Biochemistry 2BB3: **Protein Structure and Enzyme Function**

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

**Course Website:** Avenue-to-learn.

**Course Information**

Tuesday, Thursday & Friday: 11:30 - 12:20  
Term 1

**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 7) will be lecture format. Weeks 8, 9 and 10 (i.e. weeks starting Oct 27, Nov 3, Nov 10) 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.

**Textbook**
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.

Course Requirements

Evaluation: It will be based on the followings:

I. **Quizzes (40%)** Each Friday of a lecture week starting **Sep 8th** and ending **Oct 20th**, 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 weeks 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.

II. **Assignment 1 (10%)** Due **Friday Oct 2th by 4pm** in drop box, worth 10% of final mark.
   **Assignment 2 (10%)** Due **Friday Oct 30th by 4pm** in drop box, worth 10% of final mark.

III. **Inquiry (40%)**
   * Final Group Presentation: weeks 11, 12 and 13 (10% of final mark)
   * Final Written Report (group): due **Friday December 4th by 4pm** in drop box (25% of final mark)
   * Peer Evaluations: due **Friday December 4th by 4pm** in drop box 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).

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

**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:**

This course will rely heavily on the use of Avenue to Learn.

**A. Weekly Tests:** As mentioned above, each Friday starting September 11th, we will be having a short, 15 minute, in-class test. Students will download an individualized test from Avenue and submit answers to Dropbox at the end of online lecture. Marks will be posted on Avenue 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 Oct 23rd. 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 Friday Oct 2nd by 4pm. The second assignment is due on Friday Oct 30th by 4pm. Please note that assignments must be uploaded to Avenue to Learn drop box 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 October 27th, 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 should elect a group leader and inform Dr. Yang and your TA of this decision before September 25th. Each group will be expected to meet with their TA once a week for 20 minutes during weeks 8, 9 and 10.

**D. Progress Meetings with TA:** During weeks 8, 9 and 10, groups will be scheduled to meet with their TA for 20 minutes to report on their recent work, review progress and set/refine direction. *Exact meeting time, meeting platform will be provided on Avenue.* 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 Avenue 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 Monday Nov 17th, 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 Avenue’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

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 Avenue to Learn dropbox NO later than **4pm on Friday December 4th**.

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 Evaluations:** 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. **Course Schedule**

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J. **Group Assignment:** There will be 15 groups, assigned A1-3, B1-3, C1-3, D1-3 and E1-3 (see Appendix). Students are to carry out a more in depth, small group, inquiry based study on topics assigned to their group.

K. **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.

**University Policies**

**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.

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.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit had been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Course Online Content
In this course we will be using Avenue. 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.

Student Accessibility
Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities.

Changes to the Course Outline
The instructor and University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and opportunity to comment on changes. It is the responsibility of students to check their McMaster email accounts and course websites weekly during the term and to note any changes.