Biochemistry 2B03 (2012/13)
Nucleic Acid Structure and Function

Instructors:
Dr. Justin Nodwell, Course Instructor
HSC 4H21, Ext. 27335, please send email to nodwellj@mcmaster.ca

TAs:
Vanessa Yoon: topic 1 inquiry: Lachance et al., 2012. Cell 150: 475 - (yoonv@mcmaster.ca)
Mark Fuller: topic 2 inquiry: Bos et al., 2011. Nature 478: 506 - (fullerm@mcmaster.ca)
Tomas Gverzdys: topic 3 inquiry: Gibson et al., 2010. Science 329: 52-56 (Gverzdt@mcmaster.ca)
Zohaib Ghazi: topic 4 inquiry: Turnbaugh et al., 2009. Nature 457: 480, 1694-7 ghaziz@mcmaster.ca
Jennifer Chin: logistics, marking tests and exam (Chinj3@mcmaster.ca)

Lectures:
Tues., Thurs. and Fri. 8:30 - 9:20 am

Location:
ABB/102

Course Textbook:
Biochemistry, Garrett & Grisham, updated 5th Edition (required).

Office hours - Wednesdays 1-3, HSC 4H27C.

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%
Wed. Oct. 5, 2010, 8:30-9:20 am. This test will be on the materials covered in lectures 1-12.
Test 2: 25%
Friday, Nov. 8, 2010, 10:30-11:20 am. This test will be on the materials covered in lectures 14-24.
Group Project: 20%
5% will be on attendance and participation, 10% on your answers to the questions, and 5% on presentation. Additional 5% will be awarded for a group selected for class presentation for each topic upon successful completion of class presentation.
Final Exam: 30%
10% will be on lecture material, 20% will be on the assigned projects.
Detailed schedule:

**Lecture 1**, Thursday, September 6  
Opening of class and general discussion.

**Lecture 2**, Friday, September 7  
DNA structure I

**Lecture 3**, Tuesday, September 11  
DNA structure II

**Lecture 4**, Thursday, September 13  
DNA structure III.

**Lecture 5**, Friday, September 14  
DNA replication I

**Lecture 6**, Tuesday, September 18  
DNA replication II

**Lecture 7**, Thursday, September 20  
Telomeres and DNA topology.

**Lecture 8**, Friday, September 21  
Recombination I.

**Lecture 9**, Tuesday, September 25  
DNA recombination II

**Lecture 10**, Thursday, September 27  
DNA repair

**Lecture 11**, Friday, September 28  
DNA manipulation: I

**Lecture 12**, Tuesday, October 2  
DNA manipulation II

**Lecture 13**, Thursday, October 4  
Transcription I:

**Lecture 14**, Friday, October 5, 2010, 8:30-9:20 am  
TEST #1 – covers lectures 1-12.

**Lecture 15**, Tuesday, October 9  
Transcription II

**Lecture 16**, Thursday, October 11  
Transcription III

**Lecture 17**, Friday, October 12  
Transcription IV

**Lecture 18**, Tuesday, October 16  
Transcription V

**Lecture 19**, Thursday, October 18  
Translation I

**Lecture 20**, Friday, October 19  
Translation II

**Lecture 21**, Tuesday, October 23  
Translation III

**Lecture 22**, Thursday, October 25  
Translation IV

**Lecture 23**, Friday, October 26
Translation V

Lecture 24, Tuesday, October 30
Group project time.

Lecture 25, Thursday, November 1
Group project time.

Lecture 26, Friday, November 2
Group project time.

Lecture 27, Tuesday, November 6
Group project time.

TEST #2 – covers lectures 13-23.

Lecture 29, no lecture – final preparation time for student presentations
Group project time.

Lecture 30: Tuesday November 13. Individual group presentation – topics 1 and 2. (10 groups, whole day)

Lecture 31: Friday November 15. Individual group presentation – topics 3 and 4. (10 groups, whole day)

Lecture 32, Tuesday November 20.
Student lecture 1 – topic #1

Lecture 33, Thursday November 22.
Student lecture 2 – topic #2

Lecture 34, Friday November 23.
Student lecture 3 – topic #3

Lecture 35: Tuesday November 27.
Student lecture 4 – topic #4

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. The topics are:

   Paper 1. Details. **Five groups (1A through 1E) will be selected for this paper.**

   Paper 2. Details. **Five groups (2A through 2E) will be selected for this paper.**

   Paper 3. E. Details. **Five groups (3A through 3E) will be selected for this paper.**

   Paper 4. M. Details. **Five groups (4A through 4E) will be selected for this paper.**

2. Responsibilities of students
Each student should sign up for one of the 20 groups. Each student should sign up on Sept. 14 (sign-ups before that time will not be considered). You must sign up by Sept. 21 at 10 pm or you will be assessed a 5% penalty. You can sign up for a group according to your interest; however, only five groups can select a given paper and each group can only have 8 students. Therefore, please list second and third choices (please list the 20 groups in order of preference, such as 1A, 2C, 2D, etc., when signing up). Note – you must choose a group such that you will not be in conflict with your Bch 2L06 laboratory. Thus, if you have a lab session on Tuesday you must choose topic 3 or 4 and if you have a lab session on Friday you must choose topic 1 or 2. Scheduling is tight and it may not be possible to avoid 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 to the course coordinator nodwellj@mcmaster.ca by Sept 25. 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 some questions related to the paper. 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 Turn-it on software. Each group should e-mail the course coordinator the written answers to the questions given by Friday November 16th at 4 pm. Late submissions will be assessed a 5% penalty.

Each group also needs to put together a 30-minute (± 5 minutes) PowerPoint presentation and present to the TAs and the instructor. The presentation will be followed by a short question and answer period to all the members of the group. Each group must hand in a PowerPoint presentation file by 5PM Friday November 9th (Electronic files please). 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 two TAs and one instructor 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 must attend all the presentations to the class, even if they are not the presenters. Attendance will be randomly checked, please bring your ID to class.

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 CRUCIAL DETAILS, in order to do well in the final exam.
Group leaders:

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