Biochemistry 2B03 (2014/15)

Nucleic Acid Structure and Function

Note: 1) 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.

2) 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 has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

3) In this course we will be using a web-based service (Turnitin.com) to reveal plagiarism. Students will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to www.mcmaster.ca/academicintegrity.

4) In this course we will use Avenue to Learn. 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 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 this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

5) If you are absent from the university for a minor medical reason, lasting fewer than 5
days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form. Absences for a longer duration or for other reasons must be reported to your Faculty/Program office, with documentation, and relief from term work may not necessarily be granted. When using the MSAF, report your absence to singhk2@mcmaster.ca. You must then contact Dr. Karun Singh immediately (normally within 2 working days) by email to learn what relief may be granted for the work you have missed, and relevant details such as revised deadlines, or time and location of a 2 make-up exam. Please note that the MSAF may not be used for term work worth 30% or more, nor can it be used for the final examination.

6) Students will be required to deliver a seminar outside of regular class hours.

Instructors:
Dr. Karun Singh
MDCL 5030, please contact by email to singhk2@mcmaster.ca

Dr. Kristin Hope
MDCL 5026, please contact by email to kristin@mcmaster.ca

TAs:
Josie Libertucci, libertj@mcmaster.ca, Paper 1 inquiry
Zohaib Ghazi, zohaib.ghazi@gmail.com, Paper 2 inquiry
Xiaohan Ni, nxiaodian@hotmail.com, Paper 3 inquiry
Shahrzad Jahanshahi, jahans2@mcmaster.ca, Paper 4 inquiry
Lydia Ephraim, lydia_ephraim@yahoo.com, logistics, marking tests and exam

Lectures:
Monday and Wednesday, 8:30 – 9:20 AM, Friday, 10:30-11:20 AM

Location: ITB 137

Course Textbook:
Biochemistry, Garrett & Grisham, Canadian Edition (recommended)

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 have 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 examination of the primary research literature, to learn how our human creativity and imagination has led to numerous important scientific findings in nucleic acids research.
Evaluation:

**Test 1: 25%**
Wednesday, Oct. 8, 2014, in class. This test will be on the materials covered in Classes 2-13.

**Test 2: 25%**
Monday, Nov. 10, 2014, in class. This test will be on the materials covered in lectures 14-23.

**Group Project: 20%**
5% will be on attendance and participation, 7.5% on your answers to the questions, and 7.5% on presentation. An Additional 5% will be awarded for a group selected for class presentation for each topic (upon successful completion of class presentation). The winning class presentations will be held December 1st and 3rd 2014.

**Final Exam: 30%**
10% will be the materials covered by Drs. Singh and Hope, 20% will be on all 4 papers in the group inquiry.

Detailed schedule:
**Class 1**, Friday, Sept. 5, 2014
Opening class and general discussion

**Class 2**, Monday, Sept. 8, 2014
Nucleotides and nucleic acids 1. Ch 24-25

**Class 3**, Wednesday, Sept. 10, 2014
Nucleotides and nucleic acids 2. Ch 24-25

**Class 4**, Friday, Sept. 12, 2014
Nucleotides and nucleic acids 3. Ch 24-25

**Class 5**, Monday, Sept. 15, 2014
DNA replication, recombination and repair 1. Ch 27

**Class 6**, Wednesday, Sept. 17, 2014
DNA replication, recombination and repair 2. Ch 27

**Class 7**, Friday, Sept. 19, 2014
DNA replication, recombination and repair 3. Ch 28

**Class 8**, Monday, Sept. 22, 2014
DNA replication, recombination and repair 4. Ch 28

**Class 9**, Wednesday, Sept. 24, 2014
Transcription 1. Ch 29

**Class 10**, Friday, Sept. 26, 2014
Transcription 2. Ch 29

**Class 11**, Monday, Sept. 29, 2014
Transcription 3. Ch 29

**Class 12**, Wednesday, Oct. 1, 2014
Transcription 4. Ch 29

**Class 13**, Friday, Oct. 3, 2014
Transcription 5. Ch 29

**Class 14**, Monday, Oct. 6, 2014
Review

Class 15 – Wednesday, Oct. 8, 2014
Test #1 (Covering all of Dr. Singh’s lectures, up to and including Friday October 3)

Class 16, Friday, Oct. 10, 2014
Molecular Cloning I, Ch 27

Class 17, Wednesday, Oct. 15, 2014
Molecular Cloning II, Ch 27

Class 18, Friday, Oct. 17, 2014
Molecular Cloning III, Ch 27

Class 19, Monday, Oct. 20, 2014
Translation I, Ch 30

Class 20, Wednesday, Oct. 22, 2014
Translation II, Ch 30

Class 21, Friday, Oct. 24, 2014
Translation III, Ch 30

Class 22, Monday, Oct. 27, 2014
Post-transcriptional Regulation of Gene Expression I, Ch 31

