Biochem 2B03 (2021/22): Nucleic Acid Structure and Function

Instructor: Dr. Yingfu Li, email: liying@mcmaster.ca

TAs:

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Lectures: Tu We Fr 9:30AM - 10:20AM
Location: ITB 137

Office Hours: By appointment.

Course Textbook: Biochemistry - The Molecular Basis of Life, Seventh Edition, Trudy McKee and James R. McKee (required)

Course objectives:
Nucleic acids store and transmit genetic information in all cells. An accurate and detailed knowledge of their structure and function is vital for molecular scientists. Equally importantly, nucleic acids research has been a rich source of discovery and invention that is drastically enhancing our understanding of cells and diseases. In this course, we will examine the structure of nucleic acids, genes, the manner in which DNA is replicated and how its information is used by cells. In addition to conveying the prevailing paradigms in this field, we will discuss how nucleic acids are studied experimentally and how we know what we know about them today. Finally, students will be given opportunities, through inquiry projects, to learn how our human creativity and imagination has led to numerous important scientific findings in nucleic acids research.

Assessments Overview:
Test 1: 25%
Wednesday, Feb. 2, 2022 TEST #1. This test will be on the materials covered in Classes 1-10.

Test 2: 25%
Tuesday, March 15, 2022, TEST #2. This test will be on the materials covered in Classes 12-21.

Individual Project: 5%
To be detailed below.

Group Project: 15%
To be detailed below.

Final Exam: 30%
The final will cover all lecture content by Dr. Li and by student presentations.

Course Schedule:
Class 1, Tuesday, Jan.11, 2022
Opening lecture and general course outline.
Class 2, Wednesday, Jan. 12, 2022

**Nucleic acids 1. Ch 17**

Class 3, Friday, Jan. 14, 2022

**Nucleic acids 2. Ch 17**

Class 4, Tuesday, Jan. 18, 2022

**Nucleic acids 3. Ch 17**

Class 5, Wednesday, Jan. 19, 2022

**Practice Quiz and Q&A session.** Each Practice Quiz and Q&A session will provide students the chance to do quizzes, ask questions about the course content and participate in interactive discussions.

Class 6, Friday, Jan. 21, 2022

**Nucleic acids 4. Ch 17**

Class 7, Tuesday, Jan. 25, 2022

**Genetic Information 1. Ch 18**

Class 8, Wednesday, Jan. 26, 2022

**Genetic Information 2. Ch 18**

Class 9, Friday, Jan. 29, 2022

**Genetic Information 3. Ch 18**

Class 10, Tuesday, February 1, 2022

**Practice Quiz and Q&A session 2**

Class 11, Wednesday, Feb. 2, 2022 TEST #1

Class 12, Friday, Feb. 4, 2022

**Genetic Information 4. Ch 18**

Class 13, Tuesday, Feb. 8, 2022

**Genetic Information 5. Ch 18**

Class 14, Wednesday, Feb. 9, 2022

**Genetic Information 6. Ch 18**

Class 15, Friday, Feb. 11, 2022

**Practice Quiz and Q&A session 3**

Class 16, Tuesday, Feb. 15, 2022

**Protein synthesis 1. Ch 19**

Class 17, Wednesday, Feb. 16, 2022

**Protein synthesis 2. Ch 19**

Class 18, Friday, Feb. 18, 2022

**Protein synthesis 3. Ch 19**

**Mid-term recesses Monday, February 21 to Sunday, February 27, 2022**

Class 19, Tuesday, March 1, 2022

**Practice Quiz and Q&A session 4**

Class 20, Wednesday, March 2, 2022

**Protein synthesis 4. Ch 19**

Class 21, Friday, March 4, 2022

**Protein synthesis 5. Ch 19**

Class 22, Tuesday, March 8, 2022

**Group project time – no lecture**

Class 23, Wednesday March 9, 2022

**Group project time – no lecture**

Class 24, Friday March 11, 2022
Practice Quiz and Q&A session 5

Class 25: Tuesday March 15, 2022, TEST #2.

