



NEUR*4100 Neuropharmacology

Fall 2019

Section(s): C01

Department of Biomedical Sciences

Credit Weight: 0.50

Version 1.00 - August 20, 2019

1 Course Details

1.1 Calendar Description

This course will explore pharmacological manipulation of the nervous system. Content will focus on the physiology of major neurotransmitter systems in the brain, followed by current pharmacological interventions for selected brain disorders, and the use and abuse of common pharmacological agents.

Pre-Requisites:

BIOM*3090, (NEUR*2000 or PSYC*2410)

Restrictions:

This is a Priority Access Course. Enrolment may be restricted to particular programs or specializations or semester levels during certain periods.: (e.g. BSC.NEUR major, minor, and BSC.BIOM)

1.2 Course Description

The goal of this course is to provide students with a detailed understanding of the effects that pharmacological agents may have on the nervous system. In addition, students will gain experience critically evaluating scientific literature and communicating concepts in neuropharmacology. The semester will begin with an overview of neuropharmacological principles including the physiology and pharmacology of major neurotransmitters systems in the brain. This will be followed by the investigation of major neurodevelopmental, psychiatric, neurological, and neurodegenerative disorders, and the current pharmacological strategies that are employed to address these disorders. Additional topics to be covered include the use and abuse of common psychoactive drugs, the effects of pharmacological agents on the developing brain, and the delivery of agents to the CNS.

Each class will focus on one topic in neuropharmacology. The majority of classes will start with a faculty lecture, followed by a student-led Journal Club presentation. Within the Journal Club presentation, a small group of students will present a "real-world" application of neuropharmacology (e.g. a media report or a new pharmaceutical agent that has launched to

market), along with one primary research article that is related to the real-world application. Groups will also lead a class discussion during and/or following the formal presentation.

1.3 Timetable

Class Time: Tuesday and Thursday, 8:30 a.m. to 9:50 a.m.

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

The final examination will be held on Wednesday, December 4, from 2:30 p.m. to 4:30 p.m. This is subject to change, so make sure to verify with WebAdvisor for the date, time, and location for this final examination.

2 Instructional Support

E-Mail Policy: We will strive to respond to emails within two business days.

2.1 Instructional Support Team

Instructor:	Craig Bailey
Email:	baileyc@uoguelph.ca
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Course Co-ordinator:	Craig Bailey
Email:	baileyc@uoguelph.ca
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Office:	OVCE 2602
Office Hours:	Wednesday, 1:30 pm to 2:30 pm

2.2 Teaching Assistants

Teaching Assistant:	Ashutosh Patel
Email:	apatel18@uoguelph.ca

3 Learning Resources

There is no textbook for this course. We will use scientific literature that is available through the University library. Copies of all literature will be posted on CourseLink.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. 1. Knowledge in Neuropharmacology
 - (a) Demonstrate knowledge of the physiology and function for major neurotransmitter systems within the nervous system.
 - (b) Demonstrate knowledge of major nervous system disorders and the current pharmacological approaches used to address these disorders.
 - (c) Apply knowledge in neuropharmacology to synthesize novel approaches to modulate brain function in health and disease.
2. 2. Critical appraisal of primary scientific literature in neuropharmacology
 - (a) Critically evaluate published research in neuropharmacology, with an emphasis on study design, the methodology employed, and the effective communication of research findings.
 - (b) Demonstrate knowledge of the Scientific Method, and apply this knowledge to critically evaluate research in neuropharmacology.
3. 3. Effective scientific communication
 - (a) Communicate orally concepts in neuropharmacology as they apply to both real-world scenarios and primary scientific literature.

(b) Work within teams to critically evaluate primary scientific literature, communicate findings orally, and lead class discussions.

(c) Communicate in written form the critical appraisal of primary scientific literature in neuropharmacology.

5 Teaching and Learning Activities

Summary of Important Dates:

Sept 5 (in class during the first class)	Introduction and overview of class format; How to sign-up for group presentation dates
Oct 17 (in class)	Midterm Examination
Nov 8 (via email to course instructor)	Written evaluation of a research article: submit your article for approval
Nov 29 (via dropbox by 11:59 p.m.)	Written evaluation of a research article: assignment is due
Dec 4, 2:30 p.m. to 4:30 p.m.	Final Examination (refer to WebAdvisor to confirm the time, date, and location for this final examination)

