Faculty of Health

Department of Psychology

PSYC 4215 3.0/ PSYC 6226 3.0 A: NEUROIMAGING OF COGNITION fMRI METHODS

Tuesday/11:30-2:30

Fall/2022

The course will be delivered in-class, with an emphasis on lab exercises. Some lecture materials will be uploaded to Moodle.

Instructor Information

Instructor: Dr. Erez Freud
Office Hours: By appointment
Email: efreud@yorku.ca

Course Prerequisite(s): Course prerequisites are strictly enforced

- HH/PSYC 1010 6.00 (Introduction to Psychology)
- HH/PSYC 2020 6.00 (Statistical Methods I and II) or HH/PSYC 2021 3.00 (Statistical Methods I) and HH/PSYC 2022 3.00 (Statistical Methods II)
- HH/PSYC 2010 (Writing in Psychology)
- HH/PSYC 2030 3.00 (Introduction to Research Methods) or substitutes
- HH/PSYC 2240 3.00 (Biological Basis of Behaviour) or HH/PSYC 3250 3.00 (Neural Basis of Behaviour
- Students must be in an Honours program in Psychology and have completed at least 84 credits

Course Credit Exclusions

Please refer to York Courses Website for a listing of any course credit exclusions.

Course website: eClass

All course materials will be available on the course eClass site, unless otherwise indicated by the instructor. The site will be your central access point for course materials (including pre-recorded lectures, assigments and papers)

Course Description

This course offers fundamental knowledge on neuroimaging of cognition using fMRI, including practical aspects of experimental design and analytical approaches. The course provides the necessary theoretical perspectives of fMRI experiments and provides extensive hands-on experience in fMRI analysis.

Program Learning Outcomes

Upon completion of this course, students should be able to:

1. Demonstrate in-depth knowledge in the neuroimaging of cognition using fMRI.

2. Critically evaluate, synthesize and resolve conflicting results in the neuroimaging of cognition using fMRI.
3. Articulate trends in the neuroimaging of cognition using fMRI.
4. Locate research articles and show critical thinking about research findings in the neuroimaging of cognition using fMRI.

Specific Learning Objectives

At the end of this course, students should have a solid theoretical grasp of how fMRI techniques are being used in the field of cognitive neuroscience. They will have an improved ability to critically evaluate the quality of research they read. Students will also be able to design a simple neuroimaging project that addresses a cognitive-related question, and to choose the appropriate analytical approach. Finally, students should be able to clearly and effectively communicate their knowledge in both written and oral forms.

Required Text

- Poldrack, R. A., Mumford, J. A., & Nichols, T. E. (2011). Handbook of functional MRI data analysis. Cambridge University Press.
- de Beeck, H. O., & Nakatani, C. (2019). Introduction to human neuroimaging. Cambridge University Press.

Course Requirements and Assessment:

Assessment	Date of Evaluation (if known)	Weighting
Informal tutorial reports	Weekly basis	60%
Participation & contribution to class discussion	Weekly basis	20%
Term paper	Last day of classes	20%
Total		**100%**

Description of Assignments

1. Informal tutorial reports : After each informal-tutorial, students will be asked to employ the knowledge they have gained and analyze fMRI data. Students will be asked to answer questions and add specific screenshots that will demonstrate their ability to complete the required analyses.

2. Participation & contribution to class discussion – Students will be required to attend weekly in-person classes. Prior to the class the students will be asked to read a paper and to submit questions / comments.

3. Term paper - Students will perform an analysis of the course data or other data (e.g., obtained from an open external dataset) to address a specific cognitive-related question. A final report will describe this analysis, in the context of the theoretical background of the scientific question and the observed results. Teamwork will be encouraged (especially team comprised both experienced and novice imagers). The paper should follow the

guidelines for formatting and referencing outlined in the Publication Manual of the American Psychological Association (6th edition).

Class Format and Attendance Policy

Students are required to attend the weekly meeting and to submit their questions/comments 24 hours before the class.

Grading as per Senate Policy

The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (e.g., A+ = 9, A = 8, B+ = 7, C+ = 5, etc.). Assignments and tests* will bear either a letter grade designation or a corresponding number grade (e.g. A+ = 90 to 100, A = 80 to 89, B+ = 75 to 79, etc.)

Missed Tests/Midterm Exams/Late Assignment

For any missed quiz or late assignment, students MUST complete the following online form which will be received and reviewed in the Psychology undergraduate office. At this time, due to COVID-19 an Attending Physician's Statement (APS) is not required, however, a reason for missing an evaluated component in the course must be provided.

HH PSYC: Missed Tests/Exams Form. Failure to complete the form within 48 hours of the original deadline will result in a grade of zero for the missed quiz or late assignment.

