Course Syllabus

Prerequisites:
BIO 41 and junior standing, or consent of the instructor.

This course meets the following distribution requirements: Natural Sciences
(Please note: If more than one distribution area is listed, the course can be used to satisfy ONE area.)

Meetings:
12:00 PM - 1:15 PM every Tuesday and Thursday in Eaton Hall, Room 204. The first class is on 01/16/20 the last class is on 04/23/20.

Instructor: Sergei Mirkin
Office location: 200 Boston Ave., Suite 4700; phone: 7-4794, e-mail: sergei.mirkin@tufts.edu

Office Hours:
Wednesdays 2-to-4 PM, Mondays upon request.

TA: Sasha Khristich
Office location: 200 Boston Ave., Suite 4700; e-mail: alexandra.khrystich@tufts.edu

Office Hours:
Upon request.

Class Objectives:
1) To understand the interplay between DNA structure and genome functioning using a combination of lectures and discussions of the original papers.
2) To read and evaluate papers from the primary literature in the area of DNA structure/topology and genome functioning.
3) To understand molecular basis of fundamental DNA transactions, such as DNA replication, transcription, repair and recombination.
4) To practice synthesizing, presenting and critiquing original research.

Papers: 60% of classes will be conducted as a “journal club”. A student will present a paper, while the rest of the class is expected to participate in discussing the paper and its implications. Each journal club includes two presentations of approximately 35 min. each. A presenter is expected to give background information needed to understand the paper, describe the results thoroughly, and include a discussion and evaluation of the results. Everyone (!) is expected to read the papers assigned for that day so that they can participate in the discussion.

All papers will be posted on the course Canvas site. Most of the papers are also available electronically and can be accessed through the library catalog: http://www.library.tufts.edu/tisch/Links to an external site, by clicking on the electronic journals link or searching for the journal title in the Tufts library catalog.

Meeting with the Professor: Each student is expected to arrange a meeting with the Professor prior to their presentation to go over it and clear up any questions. You should have read the paper and have an outline of your presentation prepared before this meeting. After your presentation, we will schedule a brief post-presentation meeting to communicate your grade and to provide feedback.

Grading
Each student is expected to present two papers, which would account for the 60% of the final grade. 20% of the grade comes from paper discussions and 20% from the final exam.

1. **Presentations:** Presenting a paper involves four aspects. **First,** you should give some background that will help the other students understand the significance of the question in the context of other research in this area. You should focus on introducing background that relates to the paper. **Second,** you should not go through the paper figure by figure. Your role here is to present the main results of the study and methods used by the authors to get to these results. **Third,** you should facilitate discussions with your fellow students. Ideally, other students will interject their opinions of or questions about the experiments as you present each one. You can encourage participation by pausing to ask specific questions. **Fourth,** you should also summarize the author’s conclusions (usually found in the Discussion section of the paper) and encourage a discussion of these conclusions and future lines of inquiry suggested by these studies.

**Grading of Presentations**
30% - quality of background given – does it set up the paper well and include discussion of any background data or techniques needed to understand the paper?
40% - presentation of the data
15% - role as discussion leader
15% - summary and discussion of conclusions/future directions

2. **Class Participation:** Learning to participate in a meaningful discussion of scientific data is a major goal of this course. You can only participate if you have read all assigned papers and come to class prepared. During the presentation, it is OK to interrupt asking a question or making a comment. You should not save all your questions/comments until the end. Your opinion is important, and you are encouraged to express it. Class participation makes up a significant portion of your grade (20%).

3. **Final Exam:** The class will be split in two teams that will play Jeopardy-style game. It includes roughly 25 questions, which requiring deep comprehension of all topics discussed in the course.

### Course Schedule

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<tr>
<th>Date</th>
<th>Lecture</th>
<th>Topic</th>
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<td>01/21</td>
<td>Lecture 2</td>
<td>Circular DNA and DNA supercoiling</td>
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<td>01/23</td>
<td>Lecture 3</td>
<td>DNA topoisomerase, chromosomal loops</td>
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<td>01/28</td>
<td>Lecture 4</td>
<td>Unusual DNA structures</td>
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<td>01/30</td>
<td>Lecture 5</td>
<td>Unusual DNA structures</td>
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<tr>
<td>02/04</td>
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02/20   No class, Tufts Monday
02/25   Paper Presentation
02/27   Paper Presentation
03/03   Paper Presentation
03/05   Lecture 6       Transcription Machinery
03/10   Lecture 7       Replication fork
03/12   Lecture 8       Genome Architecture and Regulation
03/17   No class, Spring break
03/19   No class, Spring break
03/24   Lecture 9       Recombination
03/26   Lecture 10      Genome Editing
03/31   Paper Presentation
04/02   Paper Presentation
04/07   Paper Presentation
04/09   Paper Presentation
04/14   Paper Presentation
04/16   Paper Presentation
04/21   Paper Presentation
04/23   Paper Presentation
05/05   Final Exam