7	9			5	Ch6	Ch6	Ch6	Ch6			
2024	13	14	16			6	Ch7	Ch7	Ch7	Ch7			
2024	20	21	23			7	Reading Week						
2024	27	28	1	Mar	Feb 28; Ass2	8	Group Progress Meetings				A-E(1)	A-E(2)	A-E(3)
2024	5	6	8			9	Group Progress Meetings				A-E(1)	A-E(2)	A-E(3)
2024	12	13	15			10	Group Progress Meetings				A-E(1)	A-E(2)	A-E(3)
2024	19	20	22			11	Presentations				,A1,A2	,A3,B1	,B2,B3
2024	26	27	29			12	Presentations				,C1,C2	,C3,D1	Good Fri
2024	2	3	5	April		13	Presentations				,D2,D3	,E1,E2	,E3
2024	9	10	12		Apr 10; Report	14	No Class						

EVALUATION

1. Quizzes (40%)

- Each Friday of a lecture week starting **Jan 15th** and ending **Feb 13th**, you will have a test to complete that is worth 10% of your final mark. Since the lowest mark will be dropped, the final mark will be the result of 4 x 10% per test = 40% of final mark. The one test which will be dropped is to cover **emergencies etc.** that prohibit a student from being present; therefore, **no excuses for missing more than one Friday test will be accepted.** All marks will be posted using partial student I.D numbers on Avenue. NOTE: By attending class you are agreeing to this method of grade disclosure.

2. Assignment 1 (10%)

- Due Wednesday Jan 31st by 4pm in A2L, worth 10% of final mark.

Assignment 2 (10%)

- Due Wednesday Feb 28th by 4pm in A2L, worth 10% of final mark.

3. Inquiry (40%)

- Final Group Presentation: weeks 11, 12 and 13 (10% of final mark)
- Final Written Report (group): Due Wednesday April 10th by 4pm in A2L (25% of final mark)
- Peer Evaluations: due Wednesday April 10th by 4pm in A2L individual contribution to your group (2% of final mark)
- TA Meeting Reports: due Mid-night before meeting by email, 1% per report (3% final mark)
- Questions for Other Groups' Presentations: Bonus Mark; submit to your TA after presentations

For the Quizzes portion of the course, students are responsible for materials covered in the textbook and lectures.

Percentage grade will be converted to a final letter grade (see Table below). All percentage grades within 0.5% of the next letter grade will be reviewed.

%	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-		

IMPORTANT: Questions regarding the marking or addition of tests and assignments must be brought to the attention of the TA within ONE week of their return to you.

Important Details

A. Weekly Tests:

- As mentioned above, each Friday starting Jan 19th, we will be having a short, 15 minute, in-class test. Students will download an individualized test from A2L and submit answers to A2L at the end of lecture. Marks will be posted on A2L ASAP and answers will be taken up during the following class. Please note that material covered in each test will be **cumulative** throughout the entire course, meaning that you will be responsible for all material covered from the start of

the course up to and including the class preceding the Thursday test. There will be a total of 5 tests, the last being Feb 16th. Only the results from the best 4 tests will count toward your final mark (i.e. 4 x 10% per test = 40% of final mark). Since one test will be dropped, no excuses will be accepted for missed tests.

B. Assignments

- Each assignment will be worth 10% of your final mark. The first assignment is due on Wednesday Jan 31th by 4pm. The second assignment is due on Wednesday Feb 28th by 4pm. Please note that assignments must be uploaded to A2L **no later than 4pm**.

C. Inquiry

- During the 6 weeks of lecture, students will be exposed to different fundamental aspects of proteins. During the next 3 weeks of the course, students will carry out a more in-depth, small group, inquiry-based study. Students are being randomly assigned to groups of ~10 people. Although designated inquiry will not begin until the week of February 26th, I strongly suggest that you use the intervening time to orient yourselves with your other group members and start considering a common question for your group to explore. **Each group are assigned a temporary leader now and should elect a group leader and inform Dr. Yang and your TA of this decision before January 31th.** Each group will be expected to meet with their TA once a week for 30 minutes during weeks 8, 9 and 10.

Group	Topics	TA
A	Protein Structure (secondary and/or tertiary) and Determination – Experimental Methods	Jeremie Alexander
B	Impact of a Protein(s) on Health and Society	Mei Nee Chiu
C	Protein-Protein Interactions	Ghazaleh Dadashi Zadeh
D	Enzyme Reaction Mechanisms and Kinetics	Soyeon Lee
E	Protein-Based Biopharmaceutical	Sanne Roumans

D. Progress Meetings with TA

- During weeks 8, 9 and 10, groups will be scheduled to meet with their TA for 30 minutes to report on their recent work, review progress and set/refine direction. Progress meetings with TA will be on TEAMS under your group folder. To ensure that TAs have enough time to help students during those 3 short meetings, the leader of each group is REQUIRED to upload a one page summary of their progress, questions etc, to A2L one day prior to their designated TA meeting. Reports should be one-page, double-spaced, type written and must be submitted to Avenue the day before a scheduled TA meeting. Each report is worth 1% of the final mark. In order to document the contribution from individual group member, everyone is required to submit a short report of his/her work for the week to the group leader. These reports should form an appendix to the one-page progress report. You should come prepared to show any evidence of your research and learning, i.e. you may bring a copy of key papers or review articles that have guided you. The report and any key articles will be placed in your group's file to track your progress. Meetings will be informal. Because the success of the group depends on the full participation of all members, attendance at all meetings is mandatory. Failure to provide documentation to the Assistant Dean for medical or legal conflicts will result in an automatic zero for group participation.