Add/Drop Deadlines

For a list of all important dates please refer to Undergraduate Fall/Winter 2023-2024 Important Dates

	Fall (Term F)	Year (Term Y)	Winter (Term W)
Last date to add a course **without permission** of instructor (also see Financial Deadlines)	September 20	September 20	January 22
Last date to add a course **with permission** of instructor (also see Financial Deadlines)	September 28	September 28	January 31
Drop deadline: Last date to drop a course without receiving a grade (also see Financial Deadlines)	November 8	February 8	March 11
Course Withdrawal Period (withdraw from a course and receive a grade of "W" on transcript – see note below)	November 9 – December 5	February 9-April 8	March 12-April 8

Add and Drop Deadline Information

There are deadlines for adding and dropping courses, both academic and financial. Since, for the most part, the dates are **different**, be sure to read the information carefully so that you understand the differences between the sessional dates below and the Refund Tables.

You are strongly advised to pay close attention to the "Last date to enrol without permission of course instructor" deadlines. These deadlines represent the last date students have unrestricted access to the registration and enrolment system.

After that date, you must contact the professor/department offering the course to arrange permission.

You can drop courses using the registration and enrolment system up until the last date to drop a course without receiving a grade (drop deadline).

You may withdraw from a course using the registration and enrolment system after the drop deadline until the last day of class for the term associated with the course. When you withdraw from a course, the course remains on your transcript without a grade and is notated as 'W'. The withdrawal will not affect your grade point average or count towards the credits required for your degree.

Information on Plagiarism Detection

The written assignments will be tested using online services (such as https://smallseotools.com/plagiarism-checker/) to detect cases of plagiarism.

Electronic Device Policy

This course will be delivered in an online format and therefore electronic devices (e.g., tablets, laptops) are permitted during class time for course-related purposes.

Academic Integrity for Students

York University takes academic integrity very seriously; please familiarize yourself with Information about the Senate Policy on Academic Honesty.

It is recommended that you review Academic Integrity by completing the Academic Integrity Tutorial and Academic Honesty Quiz

Test Banks

The offering for sale of, buying of, and attempting to sell or buy test banks (banks of test questions and/or answers), or any course specific test questions/answers is not permitted in the Faculty of Health. Any student found to be doing this may be considered to have breached the Senate Policy on Academic Honesty. In particular, buying and attempting to sell banks of test questions and/or answers may be considered as “Cheating in an attempt to gain an improper advantage in an academic evaluation” (article 2.1.1 from the Senate Policy) and/or “encouraging, enabling or causing others” (article 2.1.10 from the Senate Policy) to cheat.

Academic Accommodation for Students with Disabilities

While all individuals are expected to satisfy the requirements of their program of study and to aspire to do so at a level of excellence, the university recognizes that persons with disabilities may require reasonable accommodation to enable them to do so. The university encourages students with disabilities to register with Student Accessibility Services (SAS) to discuss their

accommodation needs as early as possible in the term to establish the recommended academic accommodations that will be communicated to Course Directors as necessary. Please let me know as early as possible in the term if you anticipate requiring academic accommodation so that we can discuss how to consider your accommodation needs within the context of this course.

https://accessibility.students.yorku.ca/

Excerpt from Senate Policy on Academic Accommodation for Students with Disabilities

1. Pursuant to its commitment to sustaining an inclusive, equitable community in which all members are treated with respect and dignity, and consistent with applicable accessibility legislation, York University shall make reasonable and appropriate accommodations in order to promote the ability of students with disabilities to fulfill the academic requirements of their programs. This policy aims to eliminate systemic barriers to participation in academic activities by students with disabilities.

All students are expected to satisfy the essential learning outcomes of courses. Accommodations shall be consistent with, support and preserve the academic integrity of the curriculum and the academic standards of courses and programs. For further information please refer to: York University Academic Accommodation for Students with Disabilities Policy.

Course Materials Copyright Information

These course materials are designed for use as part of the 4215 course at York University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as book chapters, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law.

Copying this material for distribution (e.g. uploading material to a commercial third-party website) may lead to a violation of Copyright law. Intellectual Property Rights Statement.

Course Schedule (subject to changes)

Topics	Assignments
Introduction	Reading + Questions Reading p. 1-12; 70-76 (Handbook of functional MRI data analysis) Chapter 1 Introduction to Human neuroimaging
MRI physics + data structure	Reading + Questions (Chapter 2; introduction to Human Neuroimaging) MATLAB exercise
Experimental designs	Reading + Questions (Chapter 5; introduction to Human Neuroimaging) Plan an experiment
Preprocessing	Reading + Questions (Introduction to Human Neuroimaging, Chapter 6) Handbook of functional MRI data analysis Chapters 3-4)
Preprocessing - lab	Reading + Questions Lab report
Reading week	
GLM – single subject	Reading + Questions (Introduction to Human Neuroimaging, Chapter 7) Handbook of functional MRI data analysis Chapters 5)
GLM lab + Multi-run analysis	Lab report
GLM – Group analysis +Statistical inference on images + ROI analysis	Reading + Questions Handbook of functional MRI data analysis Chapters 6+7)
Group analysis and ROI analysis lab	Lab report
Multi Voxel Pattern Analysis	Reading + Questions (Introduction to Human Neuroimaging, Chapter 8.2)

	Handbook of functional MRI data analysis Chapters 9)
RSA Lab	Lab
Connectivity	Reading + Questions (Introduction to Human Neuroimaging, Chapter 8.1) Handbook of functional MRI data analysis Chapters 8)