Biochemistry 2BB3 (2015)
Protein Structure and Enzyme Function

Course Coordinator: Dr. Daniel Yang
HSC 4H25a (inside lab)
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Lectures: TSH/120; Tu, Th & Fr; 8:30 am - 9:20 am.

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.

8 weeks (weeks 1, 2, 3, 4, 5, 6, 8 and 9) will be lecture format. Weeks 10, 11 and 12 (ie. weeks starting Mar 10, 17 and 24) are being made available for students to undertake more self-directed learning. During these three weeks, students will be placed into small groups based on common interest 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.

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How to EARN your marks:

I. **Quizzes (35%)** Each Friday of a lecture week starting **January 9**th and ending **March 6**th, you will have a test to complete that is worth 5% of your final mark. Since the lowest mark will be dropped, the final mark will be the result of 7 weeks x 5% per test = 35% 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 LearnLink. **NOTE:** By attending class you are agreeing to this method of grade disclosure.

II. **Assignment 1 (15%)** Due **Friday February 6 by 4pm** in drop box (outside rm. HSC 4H25a), worth 15% of final mark.

III. **Inquiry (35%)**

- Final Group Presentation: weeks 13 and 14 (5% of final mark)
- Final Written Report (group): due **Tuesday April 7**th** by 4pm** in labeled drop boxes outside of room HSC 4H25a (25% of final mark).
- Peer Evaluations: individual contribution to your group (2% of final mark).
- TA Meeting Reports: 1% per report (3% final mark).

**Important Details:**

This course will rely heavily on the use of LearnLink **http://learnlink.mcmaster.ca.** If you have difficulty gaining access, or for further assistance, please contact LearnLink Help Desk at help@learnlink.mcmaster.ca.

I. **Weekly Tests:** As mentioned above, each Friday starting January 9, we will be having a short, 15 minute, in-class test. Students will pick up an OMR sheet on their way into class. During the last 15 minutes of class, you will have 5 multiple-choice questions to answer. OMR sheets will be placed in a collection box at the end of class. Marks will be posted on LearnLink 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 8 tests, the last being March 6th. Only the results from the best 7 tests will count toward your final mark (ie. 7 x 5% per test = 35% of final mark). Since one test will be dropped, no excuses will be accepted for missed tests.

II. **Assignments:** Each assignment will be worth 15% of your final mark. The first assignment is due on Friday February 6 by 4pm. The second assignment is due on Friday March 13 by 4pm. Please note that assignments must be placed in our designated **drop boxes no later than 4pm.**

III. **Inquiry:** During the 8 weeks of lecture, students will be exposed to different fundamental aspects of proteins. In order to make this course as interesting and useful to students as possible, students will be allowed to choose a preferred area of interest in keeping with the content of the course in which they would like to carry out a more in-depth, small group, inquiry based study. **Students are encouraged to self-assemble into groups of 11 people.** Each group should post their list of students using the template EXEL file to the main folder on learnlink by Friday Jan. 9th. Please use a group name (from A-1 to D-4) for your uploaded EXEL file (e.g. C-1.xlsx). No two groups of students should choose the same group name. Students who have not been included in a group by Jan 9th will be randomly placed into groups. Final group assignments will be posted on LearnLink Monday Jan. 12th. Although designated inquiry will not begin until the week of March 10th, 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 will be assigned a TA and will be expected to meet with their TA once a week for 20 minutes during weeks 10, 11 and 12 (details will be posted on learnlink).

**LearnLink:** A LearnLink folder labeled ‘INQUIRY’ will be set up for communicating important information from the facilitators as the course unfolds. Within the INQUIRY folder, there will be 4 folders (one for each TA) labeled A-D and an additional folder labeled GENERAL INFORMATION - be sure to check this general conference folder weekly for important announcements. Within folders A-D, additional folders will be set up for
each group (there will be 4 independent groups assigned for each TA, A-D). Here each group can communicate with their members, schedule meetings, and share information, or direct specific questions to their TA.

**Group Assignment:** There will be 16 groups, assigned A1-4, B1-4, C1-4, and D1-4. Students will be asked to choose their preferred area of interest (from the list of 4 topics/areas given below, 1-4) in which they would like to carry out a more in depth, small group, inquiry based study.