E. Final Group Presentations

- Starting Tuesday **Mar 19th**, each group will deliver a final presentation. A maximum of three members elected by the group will make the group presentation; however, following the presentation, all members of the group will answer questions from the audience. The presentation CANNOT exceed 18 minutes total, leaving 2 to 5 minutes for questions. Roughly 1/3 of the presentation should focus on the background you must communicate to your audience, and roughly 2/3 on answering the 'Question' your group decided to pursue. Be sure to use references appropriately. Any information (including figures) or ideas that are not your own, must be referenced to the primary source (not a general textbook). You must send your presentation file to A2L's Discussion folder by 10:00 pm, the DAY BEFORE your presentation.

The final presentations will be organized as part of a symposium on each of the 5 general topics. Each presentation can build on, or refer to one of the other two talks within their broader general topic section, as they will have some common ground, should you choose to coordinate your presentation with other groups. The order of the presentations is indicated in the schedule near the end of the course outline. Marks will be given based on the following criteria:

CONTENT

- Was the background material appropriate, not excessive, and helped the audience's comprehension of the topic?
- Did the group demonstrate creativity in their approach to the question?
- Did the group use adequate results from original research to support their contention?
- Did the group demonstrate an understanding of basic biochemical principles?
- Did the group critically evaluate the literature, integrate and reconstruct the new knowledge?

ORGANIZATION AND FORMAT

- Was the format of the presentation well organized and presented in a logical, easy-to-follow sequence?
- **Was the presentation indicative of a clearly defined set of objectives?**
- Was the use of visuals appropriate and legible?

CLARITY AND DELIVERY

- Clear, appropriate use of scientific language, terminology
- Was the speaker clear and audible?
- Did the speaker remain attentive and enthusiastic throughout the presentation to make it rewarding for the audience and sustain interest?
- Was the delivery practiced and smooth?

POST-PRESENTATION

- Ability to answer questions
- Demonstrated knowledge of Biochemistry

ATTENDANCE AT PRESENTATIONS

- Group leaders to take attendance and email TA at the end of term. 0.5% penalty per undocumented absence.
- Email your TA with reasons for your absences, your TA will decide if your reason is valid.

F. Final Written Report

- Each group will write a final report on their group inquiry project. The report should demonstrate a logical progression from the question, through to the conclusion. Roughly 2/3 of the report should focus on the biochemical background you must communicate to your audience, and roughly 1/3 on 'What's next'. Any information (including figures) or ideas that are not your own, must be referenced to the primary source (not a general textbook). A textbook may be referenced for general background information. Do not provide a bibliography, but a proper reference section (see journals like the Journal of Biological Chemistry, etc... (www.asbmb.org)). The final report should be a maximum of 5 pages, double-spaced, 12-point Times New Roman font, with one-inch margins. Figures and tables may be included within the main text, or included as appendices, and do not count toward the final page count. Each group is required to submit one copy of the report to A2L NO later than **4pm on Wednesday April 10th. Marks for the written report will be assigned as follows:**

- OVERALL STRUCTURE (3 marks): organization and logical flow
- FIGURES AND TABLES (3 marks): good use of
- BACKGROUND (5 marks): description and background of relevant material for setting up the question
- ANALYSIS (8 marks): level of depth and analysis in addressing question
- SUMMARY (4 marks): clear and concise, including future directions
- REFERENCING (2 marks): proper use of

G. Peer Evaluation

- You will be asked to reflect on each member's participation and preparation, knowledge acquisition, group dynamics and overall contribution to the group. Keep these important aspects in mind throughout the term as you work within your group. At the conclusion of the term, each student will be required to assess contributions made by individual group members, including themselves. A rubric will be posted on Avenue towards the end of the term for you to fill in for peer evaluation. This mandatory evaluation will be used as a tool to 'flag' any group conflicts that were not obvious to the TAs, or when there is a consensus among the group that a member(s) of the group has not participated fully in the project. These evaluations will be taken into account when evaluating group work components.

H. Final Examination

- This course has no final exam.

I. Group Assignment

- There will be 15 groups, assigned A1-3, B1-3, C1-3, D1-3 and E1-3. Students are to carry out a more in depth, small group, inquiry based study on topics assigned to their group.

Course Outline

In this course we will be using A2L. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster email 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 this course will be deemed consent to this disclosure. If you have questions or concerns about such disclosure, please discuss this with the course instructor.

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".

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 (<https://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.

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.

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), 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](#), 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

Some courses may use 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 – NA

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.