NEU 450
Autonomic Neuroscience

Fall 2025

Mondays and Wednesdays 10:20 – 11:40 AM
Natural Resources Bldg Rm 1

Course Director

Name	Office	Email	Phone
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Course Description

This course focuses on the anatomy, physiology, and pathophysiology of the autonomic nervous system. The topics that we will cover this semester include the basic anatomy and functions of the autonomic nervous system, and the role of the autonomic nervous system in disease. The course will involve lecture presentations by the instructor and all students, weekly paper discussions, weekly quizzes, and will be largely discussion based. Students will be expected to consistently participate in discussions and the final grade will be dependent on participation, student presentations, student wiki documents, and the assessment of learning through online quizzes.

Course Learning Objectives
At the completion of this course, students will be able to explain:

- the anatomy of the autonomic nervous system
- major transmitter systems used in cellular autonomic communication
- the roles of the autonomic nervous system in the regulation of body homeostasis
- how alterations to the autonomic nervous system lead to various diseases

What to do if you have a question or need help in this course

1. For questions about course administration (grades, due dates, etc.): email the Course Director, Dr. Gulbransen. *When sending email, please use your MSU email account and include NEU 450 in the subject line.* Dr. Gulbransen will hold **office hours** by appointment and can accommodate meeting in person, via Zoom or telephone (depending on request).
2. For questions on course material:
   Email Dr. Gulbransen (gulbrans@msu.edu) and schedule a time to meet.

Announcements

D2L Course Site: Announcements will be posted to the course D2L site periodically. If you need technical assistance at any time during the course or to report a problem you can:

- Visit the Distance Learning Services Support Site
- Visit the Desire2Learn Help Site (http://help.d2l.msu.edu/)
- Or call Distance Learning Services: (800) 500-1554 or (517) 355-2345

Course Requirements

Attendance

This course is largely discussion based and your participation will constitute a significant portion of your final grade. Therefore, **attendance is mandatory for full credit in this course**. Students are allowed two absences during the semester with no penalty. Unexcused absences beyond these will result in a deduction of attendance points.

Reading

Reading will consist of chapters from the assigned textbook (listed below) and peer-reviewed research papers or other supplements (to be posted on D2L).

Textbook: INTEGRATIVE ACTION OF THE AUTONOMIC NERVOUS SYSTEM: NEUROBIOLOGY OF HOMEOSTASIS by Wilfrid Janig
This text is available as an electronic resource from the MSU Library at: https://www-cambridge-org.proxy1.cl.msu.edu/core/books/integrative-action-of-the-autonomic-nervous-system/A0B9B7C3EEF524FA07ADE7526D7F7475

https://catalog.lib.msu.edu/Record/folio.in00006851182

Lectures

Lectures occur on Mon. and Wed. and the lecture topics are listed in the class schedule section below. Students must read the assigned text before the lecture in order to facilitate learning and to have the opportunity to address questions during class. Dr. Gulbransen will lead lectures/discussion for the first 5 weeks of class (see calendar below). After that, **students will be responsible for presenting lectures and leading discussions for the remainder of the course**. Presentations will constitute a significant portion of your grade. **Students must meet with Dr. Gulbransen the week prior to their presentation to discuss their material and practice their presentation.** Plan on scheduling your meeting early so you have ample time to edit your presentation and make any changes before the week of your presentation!

How do student presentations work?: Each group will choose a topic (see list below class schedule) related to the ANS in health and disease. Once choosing their topic and presentation date, each group will be given a case study related to the topic. Groups will use this to frame their presentations. Groups will be expected to 1) introduce the case and frame the problem, 2) provide a detailed background of normal ANS control in the given function/condition/scenario, 3) explain how dysregulated ANS mechanisms contribute to disease, 4) provide the management strategy and outcomes of the case and 5) discuss conclusions and outlook for unanswered questions. In class, Dr. Gulbransen will give a brief (less than 10 min) introduction to each student topic. This will be a broad overview and will not focus on mechanisms or pathophysiology. This level of detail will be provided by the students in each group. Student groups will each provide a more detailed description of specific aspects of the presentation topic. This should include specific mechanisms, anatomy, physiology, and disease processes. Presentation styles can vary and new ways of presenting the topic material is encouraged. Each student group member must participate and will have a limit of 5 PowerPoint slides. Slides should be used to present figures or data and not text. Each student must also incorporate data from primary literature in their portion of the presentation.

