

**DEPARTMENT OF BIOLOGICAL SCIENCES  
UNIVERSITY OF TORONTO SCARBOROUGH**

**BIOB11 LEC 01  
Molecular Aspects of Cellular and Genetic Processes  
Course Outline - Winter 2020**

**Lectures** Tuesdays, 12:10 PM – 1:00 PM in AC223  
Thursdays, 12:10 PM – 1:00PM in AC223  
**Instructor** Dr. Jeneni Thiagavel

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### **Course Description**

The course focuses on the central dogma of genetics. Topics include structure and function of the nucleus, DNA replication and cell cycle control, transcription and translation, gene regulation and signal transduction.

*Prerequisite:* BIOB10H3

*Exclusion:* BIOB10Y3, BIO230H, (BIO250Y)

*Breadth Requirements:* Natural Sciences

### **Learning Objectives**

After successfully completing BIOB11, students should be able to:

1. List some universal features of cells [lecture 2]
2. Describe the structure and function of DNA [lecture 2]
3. Describe the flow of genetic information in cells from DNA to RNA to Protein and list the players [and their significance] at each step [lectures 3-8]
4. Describe the modifications that occur on eukaryotic pre-mRNA [lecture 5]
5. Describe how DNA is packaged into chromosomes and how the DNA transcription machinery is still able to gain access to the strands [lectures 9]
6. Describe how DNA is replicated and the players involved [and their significance] in this process [lectures 9-11]
7. Describe the different ways that the DNA repair system operates [lecture 12]
8. Outline the different players involved in helping protein fold into its three-dimensional conformation [lecture 13]
9. Describe how gene expression is regulated and controlled at different steps and list the players [and their significance] at each step [lectures 14-17]
10. Describe how molecules are transported between the nucleus and cytosol and list the players [and their significance] that are involved in these translocations [lectures 18]
11. Describe how cells are able to communicate with one another and the players involved in cell signalling [lectures 19-22]
12. Describe how the major classes of cell-surface receptor proteins operate and the players involved [lectures 19-22]

13. Describe the events of eukaryotic cell division and the four phases of the eukaryotic cell cycle [lecture 23]
14. Explain how the cell-cycle control system operates and the players involved at each transition [lecture 23]
15. List some features that all cancer cells share [lecture 24]
16. Explain the role that cancer-critical genes play in the development of cancer [lecture 24]

**Lectures:**

Tuesdays, 12:10 PM – 1:00 PM in AC223

Thursdays, 12:10 PM – 1:00PM in AC223

**Tutorials:**

On **only** the following two Thursdays from 5:10pm-7pm in AC223:

1. Feb 13<sup>th</sup> -Review session I: Review content that will be tested on midterm test
2. April 2<sup>nd</sup>- Review session II: Review content that will be tested on final exam

Additional tutorials which are devoted to the Integrative Poster Project and will be scheduled during this time slot on different dates. Please see Quercus for more information.

**The Teaching & Course Administration Team**

**Instructor:** Dr. Jeneni Thiagavel

Email: [jeneni.thiagavel@mail.utoronto.ca](mailto:jeneni.thiagavel@mail.utoronto.ca)

Course email: [biob11.uts@utoronto.ca](mailto:biob11.uts@utoronto.ca)

- All e-mails must be sent from your UofT email and must include the course code in the subject line
- The instructor will respond to specific, course related questions
- Office hours: Thursdays 1:30-3:30pm [Room: SW525]
- All questions about general course administration should be directed to the course coordinator

**TAs:**

Fatima Naimi- [fatima.naimi@mail.utoronto.ca](mailto:fatima.naimi@mail.utoronto.ca)

Jerrica Jamison -[jerrica.jamison@mail.utoronto.ca](mailto:jerrica.jamison@mail.utoronto.ca)

Simon English -[simon.english@mail.utoronto.ca](mailto:simon.english@mail.utoronto.ca)

- All e-mails must be sent from your UofT email and must include the course code in the subject line.
- The TAs will respond to specific, course related questions or any questions regarding tutorials
- TAs will have email hours

**Course Coordinator:** Jennifer Campbell

Email: jacampbell@utsc.utoronto.ca

- All questions regarding course administration, course pre-requisites and exclusions, exam scheduling, conflicts & viewings, missed exams, marks verifications and any special accommodations pertaining to medical illness, AccessAbility, religious observances etc. will be addressed by the course coordinator.
- Office hours [Room: SW421D]
  - Monday: 10-11am
  - Tuesday: 2-4pm
  - Wednesday: 10-11am
  - Thursday :2-4pm
  - Friday: by appointment only

**Textbook:** Molecular Biology of the Cell [Sixth Edition]. Alberts/Johnson/Lewis/Morgan /Raff /Roberts/Walter.

*The textbook is the same one used in BIOB10 and is available at the UTSC bookstore.*

**Course Quercus Page:**

- Course Quercus page: The main source of information for BIOB11 is the Quercus course page [<https://q.utoronto.ca/>].
- The course syllabus, schedule, and lecture slides can be found here. Also, important information about the course including the dates and locations of exams will be posted here.

