



PSYD55 LEC01:

Functional Magnetic Resonance Imaging Laboratory

Fall 2021

Tuesday 1 – 3pm, Online

Instructor:	Dr Andy C. H. Lee
Email:	psyd55.uts@gmail.com
Website:	Quercus

1. Course Description and Objectives

This course is designed to introduce students to the basics of functional magnetic resonance imaging (fMRI) as used in the field of cognitive neuroscience, using a combination of lectures, practical exercises, group work, and individual assignments. We will cover some of the fundamental principles of this methodology including MR physics, experimental design, data pre-processing, statistical analysis, and results reporting. The aim is that by the end of this course, you will be able to:

- Appreciate the importance of fMRI to cognitive neuroscience and how it complements other research approaches in cognitive neuroscience such as patient neuropsychology and electroencephalography.
- Understand the core physical and statistical principles behind fMRI, which allow researchers to make inferences about neural activity and cognition from 'blobs on brains'.
- Identify the strengths and weaknesses associated with fMRI, including different experimental designs and statistical approaches.
- Design an effective fMRI paradigm to address an appropriate research question of interest.
- Apply basic knowledge of specialist fMRI software and statistics to preprocess and analyse individual subject and group fMRI data.
- Communicate fMRI research ideas and findings effectively in writing and orally.
- Critically evaluate fMRI findings reported in the primary research literature in order to judge the validity of the conclusions that have been made.

2. Course Requirements

2.1. Attendance & Class Participation (5% overall grade)

Classes will be a mixture of lectures, group work, and practical exercises. By attending all classes, participating in group work, and completing the assigned practical exercises, you will receive the full 5%. It is essential, therefore, that you make every effort to attend each week, particularly as the course material builds from one week to the next. Unavoidable absences (e.g. illness, emergencies) will be excused with relevant documentation.

2.2 Four Mini Quizzes (2.5% overall grade each, 10% total)

There will be a short online quiz on Quercus for each of the main modules in the course (i.e. MR physics, Experimental design, Pre-processing, Univariate statistics). Each quiz will consist of 5 multiple choice questions and you will be required to do them after the relevant course material has been covered. The aim of the quizzes is simply to help you think about and digest the course material – you can do each quiz as many times as you like until you answer all questions correctly. Successful completion of each quiz, with all questions correct will count as 2.5% towards your final grade.

2.3 Written Assignment 1 (15% overall grade; submitted via Quercus): Critique Paper

The goal of this assignment is to develop your understanding of fMRI methodology. You will be required to read an assigned experimental article (see course website) and write a ~800-word (no more than 1000 words) critique paper in response. In this paper, you must summarize the aim, main methods, results, and conclusions of the article, and on the basis of your current knowledge of fMRI, critically evaluate the methods that were used, and whether the authors' conclusions are justified.

2.4 Group Presentation (15% total)

The goal of this activity is to provide further understanding of experimental design for fMRI. You will be required to work in groups of 3 – 4 to design an fMRI study. There will be a list of experimental questions to choose from. Each group will present their design to the rest of the class in a 10-minute presentation, using a PowerPoint (or equivalent) slideshow. This presentation will describe the details of the behavioural paradigm to be used, and recommended scanning parameters.

2.5 Written Assignment 2 (20% overall grade): Experimental Design Paper

The goal of this assignment is to develop written communication of fMRI methodology. You will be required to submit your own written description of your group's fMRI experimental design (see **2.4 Group Presentation**). This should be similar to a journal article-style methods section providing details of the experimental paradigm, number of subjects, and scanning protocol.



2.6 Written Assignment 3 (35% overall grade; submitted via Quercus): Final Paper

The goals of this assignment are to develop your understanding of fMRI methodology and written communication of fMRI research. There are two parts to this Final Paper:

A) Revisiting Critique Paper: You will be asked to revisit the Critique Paper that you wrote earlier in the course (Written Assignment 1) and in particular, reconsider your critical analysis of the assigned experimental article. On the basis of the knowledge you have acquired over the course of the term, please edit this section accordingly and resubmit as part of the Final Paper. Has your opinion/evaluation of this article changed knowing what you know now?

B) Practical Exercise Write-up: You will be required to write-up the analysis steps and results from the in-class practical exercises. This should be similar to a journal article's methods and results sections providing details of fMRI data pre-processing, statistical analysis, and findings using both prose and diagrams.

An important note on plagiarism: Please review this website which describes tips on how not to plagiarize: <http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>.

Electronic copies of the papers must be submitted by the specified time on the specified day (see details in Section 4. Tentative Schedule) via the course website on Quercus. It is not necessary to submit a hard copy.

3. Assigned Reading

There will be no required reading for this course, other than the experimental article for Written Assignment 1. All information will be conveyed via class lectures and slides (making it essential, therefore, that you attend all classes). For those who have a particular interest in fMRI, a separate document will be uploaded to the course website in the early stages of the course. This document will contain recommended text for you to read in your own time and/or use as a reference if you go on to conduct fMRI research in the future (e.g. as part of graduate school). In many cases, the level of detail in the recommended articles (e.g. mathematical background) is far beyond what is covered in the current course.