Class 23, Wednesday, Oct. 29, 2014
Post-transcriptional Regulation of Gene Expression II, Ch 31

Class 24, Monday, Nov. 3, 2014
Post-transcriptional Regulation of Gene Expression III, Ch 31

Class 25, Wednesday, Nov. 5, 2014
Protein Folding, Processing and Degradation, Ch 32

Class 26, Friday, Nov. 7, 2014
Review

Class 27 – Monday, Nov. 10, 2014
Test #2 (Covering all of Dr. Hope’s lectures)

Final Exam - Date: TBA. All TAs need to attend.

Group project--Self-directed learning:

1. Papers: We have selected four recent research articles that cover a broad range of nucleic acids related topics and techniques as the basis for our group projects.

Paper 1.

TA- Josie Libertucci

Paper 2.
TA- Zohaib Ghazi

Paper 3.
TA- Xiaodan Ni

Paper 4.
TA- Shahrzad Jahanshahi

2. Responsibilities of students
Each student should sign up for one of the 36 groups. Each student can sign up in Avenue to Learn on Sept. 17 at 9 pm. You must sign up by Sept. 24 at 10 pm (the site will be closed then and you will be assessed a 5% penalty). You can sign up for a group according to your interest; however, only nine groups can select a given paper and each group can only have maximal 5 students. Therefore, you should be prepared to have a second or third choice **Note – you must choose a group such that you will not be in conflict with your Biochem 2L06 laboratory.** Scheduling is tight and it may not be possible to avoid all the conflicts with individual lectures.

Each group must select a group leader who will be in charge of group activities; otherwise the instructors 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 Dr. Singh, Lydia Ephraim and your designated TA for the paper chosen by Sept
29. A teaching assistant is available to work with students on a given paper and the TA will function as a resource person for guidance.

Each group needs to work together to answer questions related to their paper as part of the inquiry-based group project. Some of the questions are technique oriented and others are of problem solving in nature. The answer to many of these questions can only be found from inquiry. Be aware that your written answers will be screened for plagiarism using computer software. Each group leader should e-mail Dr. Singh, TA: Lydia Ephraim and your designated TA, the written answers to the questions given (in Word file – please make sure to properly identify group number and group member names on the document) by Wednesday, Nov. 26 at 4 pm. Late submissions will be assessed a 5% penalty.

NOTE for Final Exam: All students are responsible to read and understand all 4 papers for the final exam (even though you selected 1 paper for your group inquiry).

Each group also needs to put together a 25-minute PowerPoint presentation and present it to the TAs and the instructors on Nov. 24, 26, 27 at a specific time. NOTE: Paper 1 can not be picked for November 24th. To schedule time slots for your group’s presentation, you will be contacted by Meagan Heirwegh (advisor@mcmaster.ca) for your preferences; please do not contact her until she first makes contact with your groups. For the presentation, every group member is required to present. We recommend each person speak for approximately 5 minutes within the 25-minute presentation (there are 5 people per group). The presentation will be followed by a 5-minute question/answer period to all the members of the group. Each group must email Dr. Singh and Lydia Ephraim a PowerPoint presentation file by Monday, Nov. 23rd 11:59 pm. Please note that the presentation time to the instructors and TAs cannot be changed, so when you sign up for a particular group, consider any conflicts with your own schedule. Absolutely no re-scheduling will be given once the groups are set and all members of the groups must attend their presentations.

Each group must contact their TA to set up two mandatory meetings, one in October and one in November. These two meetings are required as part of 5% marks on attendance and participation. Each presentation will be evaluated by TAs and Drs. Singh or Hope on the basis of clarity, creativity, accuracy and quality of the presentation. One group will be selected to present each topic to the entire class. The winning group will receive an extra 5% to their final mark. However, each group has to be prepared to give a presentation in a scheduled class during which the competition results will be announced. Everybody should attend all the presentations to the class, even if they are not the presenters, as all 4 papers from the inquiry will be tested on for the Final Exam. A significant portion of your final marks (45%) relates to the group project, speaking to its importance. The group project needs a term-long effort and each group should start to work on its project as early as possible. It is everyone’s responsibility to be an active member of your group and to make sure that YOU ABSOLUTELY UNDERSTAND THE PAPER ASSIGNED AND KNOWS DETAILS.