Paper Discussions

Reading and discussing primary scientific literature will be required in this course. Primary research articles will be assigned each week and will be discussed on Wed. Papers will be selected by Dr. Gulbransen to complement the material presented in the first 5 weeks of class. For student presentations, groups will be assigned a paper to complement the material that they present during the week they lead class. In both cases, all students must read the papers before class and come prepared to contribute to discussions.

How do student paper discussions work?: Student-led paper discussions will focus on offering two differing perspectives of the research. Half of each group will focus on presenting the results to a scientific audience and the other half of the group will focus on presenting the relevance of the results to a clinical audience. Strengths and weaknesses of the data, analysis, conclusions, and relevance should be considered.

Weekly Quizzes

There will be 15 quizzes throughout the semester, all of them administered online.

- Quizzes cover the material presented that week or anything up to that point in the class. Quiz dates are listed in the course schedule section below.
- **Quizzes will become active on D2L on Thursday at 2 PM and close Sunday at 11 PM**.
- Quizzes will consist of 10 multiple-choice questions (2 points each).
- **Students will prepare quizzes for their assigned topic area.** Draft versions of quiz questions are due to the instructor (Dr. Gulbransen) **by 5 PM on the Monday** of the week your group is presenting. *If questions are not received on time, the group members will receive a score of "0" on the quiz.*
- **Any material presented in class (lecture material or paper discussions) or covered in the assigned reading may be included in quizzes.**

Class Wiki

As part of your presentation, each group is required to compose a "Wiki document" on the topic. This should be a short, focused, summary of the topic area that highlights key points. Example documents will be provided at the beginning of class. Wiki documents will be posted on D2L as a class resource. Wiki docs must include summary figures and references.

Exams

There will be no exams in this course. Your grade will be entirely based on your participation, quizzes, the Wiki document, and presentations.

Policy for rescheduling quizzes and presentations

There are legitimate reasons for students being unable to complete a scheduled exam or quiz at the scheduled time. Scheduled interviews for medical/graduate school admissions, job interviews, student illness or family emergencies are all examples. However, students must request that the exam/quiz be rescheduled at least 24 hours **before** the scheduled time for the exam/quiz. In the case of illness, documentation of a doctor's visit must be provided. Requests for an opportunity to take an exam or quiz that are made after the scheduled assessment time will be denied.

Grading

Grading Criteria

Grades will be based on participation (~15%), presentations (~24%), D2L quizzes (~52%), and the completion of a Wiki doc on the chosen topic (~9%). Attendance is mandatory for full credit. After 2 missed classes, each additional absence will result in a deduction of attendance credit. Participation will be evaluated on the basis of in class discussions (i.e. asking questions, contributing thoughtfully to discussions, giving your interpretation of data in assigned manuscripts, presenting figures, etc), actively participating in your presentation, and fully contributing to group activities (i.e. presentation, quiz preparation, and Wiki document). Your participation in group activities will be evaluated by your fellow group members.

Specific criteria that will be used to assess grade:

1) Participation (85 total): Combined score from peer evaluations, attendance and in class participation, and gauged participation in presentations.
    a. Peer evaluations (30 points total): Includes evaluations of contribution to researching topic for presentation, preparing presentation, in class presentation, choosing papers, preparing for paper discussion, in class paper discussion, preparing the Wiki doc, and preparing quiz questions.
    b. Attendance (15 points total): Attendance at all class periods (2 excused absences).
    c. In class participation (40 points total): Excellent 40, Good 20-39, Poor 1-19, Never 0
2) Presentations (140 points total): Combined score of presentation (60), paper discussion (60), and quiz questions (20). Will be assessed on accuracy, clarity, overall quality of presentation, group member engagement, ability to present and discuss data, ability to answer questions, presentation style, completeness of presentation, and overall preparation.