**TOPICS/AREAS:**

- A – Protein Structure (secondary and/or tertiary) and Determination – Experimental Methods
- B – Impact of a Protein(s) on Health and Society
- C – Protein-Protein Interactions
- D – Enzyme Reaction Mechanisms and Kinetics

**Progress Meetings with TA:** During weeks 10, 11 and 12, 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 times and locations are provided later on Learnlink. To ensure that TAs have enough time to help students during those 3 short meetings, each group is REQUIRED to upload a one page summary of their progress, questions etc. to their Learnlink folder one day prior to their designated TA meeting. Reports should be one-page, double-spaced, typewritten and must be submitted to Learnlink the day before a scheduled TA meeting. Each report is worth 1% of the final mark. You should come prepared to show any evidence of your research and learning, ie. 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.

**Final Group Presentations:** Starting Tuesday March 31st, each group will deliver a final presentation. A maximum of two members from a group will be permitted to make the group presentation; however, following the presentation, all members of the group will proceed to the front of the room to answer questions from the audience. The presentation CANNOT exceed 9 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). Should you choose to give a PowerPoint presentation, you must send your presentation file to your group’s LearnLink folder by 10:00 am, the DAY BEFORE your presentation. All PowerPoint presentations will be loaded onto the laptop being used that day, as time will not allow for each group to use individual computers. The final presentations will be organized as part of a symposium on each of the six general topics. Each presentation can build on, or refer to one of the other three 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

**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](http://www.asbmb.org)). The final report should be a maximum of 5 pages, double-spaced. 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 a digital copy of the report to the appropriate folder via LearnLink, as well as one hard copy. All hard copies should be stapled, 12-point Times New Roman font, with one-inch margins and placed in the designated drop box NO later than **4pm on Tuesday April 7th**.

Marks 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 (3 marks):** clear and concise, including future directions
• **REFERENCING (3 marks):** proper use of

**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. In the **hard copy ONLY** of each student’s final report, an additional page should be attached that gives a list of each group member’s name, student number and your evaluation of their level of contribution to the group indicated as a mark from 0 to 5, with 0 indicating absolutely no contribution and 5 indicating a fair and equitable contribution. 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.

**Academic Integrity:**

You are expected to exhibit honesty and use ethical behavior 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
http://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 has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Request for Relief for Missed Academic Term Work:
For absences from classes lasting up to 5 days: Using the McMaster student absence form (MSAF) on-line, self-reporting tool, undergraduate students may report absences lasting up to 5 days and may also request relief for missed academic work. The submission of medical or other types of supporting documentation is normally not required. Students may use this tool to submit a maximum of two requests for relief of missed academic work per term. Students must immediately follow up with their course instructors regarding the nature of the relief. Failure to do so may negate the opportunity for relief. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course. The MSAF on-line, self-reporting tool cannot be used to apply for any final examination or its equivalent. See Petitions for Special Consideration in the Undergraduate Calendar.

Please note:
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 the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

Schedule, Submissions and Important Due Dates:

**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.

**Weekly Tests:**
To be held on:
• January 9, 16, 23, 30; February 6, 13, 27; and March 6

**Assignments:**
Assignment 1 – Deadline: **Friday February 6th by 4pm** in drop box outside of room HSC-4H25a
Assignment 2 – Deadline: **Friday March 13th by 4pm** in drop box outside of room HSC-4H25a

**Student Group Preferences:**
Friday January 9th posted to “Post Inquiry choices here” folder on LearnLink

**Assigned Group Posting:**
Posted on LearnLink Monday January 12th

**Progress Meetings with TA’s:** (will be posted on learnlink)

**Final Group Presentations (to be held during regular class time):**
• Group A (1-4) – Tuesday March 31
• Group B (1-4) – Thursday April 2
• Group C (1-4) – Friday April 3
• Group D (1-4) – Tuesday April 7

**Final Written Report/ Peer Evaluations:**
Deadline: **Tuesday April 7th by 4pm** in drop box outside of room HSC-4H25a

Please refer to this course outline frequently, as it contains a great deal of important information, specific guidelines, instructions and due dates!

Enjoy