4. Tentative Schedule

Date	Topic	Quizzes & Assignments due
Sep 7	Getting started & Basic magnetic resonance physics lecture I	
Sep 14	Basic magnetic resonance physics lecture II	
Sep 21	Experimental design lecture I	
Sep 28	Experimental design lecture II	1pm Critique Paper; Quiz 1
Oct 5	Experimental design group work	
Oct 12	Reading week	
Oct 19	Experimental design group presentations	1pm Quiz 2
Oct 26	Pre-processing lecture I & practical exercises	1pm Experimental Design Paper
Nov 2	Pre-processing lecture II & practical exercises	
Nov 9	Pre-processing practical exercises	
Nov 16	Univariate statistics lecture I & practical exercises	1pm Quiz 3
Nov 23	Univariate statistics II & practical exercises	
Nov 30	Univariate statistics practical exercises	
Dec 6		11:59pm Quiz 4 & Final Paper

Lecture slides will be posted on the course website (in the "Content" section) by midnight at the latest the night before the lecture.

5. Course Policies

5.1 Late Assignments

All assignments are due by 1pm or 11:59pm on the specified due date (see Section 4. Tentative Schedule). Except in the case of a documented emergency (see above), for every 24 hours that the paper is late, 10% will be docked off the final mark. For instance, for the first deadline Sep 28th, a paper handed in past 1pm on Sep 29th will only receive 90% of the mark the quality of the work deserves, a paper handed in past 1pm on Sep 30th will only receive 80% of the mark the quality of the work deserves, and so forth. Appropriate documentation is required in all emergency situations. Unless you have a legitimate, documented emergency, NO EXTENSIONS WILL BE GIVEN.

5.2 Missed term work due to medical illness or other emergencies

For missed term work (assignments and term tests) due to illness, emergency, or other mitigating circumstances, please follow the procedures outlined below.

- The following reasons are not considered sufficient for missed term work: travel for leisure, weddings, personal commitments, work commitments, human error.
- Missed Final Exams are handled by the Registrar's Office and should be declared on eService: <http://www.utsc.utoronto.ca/registrar/missing-examination>
- Instructors cannot accept term work any later than five business days after the last day of class. Beyond this date, you would need to file a petition with the Registrar's Office: <https://www.utsc.utoronto.ca/registrar/term-work>

Accommodations for Illness or Emergency:

For missed work due to ILLNESS OR EMERGENCY, complete the following three-step process:

1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>)
2. **Declare your absence** on **ACORN** (Profile & Settings > Absence Declaration)
3. **Email both the Request for Missed Term Work Accommodations Form AND a screenshot of your Self-Declared Absence on ACORN** to the course email address (psyd55.utsc@gmail.com) **WITHIN 2 BUSINESS DAYS** of the missed work.

Note: If you are unable to submit your documents within 2-business days, you must still email your instructor within the 2-business day window to explain the nature of the delay, and when you will be able to provide your documents. Exceptions to the documentation deadline will only be made under exceptional circumstances.

Note: For this semester, we do not require any additional supporting documentation (e.g. medical notes) to support your missed term work accommodation request.

Accommodations for Academic Conflicts:

For missed term work due to an ACADEMIC CONFLICT (i.e. two midterms scheduled at the same time), please complete the following process:

1. Complete the **Request for Missed Term Work Accommodations Form** (<http://uoft.me/PSY-MTW>), choosing "Other" and explaining the conflict in the space provided.
2. Take screenshots of your course homepages that demonstrate the conflict.
3. Email the form and screenshots to your course instructor at least two weeks (10 business days) before the date of the activity, or as soon as possible if it was not possible to identify the conflict earlier.

Note: Multiple assignments due on the same day are not considered conflicts. Accommodations may only be possible in the case of quizzes and tests that are both scheduled during the same discrete period. Back-to-back tests/quizzes are not considered conflicts.

Note: Students are responsible for keeping their course timetables conflict-free. Students who choose to register in two synchronous courses with overlapping lecture/tutorial/lab schedules may not necessarily be accommodated.

Accommodations for Religious Conflicts:

For missed term work due to a RELIGIOUS CONFLICT, please complete the following process:

1. Complete the [Request for Missed Term Work Accommodations Form](http://uoft.me/PSY-MTW) (<http://uoft.me/PSY-MTW>), choosing "Other" and noting "Religious conflict" in the space provided.
2. Email the form to your course instructor at least two weeks (10 business days) before the date of the activity, or as soon as possible if it was not possible to identify the conflict earlier.

Accommodations for Time Zone Conflicts:

If you are physically in a different time zone and a quiz or midterm is scheduled outside of 7:00am to midnight in your local time, please complete the following process:

1. Complete the [Time Zone Conflict Form](https://uoft.me/PSY-TimeZone) (<https://uoft.me/PSY-TimeZone>), and
2. Email the form to your course instructor at least two weeks (10 business days) before the date of the activity, or as soon as possible, if it was not possible to identify the conflict earlier.