3) Wikidoc (56 total): Will be assessed on clarity, accuracy, succinctness, ability to highlight important points, quality of presentation, usefulness as an overview of topic, incorporation of figures, and usage of references.
4) Quizzes (300 total): 15 weekly D2L quizzes. Scored on total correct answers.

Activity	Points
Participation	85
Presentations	140
Quizzes	300
Wiki doc	56
Total	581

Grading Scale	Percentage Points	Points
4.0	≥ 90%	≥ 522 points
3.5	85 – 89%	493-521 points
3.0	80 – 84%	464-492 points
2.5	75 – 79%	435-463 points
2.0	70 – 74%	406-434 points
1.5	65 – 69%	377-405 points
1.0	60 – 64%	348-376 points
0.0	≤ 59%	≤ 347 points

Class Schedule

The lecture titles/subjects are tentative and subject to change. Any changes to the schedule will be announced ahead of time and posted to D2L.

Week	Class Leader	Lecture Date	Topic	Reading	D2L Quiz Date
1	BG	Mon. Aug 25	Syllabus and expectations	Syllabus	Sun. Aug. 31
		Wed. Aug. 27	Functional anatomy of the autonomic nervous system	Janig Ch. 1 & 2 + paper on D2L – required for discussion	
2	BG	Mon. Sept. 1	*No Class: Labor Day*		
	Guest	Wed. Sept. 3	Development of the ANS (Guest – Dr. Julia Ganz)	TBD – on D2L	Sun. Sept. 7
3	BG	Mon. Sept. 8	The final autonomic pathway and impulse transmission through autonomic ganglia	Janig Ch. 3, 4 & 6	Sun. Sept. 14
		Wed. Sept. 10		On D2L - Paper TBD	

Week	Class Leader	Lecture Date	Topic	Reading	D2L Quiz Date
4	BG	Mon. Sept. 15	Autonomic neuroeffector transmission	Janig Ch. 7 (also see Ch. 4 for pathways)	Sun. Sept. 21
		Wed. Sept. 17		On D2L - Paper TBD	
5	BG	Mon. Sept. 22	Enteric Nervous System	Janig Ch. 5	Sun. Sept. 28
		Wed. Sept. 24		On D2L – Paper TBD	
6	Students	Mon. Sept. 29	***See below for list of potential student topics**	TBD	Sun. Oct. 5
		Wed. Oct. 1		On D2L	
7	Students	Mon. Oct. 6		TBD	Sun. Oct. 12
		Wed. Oct. 8		On D2L	
8	Students	Mon. Oct. 13		TBD	Sun. Oct. 19
		Wed. Oct. 15		On D2L	
9		Mon. Oct. 20	*No class: MSU Fall Break*		
	Guest	Wed. Oct. 22	Dr. Nathan Tykocki – Urinary Bladder	On D2L	Sun. Oct. 26
10	Students	Mon. Oct. 27		TBD	Sun. Nov. 2
		Wed. Oct. 29		On D2L	
11	Students	Mon. Nov. 3		TBD	Sun. Nov. 9
		Wed. Nov. 5		On D2L	
12	Students	Mon. Nov. 10		TBD	Sun. Nov. 16
		Wed. Nov. 12		On D2L	
13	Students	Mon. Nov. 17		TBD	Sun. Nov. 23

Week	Class Leader	Lecture Date	Topic	Reading	D2L Quiz Date
		Wed. Nov. 19		On D2L	
14	Students	Mon. Nov. 24		TBD	Mon. Dec. 1
		Wed. Nov. 26		On D2L	
15	Students	Mon. Dec. 1		TBD	Sun. Dec. 7
		Wed. Dec. 3		On D2L	

* Potential Student Topics (9 Groups of 4)

- Interactions between the gut microbiome and the ANS
- Respiratory System
- Cardiovascular System
- Thermoregulation
- Regulation of Body Fluids
- The ANS and Neuroendrocrinology
- Regulation of Caloric Homeostasis
- Pure Autonomic Failure
- Autonomic Control During Pregnancy
- Space Physiology
- Drug-Induced Autonomic Dysfunction
- Mind-Body Interactions
- The ANS in hibernation
- High altitude mountaineering and the ANS
- The ANS in extreme free diving

Additional topics may be considered if groups have a strong rationale, and the topic is clearly focused on the ANS. All additional topics must be approved by Dr. Gulbransen prior to being finalized.

