ANALYZING PHYSIOLOGICAL SYSTEMS: PHGY 425

Course Outline Fall 2022

Time: Tuesdays and Thursdays from 1:05 p.m. to 2:25 p.m.
Location: STBIO N5/1

Course Coordinator:

Dr. E. Cook erik.cook@mcgill.ca

MODULE	LECTURER	DATE	
		TUES	THURS
1	Aline Rangel-Olguin		Sept. 1
		Sept. 6	Sept. 8
		Sept. 13	
2	Dr. Erik Cook		Sept. 15
		Sept. 20	Sept. 22
		Sept. 27	Sept. 29
		Oct. 4	Oct. 6
		Fall Break	**FRIDAY** Oct. 14
3	Dr. Curtis Baker	Oct. 18	Oct. 20
		Oct. 25	Oct. 27
		Nov. 1	Nov. 3
4	Dr. Mladen Glavinovic	Nov. 8	Nov. 10
		Nov. 15	Nov. 17
5	Dr. Pouya Bashivan	Nov. 22	Nov. 24
		Nov. 29	Dec. 1

ANALYSING PHYSIOLOGICAL SYSTEMS: PHGY 425

Semester: Fall 2022
Schedule: 2 lectures each of 90 minutes per week
Pre-Requisites: Any introductory computer programming at the 100 or 200 level. Students with computer programming or computer science classes at the 300 level and above are not allowed to take this course.
Credit Weight: 3

Abstract:

An introduction to the analysis of physiological data. The course will focus on ways to think about data analysis and how to develop helpful analysis tools for understanding complex biological systems.

Course grade:

The final grade will be based on the average of homework assignments and in-class quizzes. All assignments and quizzes will be weighted the same.

Assignments

Students will complete one or more assignments per module. Assignments will be handed out (or posted on myCourse) one week before they are due. Students must submit assignments by **emailing them to the grader**. If there is no grader, please email them to the instructor. Instructors for each module will specify what to include for each assignment submission. Assignments must be submitted as a single "zipped" folder. The name of the folder should have the student's name and assignment number (e.g. studentNameAssignment1). **A penalty of up to 20%** can result if an assignment is not submitted in the correct format.

Assignments are due before class start on the due date. Late submission will be penalized **5% per day up to a maximum of 25%.** Thus, you are encouraged to complete all assignments regardless of being late.

Students are allowed to consult with other students for the assignments. However, all assignments must contain a **statement-of-work** that lists the names of other individuals consulted during the assignment and their specific contributions. The statement-of-work must be included at the beginning of the "assignment report". A statement-of-work is required even if the student worked on the assignment alone.

Failure to include a statement of work, or submitting an incomplete statement, could result in a **penalty of up to 50%** on that assignment. Note that evidence of plagiarism of another student's assignment (Matlab code, report, etc.) will be forwarded to the Faculty of Science.

In-class quizzes

Some instructors may elect to have one or more in-class quizzes during a module. Quizzes will be announced at least one week before being administered and will take approximately 20 min to complete. Students that are absent during a quiz will require valid documentation describing their absence in order to be allowed to take a make-up quiz.

Syllabus:

Module 1: Programming in MATLAB (Aline Rangel Olguin)

Overview of the MATLAB programming environment. Emphasis on how to write simple data analysis programs and basic data visualization.

Module 2:* Basics of *data analysis (Dr. E. Cook)

Introduction to data variability, sampled data, linear convolution, linear regression and simple linear and nonlinear models of physiological activity.

Module 3: Optimizing parameters to describe neural data (Dr. C. Baker)

Data reduction by fitting parameters of descriptive functions for neural responses. Space and frequency domain descriptions of visual receptive field models. Machine learning approaches (regression) for fitting parameters of neurophysiological models.

Module 4: Data analysis using artificial neural networks (Dr. P. Bashivan)

Introduction to data analysis using artificial neural networks.

Module 5: Models of synaptic transmission (Dr. M. Glavinovic)

Mathematical modeling of synaptic transmission and calcium dynamics. Diffusion in confined space with a chemical reaction. Continuous modeling, Monte Carlo simulation and molecular dynamics.

Lecturers	**E-Mail**
Dr. P. Bashivan	pouya.bashivan@mcgill.ca
Dr. C. Baker	curtis.lee.baker@mcgill.ca
Dr. E. Cook	erik.cook@mcgill.ca
Dr. M. Glavinovic	mladen.glavinovic@mcgill.ca

TA

Aline Rangel Olguin aline.rangelolguin@mail.mcgill.ca

Grader

TBD

Course Administrator

Ms. Jennifer Rondeau undergrad1.physiology@mcgill.ca