LIFE SCI 4XX3: Structure and Function of the Synapse
Course Syllabus

*If you require this information in an alternate/accessible format, please contact Dr. Piskuric at (905) 525-9140 ext. 21331.

Instructor: Nikol Piskuric, Ph.D.
Office location: Psychology Building, Room 108
Email: piskurn@mcmaster.ca (Please include course code in the subject heading.)
Office hours: By appointment.
Course Website: avenue.mcmaster.ca. Please check this site regularly for updates.

Course Description
Synapses are the sites of communication between neurons, and convey all information about our senses, behaviors, thoughts and emotions. This course will examine synapse physiology, including vesicle dynamics, calcium signaling, the post-synaptic neuron, and synaptic plasticity. Other possible topics include glial cells at the tripartite synapse, electrical synapses, and diseases of the synapse.

This is a communication-intensive course, in which students have the opportunity to develop their written, oral, and interpersonal communication skills. We will also focus on deconstructing and understanding primary research.

Intended Learning Outcomes
By the end of this course, you should be able to:
1. Identify the key anatomical features that distinguish pre- and post-synaptic compartments.
2. Sequence the steps of endocytosis and exocytosis in detail, including the major proteins involved.
3. Describe direct and indirect mechanisms by which neurotransmitters affect the excitability of presynaptic and postsynaptic cells.
4. Describe and compare the mechanisms underlying short-term plasticity and long-term plasticity.
5. Describe some anatomical and physiological techniques that are used to study synapse structure and function.
6. Evaluate the usefulness of a scientific technique to answer a given research question; select a technique to answer a given question, and justify your selection.
7. Outline several classical/foundational experiments that led to our current understanding of synapse structure and function.
8. Contextualize a research article within the broader field of research.
9. Create and deliver a succinct and informative oral presentation to an audience of your peers.
10. Work in a group to propose a solution to a novel scientific question.

Course Format
This course consists of one 3-hr seminar per week.

Prerequisites
LIFE SCI 3BB3. Note that students who have completed LIFESCI 2C03 or 2CC3 (but not 3BB3) can petition to enroll in LIFESCI 4XX3; these students must seek approval from the Instructor and will be allowed to enroll on a case-by-case basis.
Course Materials
There is no textbook for this course. Reading materials and lecture notes will be posted as PDF files on the course website through Avenue to Learn. You are directed to the following textbooks for supplementary reading.


Course Assessment (%)

<table>
<thead>
<tr>
<th>Component</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation 1</td>
<td>10</td>
</tr>
<tr>
<td>Presentation 2</td>
<td>15</td>
</tr>
<tr>
<td>Article analyses</td>
<td>22 7%, 6%, 5%, 4%, 0%; graded by performance</td>
</tr>
<tr>
<td>Midterm test</td>
<td>20 In class</td>
</tr>
<tr>
<td>End-of-term test</td>
<td>21 In class; cumulative</td>
</tr>
<tr>
<td>Participation</td>
<td>12 1% per class</td>
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</tbody>
</table>

*There is no final exam in LIFESCI 4XX3

Oral presentations
Each student will present two primary research articles throughout the term (individual or in groups, TBD). Your article will be assigned 2 weeks prior to your presentation date; articles are assigned in this way in order to give all students an equal amount of preparation time. Presentations should be 20 minutes (maximum) long, and they will be followed by a 10-15 minute class discussion. In preparation for your presentation, you should read other pertinent background literature and familiarize yourself with the experimental methods used in your paper. A marking rubric for oral presentations will be posted on Avenue. Please feel free to speak with me after class or via email if you have questions about your paper.

Article Analyses
An Article Analysis is a deconstruction of a research article. Students will be required to analyze each component of an assigned article, including the introduction, hypothesis, methods, results, and conclusions. There will be 5 Article Analyses throughout the term; the lowest grade will be dropped and the remaining 4 will be weighted based on performance. See Avenue for assignment guidelines.

Tests
Tests will be scheduled during class time, and will consist of short and long answer questions. Tests will be cumulative and will include topics covered in lectures, article analyses, and class discussions (e.g., in-class exercises). **There will be no make-up exams in LIFESCI 4XX3.** Students who miss the midterm will have the weight of the midterm transferred to the final exam. Students who miss the final exam will have a 1-hr oral exam with the Instructor, arbitrated by another Faculty member from PNB or Biology, and an administrator from the Life Sciences Program.

Participation
Students will be graded based on the quality and quantity of their contributions to the general class discussion, discussions following student presentations, and discussions based on in-class exercises. In-class exercises are short problem sets that students will work on in groups during class time.
Seeking Help
Please ask the course Instructor for help at any time if you need it. As a learner, it is your responsibility to recognize when you need help and then ask for it.