5.1 Lecture

Thu, Sep 5

Topics: Introduction and course overview

Tue, Sep 10

Topics: Principles: Neurotransmitters and their receptors in the

CNS

Thu, Sep 12

Topics: Principles: Neurotransmitters and their receptors in the CNS

Tue, Sep 17

Topics: Glutamate neurotransmission

Thu, Sep 19

Topics: GABA neurotransmission

Tue, Sep 24

Topics: Acetylcholine neurotransmission

Thu, Sep 26

Topics: Serotonin neurotransmission

Tue, Oct 1

Topics: Catecholamine neurotransmission (DA, NE, E)

Thu, Oct 3

Topics: Opioid neurotransmission

Tue, Oct 8

Topics: Attention-Deficit / Hyperactivity Disorder (ADHD)

Thu, Oct 10

Topics: Anxiety Disorders

Tue, Oct 15

Topics:	Fall Study Break - NO CLASS
Thu, Oct 17	
Topics:	Midterm Examination (in-class)
Tue, Oct 22	
Topics:	Depressive Disorders
Thu, Oct 24	
Topics:	Bipolar and Related Disorders
Tue, Oct 29	
Topics:	Schizophrenia Spectrum Disorders
Thu, Oct 31	
Topics:	Epilepsy
Tue, Nov 5	
Topics:	Headache, Migraine, and Neuropathy
Thu, Nov 7	
Topics:	Alzheimer's Disease
Tue, Nov 12	
Topics:	Parkinson's Disease
Thu, Nov 14	
Topics:	Amphetamines and Cocaine
Tue, Nov 19	
Topics:	Benzodiazepines and Barbiturates

Thu, Nov 21**Topics:** Opioids**Tue, Nov 26****Topics:** Marijuana and Cannabinoids**Thu, Nov 28****Topics:** Alcohol / Ethanol

6 Assessments

6.1 Marking Schemes & Distributions

The final grade in the course will be determined according to the following format:

Weight	Component	Course Learning Outcomes Addressed
25%	Journal Club group presentations	#1, #2, #3
5%	Two peer evaluations of group presentations	#1, #2, #3
20%	Written evaluation of a research manuscript	#1, #2, #3
20%	Midterm examination	#1, #2
30%	Final examination	#1, #2
100%	Final Grade	

6.2 Assessment Details

Journal Club Group Presentation (25%)

Students will work in groups of three to prepare and deliver a “Journal Club” presentation within class on an assigned topic. Each class will start with a 30-minute lecture delivered by a faculty member, followed by a short break. This will be followed by the student-led Journal Club presentation for the remainder of the class (approximately 45 minutes).

Students are encouraged to design their presentation by selecting their real-world application and primary research article themselves. However, the instructor and teaching assistant will be able to guide the presenting group through this process. The real-world application can be a recent media article (e.g. from a reputable newspaper, magazine, or website) or the launch of a new pharmaceutical agent to market (e.g. a pharmaceutical company started selling a new drug related to the lecture topic). The primary research article will be a recently-published scientific study that is related to the real-world application and lecture topic). The format for the presentation is as follows:

(i) Real-World Application

Groups will present one real-world application related to that day’s lecture topic in neuropharmacology. This should be from the past five years (2014-2019) and can take the form of a media article (from a newspaper, magazine, or reputable website), the launch of a new pharmaceutical agent related to that day’s neurotransmitter or disorder, or anything else deemed to be appropriate. Example real-world applications could include discussion on the development/use of a new treatment for a specific nervous system disorder, a health warning for potential adverse effects of an approved pharmaceutical agent, or the effects that a drug of abuse may have on the brain. The content can be related to the lecture topic in any way. As a guide, aim to have this part of the presentation take no longer than 5-10 minutes.

The format for the real-world application should include:

- Introduction / background information
- Description of the story that is being reported
- Significance to people (why does this story matter to us?)

(ii) Primary Research Article

Groups will present one primary research article, or “journal article”, that describes a recent high-impact scientific study. This can be either a basic (lab bench / laboratory) or clinical (human) study, so long as it has been published in a high-impact journal. This article can be related to the real-world application in any way, but the more closely they relate the better. As a guide, aim to have this part of the presentation take no longer than 20 minutes (or no longer than 30 minutes total if the class discussion is included).