Accommodations for Students Registered with AccessAbility Services:

For missed TERM TESTS due to ACCESSABILITY REASONS:

- Contact your AccessAbility consultant and have them email your instructor detailing accommodations required.

For missed ASSIGNMENTS due to ACCESSABILITY REASONS:

- If your desired accommodation is within the scope of your Accommodation Letter (e.g. your letter includes "extensions of up to 7 days" and you need 3 days):
 1. Complete the [Request for Missed Term Work Accommodations Form](#).
 2. Email the form and your Accommodation Letter to your instructor, specifying how many days extension you are requesting.
- If your desired accommodation is outside the scope of your Accommodation Letter (e.g. your letter includes "extensions of up to 7 days" but you need more time than that):
 1. Contact your AccessAbility consultant and have them email your instructor detailing the accommodations required.

Accommodation Procedure:

After submitting your documentation, you will receive a response from your instructor or TA. This form does not guarantee that you will be accommodated. The course instructor reserves the right to decide what accommodations (if any) will be made. Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation. **You are responsible for checking your official U of T email and Quercus course announcements daily**, as accommodations may be time-critical.

For missed assignments, **do not wait for an instructor response to resume work on your assignment**. Extension accommodations may be as short as one business day, depending on the nature of the illness/emergency. You should complete your assignment as soon as you are able and email it your instructor.

For an anticipated event (e.g. scheduled surgery or an illness with a prolonged recovery period), submit a [Verification of Illness Form](#) completed by your doctor, AND this form to your instructor if you would



like to request accommodations in advance of the assignment deadline or midterm date. Declare your future absence on [ACORN](#) (absences can be declared up to 14 days in the future).

Missed Accommodations

If an accommodation is granted but a continued illness/emergency prevents you from meeting the requirements of your accommodation, you must repeat the missed term work procedure to request additional accommodations. **Please make it clear in your subject line that you are requesting a second accommodation.** For example, if you are given an extension but are still sick and need more time, or if you miss a make-up midterm, you must submit another request 'Missed Term Work Accommodations' form and declare your extended absence on ACORN. ***Note: In the case of a missed make-up test, an opportunity to write a second make-up test may not be provided.

5.3 Grading Scale

NUMERICAL MARKS	LETTER GRADE
90 - 100%	A+
85 - 89%	A
80 - 84%	A-
77 - 79%	B+
73 - 76%	B
70 - 72%	B-
67 - 69%	C+
63 - 66%	C
60 - 62%	C-
57 - 59%	D+
53 - 56%	D
50 - 52%	D-
0 - 49%	F

Guidelines (<http://www.writing.utoronto.ca/advice/general/grading-policy>):

A+ Outstanding performance, exceeding even the A described below.

A Exceptional performance: strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter with sound critical evaluations; evidence of extensive knowledge base.

B Good performance: evidence of grasp of subject matter; some evidence of critical capacity and analytic ability; reasonable understanding of relevant issues; evidence of familiarity with the literature.



C Intellectually adequate performance: student who is profiting from her or his university experience; understanding of the subject matter and ability to develop solutions to simple problems in the material.

D Minimally acceptable performance: some evidence of familiarity with subject matter and some evidence that critical and analytic skills have been developed.

F Inadequate performance: little evidence of even superficial understanding of the subject matter; weakness in critical and analytic skills; with limited or irrelevant use of literature.

Note: for all written work, consistently poor spelling/grammar will be penalised. Please make use of the UTSC writing centre if you feel you need additional help with writing or want to develop your writing skills further: <http://ctl.utsc.utoronto.ca/twc/>.

5.4 Contesting a grade

All requests for a re-grade must be submitted in writing within two weeks of the day the grade is received. Only requests that include adequate written justification of an error in the original grading will be considered. A legitimate request will result in the entire exam or assignment being re-graded. Your overall grade may be raised, lowered, or it may stay the same. If there has been an error in our arithmetic, please let us know and we will immediately recalculate your grade (no written request necessary). Arbitrary requests for grade increases will not be entertained.

5.5 Video and Auditory Recording

For reasons of privacy as well as protection of copyright, unauthorized video or audio recording in classrooms is prohibited. This is outlined in the Provost's guidelines on Appropriate Use of Information and Communication Technology. Note, however, that these guidelines include the provision that students may obtain consent to record lectures and, "in the case of private use by students with disabilities, the instructor's consent must not be unreasonably withheld."

5.6 Accessibility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible.

5.7 Academic Integrity

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:



In papers and assignments:

- Using someone else's ideas or words without appropriate acknowledgement.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts.
- Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

- Using or possessing unauthorized aids.
- Looking at someone else's answers during an exam or test.
- Misrepresenting your identity.

In academic work:

- Falsifying institutional documents or grades.
- Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site (<https://uoft.me/pdt-faq>).

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <http://www.utoronto.ca/academicintegrity/>).