Class 26, Wednesday March 16, 2022
  Group presentation (FS1 and FS2)
Class 27, Friday March 18, 2022
  Group presentation (FS3 and CB1)
Class 28, Tuesday March 22, 2022
  Group presentation (CB2 and CB3)
Class 29, Wednesday March 23, 2022
  Group presentation (SD1 and SD2)
Class 30, Friday March 25, 2022
  Group presentation (SD3 and RT1)
Class 31, Tuesday March 29, 2022
  Group presentation (RT2 and RT3)
Class 32, Wednesday March 30, 2022
  Group presentation (COVID-19 1 and COVID-19 2)

No class on Friday April 1, 2022

Class 33, Tuesday April 5, 2022
  Group presentation (COVID-19 3; Q&A; Concluding remarks and student feedbacks)

After April 5, 2022, there are no more classes for Biochemistry 2B03

Please use the time following this to study for the final exam.

Final Exam – 2 hours.

Group project – Self-directed learning, group learning, discussion and writing assignments:

Topics for group projects.

Topic 1 – Scientific Discoveries (SD). An important discovery related to nucleic acids. 
  TA1

Topic 2 – Research techniques (RT). A widely used research technique related to nucleic acids 
  TA2

  TA3

Topic 4 – Canadian biochemists (CB). Life and research of a Canadian scientist who has worked or is doing research related to any material covered in the lectures. 
  TA4

  TA5
2. Responsibilities of students
Each student should sign up for one of 15 groups (3 groups per topic). Each student can sign up in A2L on **Wednesday Jan. 19, 2022 at 10 pm.** You must sign up by **Friday Jan. 21, 2022 at 10 pm** (the site will be closed by then and you will be assessed a 5% penalty). You can sign up for a group according to your interest; however, each group can have maximal 10 students. Therefore, you should be prepared to have a second or third choice.

Each group must select a group leader who will be in charge of group activities; otherwise Dr. Li will arbitrarily select a group leader. Please e-mail the name and contact information of the group leader (name, email and phone – for emergency use only) to **TA6 and your designated teaching assistant (TA)** by **Monday Jan. 24, 2022 at 10 pm.** Your TA will function as a resource person for guidance on your selected topic.

Each student in the group needs to select a specific item that fits within the topic the group has selected to work on, and conduct independent research on this item. For this part of inquiry, you need to produce two outcomes that will be marked by your TA – a 2-page (single-spaced, Times New Roman, Font 12) essay (2%) on this item and a YouTube clip of 2.5 minutes as the maximal time (3%). Name your video as “Your Name Topic (5 words or less) Biochem 2B03 2022”, such as “Yingfu Li Story of Michael Smith Biochem 2B03 2022”. Keep your clip under 50 MB.

Each group must decide on choosing one of the member items as the focus of the group project. To help you with the choice of the topic, each group must contact their TA to set up ONE mandatory meeting before **Monday Feb. 7.** The session can be up to an hour (but a minimum of 30 min to be able to appropriately answer questions from the students. This meeting is required as part of 2.5% marks on attendance and participation.

Each group then focuses on this item as a group project. For this part of inquiry, you need to produce two outcomes that will be marked – a 5-page (single-spaced, Times New Roman, Font 12) essay on this item (5%) and a ppt file for 20-minute presentation with detailed script for each slide. Each group will also need to create 5 Kahoot questions that complement the presentation. Please also provide 3-5 multiple choice questions based on the material you will present, which may be used for the final exam. The Kahoot will be played live after each presentation, and the question difficulty will be a grading component of the group project. Every student needs to attend every student lecture (reporting to your TA for class attendance at the end of each class).

It is everyone’s responsibility to be an active member of your group and to make sure that YOU ABSOLUTELY UNDERSTAND THE TOPIC YOUR GROUP HAS CHosen AND KNOW DETAILS.

Be aware that your essays will be screened for plagiarism using computer software. Submit your individual essay, your YouTube clip, and group essay to A2L. Submit your essays in a Word file by **Tuesday, March 15 2021 at 5 pm.** Name your essays as “Your or Group Name Topic (5 words or less) Biochem 2B03 2022”. Each group leader should upload your group ppt file to A2L by **Tuesday, March 15, 2022 at 10 pm.** and Name your ppt as “Group Name Topic (5 words or less) Biochem 2B03 2022” Each late submission will be assessed a 5% penalty.
Course Policies

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”.

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), 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, 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 the McMaster Office of Academic Integrity’s webpage.

CONDUCT EXPECTATIONS. As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of 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.

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.