**Expectations for Conduct in the Academic Setting:**

Students are expected to listen attentively during class. Please show respect for your instructor and fellow students by listening quietly, arriving on time, and staying until the end of lecture. Please switch cell phones to silent mode and refrain from texting during class. Please come to class prepared and never hesitate to ask questions.

**Assessments/ Exams**

Description	Weight
Midterm Test	40%
Poster Presentation	10%
Final Exam	50%

**1. Midterm Test: 40%**

- This test covers lectures 1-12 (inclusive).
- The date, time, location will be determined by the registrar's office.

## **2. Integrative Research Poster Project: 10%**

- This mandatory project is meant to help develop your scientific communication skills as well as to help you appreciate the links between different fields of study in biological sciences.
- The details of this project are posted as a separate document on the Quercus site.
- The TA dedicated to this project [Madison Marshall] can be contacted at: [bioposterhelp@utsc.utoronto.ca](mailto:bioposterhelp@utsc.utoronto.ca).

## **3. Final Exam: 50%**

- This exam will test content covered in lectures 1-24 (inclusive).
- The date, time, location will be determined by the registrar's office. The exam will occur during the final exam period at UTSC in April 2020.

### **Missed Midterm Test or Final Exam:**

#### **Missed Midterm Test:**

- You will need to provide the Course Coordinator Jennifer Campbell with a UTSC medical certificate within 48 hours of a missed exam, if you wish to be considered for a potential make up exam.
- A makeup midterm exam may be offered to students who provide significant evidence of extreme circumstances/ illness. The structure of the midterm will differ from the normal midterm, as determined by the instructor.

#### **Missed Final Exam:**

- you will need to declare your absence on ACORN and submit a petition via the registrar's office and provide them with documentation. The course instructor/ coordinator is not responsible for scheduling missed final exams.

*Note that it is not sufficient simply to visit a doctor's office; the documentation must show that you were incapable of writing the test or completing the assignment on [date] for medical reasons. The medical certificate must include the statement "[Name of student] was unable to write the test on [date] for medical reasons". Documentation must show the physician was consulted within one day of the test. A statement merely confirming the report of an illness made by a student is not acceptable.*

Please note that the self-declaration of student illness reports cannot be used for any missed assessments in this course (including all course work and deadlines associated with the Integrative Research Poster Project).

### **Academic Integrity**

<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment. On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes. All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters and could have serious consequences for students including suspension or expulsion from the university

### **Accessibility Needs**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. AccessAbility Services staff (located in Rm SW302, Science Wing) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (phone 416-287-7560 or email [ability@utsc.utoronto.ca](mailto:ability@utsc.utoronto.ca)).

## Course Schedule

<b>Date</b>	<b>Lecture</b>	<b>Topic</b>	<b>Chapter</b>
Jan 7	1	Introduction to Course/Overview/Learning Objectives/Resources	
Jan 9	2	Basic genetic mechanisms [how cells maintain, replicate and express the genetic information carried in its DNA] Universal features of cells The structure and function of the DNA	1&4
Jan 14	3	Transcription Part 1 [Gene expression: how the information encoded in DNA is interpreted by the cell to guide the synthesis of RNA]	6
Jan 16	4	Transcription Part 2 [Gene expression: how the information encoded in DNA is interpreted by the cell to guide the synthesis of RNA]	6
Jan 21	5	Transcription Part 3 [Gene expression: how the information encoded in DNA is interpreted by the cell to guide the synthesis of RNA]	6
Jan 23	6	Translation Part 1 [Gene expression: how the information encoded in DNA is interpreted by the cell to guide the synthesis of protein]	6
Jan 28	7	Translation Part 2 [Gene expression: how the information encoded in DNA is interpreted by the cell to guide the synthesis of protein]	6
Jan 30	8	Translation Part 3 [Initiation & Termination of Translation]	6
Feb 4	9	Chromosomal DNA & it's packaging in the Chromatin Fiber DNA Replication: Part 1 [DNA Replication Mechanisms]	4 & 5
Feb 6	10	DNA Replication Part 2 [DNA Replication Mechanisms]	5
Feb 11	11	DNA Replication Part 3 [Initiation & Completion of DNA Replication]	5
Feb 13	12	DNA Repair	5
Feb 18	READING WEEK		
Feb 20	READING WEEK		

Feb 25	13	Protein Folding	6
Feb 27	14	Control of Gene Expression Part 1	7
Mar 3	15	Control of Gene Expression Part 2	7
Mar 5	16	Control of Gene Expression Part 3	7
Mar 10	17	Control of Gene Expression Part 4 [Post-Transcriptional Controls]	7
Mar 12	18	Protein Sorting [Transport between Nucleus & Cytosol]	12
Mar 17	19	Cell Signaling Part 1 [Principles of Cell Signaling]	15
Mar 19	20	Cell Signaling Part 2 [Principles of Cell Signaling]	15
Mar 24	21	Cell Signaling Part 3 [G-protein & Enzyme Coupled Receptors]	15
Mar 26	22	Cell Signaling Part4 [G-protein & Enzyme Coupled Receptors]	15
Mar 31	23	The Cell-Cycle The Cell-Cycle control system	17
Apr 2	24	Cancer-critical genes Molecular changes that makes a cell cancerous	20