This presentation should include discussion on the main sections of the article:

- Introduction / background information

- Research methods employed
- Results
- Conclusion / discussion (including relevance to the real-world application)

Here are some other notes regarding the group Journal Club presentations:

- Each group is encouraged to choose its real-world application and primary research article. **These must both be forwarded to the instructor for approval no later than one week before your presentation.** If you want, the instructor and T.A. can help you select these.
- You may insert figures/data from your primary research article, or from other research articles, into your presentation.
- Each group will be evaluated for their ability to initiate and continue a class discussion at the end of the presentation, so you may want to have a few questions and discussion topics ready at the end of the slide show. You may also/alternatively want to incorporate class discussion and/or field questions from the class during the presentation of the primary research article. This is normal for a “journal club” style presentation. If you do this, just keep track of your overall timing so that the presentation can be completed by the end of class.
- Each group is responsible for managing its timing. Marks will be deducted if the presentation is unreasonably short, or if it is not completed by the end of class.
- The presentation slides should be made using PowerPoint. You may run your slides off of your own computer or from a USB drive plugged into the classroom computer.
- The division of labour will be decided among group members, however all group members must speak during the presentation.
- Each member of the group will receive an equal grade. If there are significant issues with the contribution of an individual group member, this must be brought to the course instructor’s attention before the presentation date.
- Presentations will be evaluated for content, style, timing, and teamwork, in addition to the effort made to foster good class discussion. A marking rubric will be provided on CourseLink.

Peer Evaluations of Group Journal Club Presentations (5%)

Students will each (individually) prepare and submit written evaluations/critiques for two Journal Club group presentations. One critique is required for the first half of the semester (before the midterm examination) and one critique is required for the second half of the semester (after the midterm examination). Critiques are to be submitted by Dropbox on the CourseLink website, within one week of the presentation being evaluated. The penalty for

submitting critiques after that date will be 10% per day deducted from the grade for this assignment. Each evaluation is worth 2.5% of your final grade and will be graded as pass/fail so long as the requirements below are all met.

Each critique should include:

- A summary of the presentation. This may be ½ to 1 page long.
- One aspect of the presentation that you liked, and explain why you liked it.
- One piece of constructive criticism for the group.
- Once question that you would pose to the group.

Peer evaluations will be forwarded to the presenting group anonymously (without your name).

Written Evaluation of a Primary Research Article (20%)

Due: Fri, Nov 29, 11:59 PM

Students will each (individually) prepare and submit a written evaluation/critique of a published research article that is related to any neuropharmacological topic in this course. The selected article can describe either a basic (lab bench / laboratory) or clinical (human / veterinary) research study, so long as it has been published in a reputable journal. This report should be no longer than four double-spaced pages and is to be submitted electronically using Dropbox on the CourseLink website by 11:59 p.m. on Friday, November 29. You cannot select an article that has been presented in a Journal Club group presentation. Your selected article should be sent to the instructor for approval no later than Friday, November 8, and you will receive an email reply within one week of your email.

Each written evaluation of a primary research article should be written in your own words and should include a description of the following sections of the paper, along with your critique:

- Introduction / Background information
- Methods employed
- Results
- Conclusion / Discussion
- Your critique: Provide your impression of the research study and article, making sure to include: (i) two things that you liked about the research study and why you liked them; and (ii) two aspects of the study/experiments that you feel could be improved, along with your suggestions for improvement. This critique section should be between one and two double-spaced pages in length, within the total of four double-spaced pages for this assignment.

The penalty for submitting written evaluations after the deadline will be 10% per day deducted from the grade for this assignment. Figures and references may be included in this report, and do not count in the four pages of maximum writing; these should be placed after your main text.

Midterm Examination (20%)

Date: Thu, Oct 17, in-class

A midterm examination will be held in class on Thursday, October 17. This examination will cover material presented in all lectures and in all student group presentations up to and including class number 11 that takes place on Thursday, October 10.

Final Examination (30%)

Date: Wed, Dec 4, 2:30 PM - 4:30 PM

A two-hour final examination will be held during the Fall examination period, from 2:30 p.m. to 4:30 p.m. on Wednesday, December 4, 2019. Please refer to WebAdvisor to confirm the time, date, and location of this exam. This information will also be provided in class and on CourseLink. This examination will be non-cumulative, so it will cover all material not included in the midterm examination, i.e., from class number 12 on Tuesday, Wednesday, October 22 onward. Material from lectures and student group presentations will be tested in this examination.

7 Course Statements

7.1 Turnitin

In this course, your instructor will be using Turnitin, integrated with the CourseLink Dropbox tool, to detect possible plagiarism, unauthorized collaboration or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph.

All submitted assignments will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site.

A major benefit of using Turnitin is that students will be able to educate and empower themselves in preventing academic misconduct. In this course, you may screen your own assignments through Turnitin as many times as you wish before the due date. You will be able to see and print reports that show you exactly where you have properly and improperly referenced the outside sources and materials in your assignment.

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or

compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website
<https://www.uoguelph.ca/sas>

8.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
<https://www.uoguelph.ca/academics/calendars>