Biology 4T03/6T03
Molecular and Cellular Neuroscience
Winter 2021 Course Outline

Course Details

Instructors:	Dr. M. Fahnestock	fahnestock@mcmaster.ca
	Dr. D. Gillespie	gilles@mcmaster.ca
Office hours:	Fahnestock:	by appointment
	Gillespie:	Wednesdays, 4:30-6:00pm, PC310 or MSTeams
TA:	Arman Shekari	shekara@mcmaster.ca, x22215

Lectures: Tuesdays 4:30-5:20pm and Thursdays 3:30-4:20pm in HH217

Tutorial: Fridays, 8:30-11:20am in JHE 210

Course Description

This course will focus on selected topics in molecular and cellular neuroscience. The first half of the course (Fahnestock) will review principles of molecular neuroscience, specifically regulation of gene expression in the nervous system, neurotrophic factors and their receptors and signal transduction pathways, and the molecular and genetic bases of neurological diseases. The second half of the course (Gillespie) will cover ion channels and transporters, regulated vesicular release, and synaptic transmission and plasticity. Both cellular and molecular approaches will be discussed.

Prerequisites

BIOLOGY 2B03 (or ISCI 2A18 A/B), BIOLOGY 3P03 and registration in Level III or above of an Honours Biology program, Honours Neuroscience, or Honours Psychology, Neuroscience & Behaviour. One or more of MOLBIOL 3B03, Biochemistry 2B03/2BB3 or Biochemistry 3G03 are recommended.

Format

- Weekly class meetings include two one-hour lectures and one three-hour tutorial.
- The required tutorial is scheduled for seminar presentations and discussion of assigned journal articles by the students.
- Two quizzes will be held during lecture slots at the middle of the term and at the end of the term.

Course Objectives

By the end of this course students will be able to

- Critically read original research articles in molecular and cellular neuroscience
- Present original research articles in molecular and cellular neuroscience in journal club format
- Formulate intelligent questions about molecular and cellular neuroscience
- Discuss creative directions for further work in molecular and cellular neuroscience

Course Schedule

Week	Date	Topic
0	Jan 7 Jan 8	Organizational meeting – Introduction No tutorial
1	Jan 12 Jan 14 Jan 15	Cell-cell communication (Neurotransmitters/Neurotrophic factors) Gene regulation in the nervous system – DNA Tutorial 1
2	Jan 19 Jan 21 Jan 22	Gene regulation in the nervous system – RNA Biosynthesis of secreted proteins in the nervous system Tutorial 2
3	Jan 26 Jan 28 Jan 29	Receptors Signal transduction – kinase pathways Tutorial 3
4	Feb 2 Feb 4 Feb 5	Signal transduction – other pathways Signal transduction – anterograde and retrograde transport Tutorial 4
5	Feb 9 Feb 11 Feb 12	Genetic basis of nervous system diseases Alzheimer's disease; Protein aggregation Tutorial 5
Feb 15 – Feb 20		Midterm Recess
6	Feb 23 Feb 25 Feb 26	Neurodegenerative and neurodevelopmental diseases **QUIZ:** covering Section I Tutorial 6
7	Mar 2 Mar 4 Mar 5	Ion channels and transporters Voltage-gated and leak channels Tutorial 7
8	Mar 9 Mar 11 Mar 12	Ligand-gated channels Mechanosensory and thermo-gated channels Tutorial 8
9	Mar 16 Mar 18 Mar 19	The presynaptic terminal The synaptic vesicle Tutorial 9
10	Mar 23 Mar 25 Mar 26	Regulated release The postsynaptic specialization Tutorial 10

11	Mar 30 Apr 1 Apr 2	Synaptic transmission **QUIZ:** covering Section 2 No tutorial (Holiday)
12	Apr 6 Apr 8 Apr 9	Synaptic plasticity I Synaptic plasticity II Tutorial 11

IMPORTANT NOTE

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 any 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. Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.

Course Materials

- No formal text is required for this course.
- Assigned readings will include original journal articles and possibly review articles.
- References for the assigned readings will be posted on Avenue 2 weeks before they are discussed in tutorial.
    - Assigned readings for Tutorial 1 will be posted on the first day of class, 8 days before the tutorial presentation/discussion.
- Assigned articles that are not accessible through the university library system will be posted on Avenue.
- As copyright law applies to **all resources** posted on or linked from Avenue, students may not disseminate these materials to individuals not enrolled in this course.

Course Evaluation

Biology 4T03:

- Tutorial presentation (~ 30 minutes) of assigned original article 30%
- Quiz 1 (~ 1 hour, in class), covering material of first half 30%
- Quiz 2 (~ 1 hour, in class), covering material of second half 30%
- Participation in group discussion 10%
- There is no formal final examination.
- No makeup examinations or tutorial presentations will be permitted. Consideration will be given with a doctor's note only, and only for redistribution of the mark.

Biology 6T03:

- Grading scheme as outlined above for Biology 4T03 50%
- Essay on instructor-approved topic in molecular/cellular neuroscience 50%
    - Essay topic must be approved by Thursday, Feb 11, 2021
    - Essays are due on Thursday, Apr 8, 2021, at 7:00pm (on Avenue, unless alternative prior arrangements have been made with the appropriate instructor)
    - Consult appropriate instructor for formatting guidelines
    - Late submissions will be assessed a 10% penalty for each day (or fraction thereof) late

Academic Integrity

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. **It is your responsibility to understand what constitutes academic dishonesty.**

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. For information on the various types of academic dishonesty please refer to the *Academic Integrity Policy*, located at https://secretariat.mcmaster.ca/university-policies-procedures- guidelines/

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Authenticity/Plagiarism Detection

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. Avenue to Learn, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

Courses with an On-line Element

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn, LearnLink, web pages, capa, Moodle, Echo360, Microsoft Teams, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, 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 a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

Online Proctoring

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the *Code of Student Rights & Responsibilities* (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx, Echo360, Microsoft Teams or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's *Academic Accommodation of Students with Disabilities* policy.

Requests for Relief for Missed Academic Term Work

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work". View the McMaster Student Absence Form (MSAF) for more information.

Academic Accommodation for Religious, Indigenous or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.