Student Services
Several services are available on campus to assist students. You are encouraged to visit the Student Wellness Centre (http://wellness.mcmaster.ca) for mental and/or physical health related issues, the Student Accessibility Centre (http://sas.mcmaster.ca) for academic or disability-related needs, and the Student Success Centre (http://studentsuccess.mcmaster.ca) for academic counseling, tutoring, and other academic and career support.

Missed Work Policy
For absences from classes lasting up to 3 days due to a medical or personal reason:
Using the McMaster Student Absence Form (MSAF) on-line self-reporting tool, undergraduate students may report absences lasting up to 3 days and may also request relief for missed academic work worth less than 25% of the final grade. The submission of medical documentation is normally not required. Students may use this tool to submit a maximum of one request for relief of missed academic work per term. Students must immediately (within 2 days of the missed work) follow up with their course instructors regarding the nature of the relief. Failure to do so may negate the opportunity for relief. The MSAF tool cannot be used to apply for relief for any final examination or its equivalent.

Students who (1) are absent for more than 3 days, (2) wish to submit more than one request for relief of missed academic work per term, (3) are absent for reasons other than a medical situation, or (4) missed work worth 25% or more of their grade, cannot use the MSAF tool to request relief. They MUST report to their Faculty Office to discuss their situation and may be required to provide appropriate supporting documentation. If warranted, students will be approved to use a discretionary version of the MSAF on-line, self-reporting tool.

For absences from classes lasting more than 3 days, for work worth 25% or more, or for the reporting of more than one request for relief per term:
If the reason was medical, the approved McMaster University Medical Form covering the relevant dates must be submitted. The student must be seen by a doctor at the earliest possible date, normally on or before the date of the missed work and the doctor must verify the duration of the illness. Relief will not be considered for minor illnesses. If the reason is non-medical, appropriate documentation with verifiable origin covering the relevant dates must be submitted, normally within five working days. In some circumstances, students may be advised to submit a Petition for Special Consideration (Form A) seeking relief for missed academic work. In deciding whether or not to grant a petition, adequacy of the supporting documentation, including the timing in relation to the due date of the missed work and the degree of the student's incapacitation, may be taken into account. If the petition is approved the Faculty Office will notify the instructor(s) recommending relief. The student must contact the instructor promptly to discuss the appropriate relief. Failure to do so may negate the opportunity for relief. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.

Academic Dishonesty
Academic dishonesty consists of misrepresentation by deception or by other fraudulent means, and can result in serious consequences for a student such as the grade of zero on an exam or assignment, loss of course credit with a notation on the student's transcript that reads "Grade of F assigned for academic dishonesty", and/or suspension or expulsion from McMaster
University. It is your responsibility to understand what constitutes academic dishonesty. For example, plagiarism, improper collaboration, copying and/or use of unauthorized aids in tests and examinations (i.e. cheating) are just a few forms of academic dishonesty. For more information on academic integrity and the various kinds of academic dishonesty, please refer to McMaster’s Academic Integrity Policy located at [http://www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

**Notice of changes to course structure**
The university reserves 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 either type of 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.

The professor reserves the right to change any and all course requirements if the need should arise. Any change in the course requirements will be posted on the webpage, and the details will be announced in class. Any concerns about announced changes should be addressed with the professor as soon as the changes are announced.

**Grades**
Grades obtained in LIFESCI 4XX3 will be converted according to the following scheme, which is in general use at McMaster University.

<table>
<thead>
<tr>
<th>Percentage Range</th>
<th>Grade</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 – 100%</td>
<td>A+</td>
<td>12</td>
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<tr>
<td>85 – 89%</td>
<td>A</td>
<td>11</td>
</tr>
<tr>
<td>80 – 84%</td>
<td>A-</td>
<td>10</td>
</tr>
<tr>
<td>77 – 79%</td>
<td>B+</td>
<td>9</td>
</tr>
<tr>
<td>73 – 76%</td>
<td>B</td>
<td>8</td>
</tr>
<tr>
<td>70 – 72%</td>
<td>B-</td>
<td>7</td>
</tr>
<tr>
<td>67 – 69%</td>
<td>C+</td>
<td>6</td>
</tr>
<tr>
<td>63 – 66%</td>
<td>C</td>
<td>5</td>
</tr>
<tr>
<td>60 – 62%</td>
<td>C-</td>
<td>4</td>
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<tr>
<td>57 – 59%</td>
<td>D+</td>
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<tr>
<td>53 – 56%</td>
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<td>50 – 52%</td>
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<tr>
<td>0 – 49%</td>
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