Syllabus
Genomics and Functional Nucleic-Acid Nanotechnology (BME1453)
Fall 2024

1. Course Overview

The goal of this course is to provide an overview of the structure, properties, and applications of DNA/RNA as programmable information polymers. The course is organized into three modules: 1) DNA for spatial imaging and barcoding, 2) DNA for molecular programming, and 3) DNA for building nanomaterials. Each module will last 2-3 weeks long and will consist of student-led presentations and discussions mixed with brief introductory lectures. Each module will start with the discussion of fundamental concepts and progress to emerging trends and applications. Student grades will include a mix of participation, oral presentation, a paper outline, and a 'mock grant'.

2. Course Objectives

Upon completion of this course, you will become familiar with:

a. Technologies for reading and writing DNA
b. Application of DNA in genomics;
c. Nucleic acids as enzymes and affinity agents;
d. Dynamic DNA nanotechnology: fundamental concepts, examples and applications;
e. Structural DNA nanotechnology: fundamental concepts, examples and applications;

3. Instructor information

Course Instructor:
Professor Leo Chou
Email: leo.chou@utoronto.ca | Tel: 416.946.8019
Office Hours: by appointment

Teaching Assistants:
Shana Alexander
Email: shana.alexander@mail.utoronto.ca

4. Course Logistics

Format: The course will consist of weekly 2-hour long classes containing a mixture of lectures, discussions, and student presentations.

Enrollment: The maximum number of students for this course is set at 20 students.

In the scenario that COVID precludes in-person teaching, classes will take place virtually:

- Will meet live over Zoom weekly
- Information will be communicated via Quercus announcements: https://q.utoronto.ca/. It is your responsibility to ensure you are set to receive all notifications from BME1453H1 module

Table 1. Overview of Course Syllabus and Schedule
TBD

5. Grading Breakdown

Deliverable	% Final Grade
Quercus knowledge checks	10%
Primary literature critique	20%
In-class participation	10%
Oral presentations	15%
Paper Outline (2-pages)	30%
Mock grant (4-pages + references)	30%
Total	100%

Quercus knowledge checks

- Each week there will be assigned readings
- Accompanying each reading will be pre-defined questions to answer
- You can complete these questions on Quercus

Primary literature critiques

- You will prepare a

6. Participation & Attendance

Good attendance and strong attendance are fundamental to success in graduate courses. You are expected to come into class, participate in discussions and asking questions. Students with diverse learning styles and needs are welcome in BME1453H1. If you have a health consideration and/or disability that may require accommodations, please contact the instructor (leo.chou@utoronto.ca; 416.946.8019) and/or Accessibility Services (http://accessibility.utoronto.ca; 416.978.8060).

7. Oral Presentations

There will be 3-4 modules, each will include a series of paper presentations by students. We will divide the class into groups and each group will take turns presenting a paper in each module. The instructions for presentations are posted separately. This will make up 15% of your final grade.

8. Paper Outline

You will be asked to convert a paper into a mini grant outline. This will motivate you to breakdown a paper into its components. You will also be used to provide constructive criticisms and suggestions for follow up studies. This can be either one of the papers you presented or a different paper, depending on student enrollment. This will make up 15% of your final grade.

9. Mock Grant

You will be asked to write a 'mock grant' on a topic of your choice. A template will be provided to guide this process. The grants will be evaluated and ranked by your peers during the last two weeks of the lecture. The goal of this assignment is to improve your scientific writing, to motivate you to delve deeper into a topic of your interest and familiarize you with the grant evaluation process. Grant evaluation will take place in a 'mock grant review panel' where each one of you will play the role of a lead and co-reviewers. This is to get you to understand how grants are reviewed in 'real life' by funding agencies. The review process will provide insights into how your scientific ideas are discussed and evaluated by your peers.

Note: Submission deadline: Submission deadlines are concrete. Any document handed in late will not be accepted and will be assigned a zero grade.

Note: Academic integrity: This is of utmost importance. Any issues of plagiarism and/or inappropriate collaboration will be taken seriously and reported to the higher authority.