Other Course Information

Attendance

Attendance is mandatory for success in this course. The course is largely discussion based, student led, and your participation in the discussions and presentations will comprise a large part of your grade. It will be impossible to pass this course if you are absent for a substantial portion of the class periods.

Course Policies

Academic Integrity

The "Academic Freedom for Students at Michigan State University" document (found at http://splife.studentlife.msu.edu) is a legal document that you, as a member of the MSU community, should be familiar with. The welcome letter at the beginning reads, in part:

"As an academic community, it is necessary to set standards that will promote an environment conducive to learning. The first part of Spartan Life presents the policies, regulations and guidelines developed to provide an atmosphere that furthers opportunities for intellectual and personal development while protecting individual freedoms. As a student you are encouraged to exercise your rights and you are expected to meet your responsibility to adhere to the standards set. The second part of this guide serves to inform you of the rules, regulations, rights and responsibilities that have been established in the interest of all members of the University community."

The following link provides helpful information about plagiarism that was put together by the School of Education at Indiana University. There is a great online quiz that you can take to see if you understand what is and is not plagiarism. Knowledge is power! (Take the quiz.)
https://www.indiana.edu/~tedfrick/plagiarism/

Use of Generative Artificial Intelligence (AI)
AI is a powerful tool that in rapidly expanding. It is unlikely that AI will be a major help to you in this class; however, if used AI generated information should be viewed as a thought-provoking exercise and not an end product. AI generated text should not be used in any assignment for this course and all documents should be original pieces composed by students. AI can be useful when developing starting points for group presentations but should be viewed with caution and all information generated by AI should be validated independently.

Inform Your Instructor of Any Accommodations Needed
From the Resource Center for Persons with Disabilities (RCPD): Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at rcpd.msu.edu. Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form.

Please present this form to Dr. Gulbransen **as soon as possible (preferably within the first two weeks of class) so that accommodations can be made.** Requests received after this date may not be honored.

Resource Persons with Disabilities (RCPD)

- To make an appointment with a specialist, contact: (517) 353-9642 or TTY: (517) 355-1293
- Web site for RCPD: http://MYProfile.rcpd.msu.edu

Limits to Confidentiality
Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructor, I must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with me:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child,
- Allegations of sexual assault or sexual harassment when they involve MSU students, faculty, or staff, and

- Credible threats of harm to oneself or to others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting you are encouraged to make an appointment with the MSU Counseling Center.

Grief Absence Requests

Course instructors are sensitive to and will accommodate the bereavement process of a student who has lost a family member or who is experiencing emotional distress from a similar tragedy so that the student is not academically disadvantaged in his/her classes. It is the responsibility of the student to: a) notify the Associate Dean of his/her college of the need for a grief absence prior to leaving campus, b) provide appropriate verification of the grief absence as specified by the Associate Dean, and c) complete all missed work as determined by the instructor. It is the responsibility of the Associate Dean or designee to: a) determine with the student the expected period of absence – it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) notify the faculty that the student will be absent, and c) receive verification of the authenticity of a grief absence request upon the student's return. It is the responsibility of the instructor to work with the student to: a) make reasonable accommodations and b) to include appropriate language describing such accommodations in their course syllabus, so that the student is not penalized due to a verified grief absence.

Students who believe their rights under this policy have been violated should contact the University Ombudsperson.

For the Grief Absence Request form go to: *https://reg.msu.edu/StuForms/Stuinfo/GriefAbsenceForm.aspx*.

http://splife.studentlife.msu.edu/regulations/selected/grief-absence-policy