

Brain Imaging Laboratory (PSYC04H3 S LEC01)
COURSE SYLLABUS – Winter 2019

INSTRUCTORS:

Dr. Lorna Garcia-Penton

Office Hours and Location: Weeks 1-3, Thursdays @ 1 - 2:30pm, Science Wing, Room 410M

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Dr. Alejandro Pérez

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Achala Rodrigo, M.A.

Office Hours and Location: Weeks 10-12, Mondays @ 2 - 3pm, Science Wing, Room 561

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Teaching Assistant: Angela Wang

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Class Time and Location: Monday @ 15:00-17:00 in Science Wing, Room 316 (SW316).

Tutorials: This course is composed of three separate modules (one for each brain imaging technique). Module-specific syllabi will be distributed at the beginning of each module and will describe the times and locations of required tutorials and readings and how to submit assignments for each module.

Brain Imaging Laboratory is a course designed to familiarize you with cutting-edge techniques used by psychologists to study the neural basis of cognition, perception and motor control. Specifically, you will obtain hands-on experience with data collection, signal processing and statistical analysis for functional magnetic resonance imaging (fMRI), functional near-infrared spectroscopy (fNIRS), and electroencephalography (EEG). You will also learn the core principles of

experimental designs for brain imaging research and learn how to interpret findings using each of these brain imaging techniques.

Weekly Topics, Readings and Important Dates

WEEK	DATE	TOPIC
1	January 7	fMRI (Dr. Garcia-Penton)
2	January 14	fMRI (Dr. Garcia-Penton) <i>**Data collection at the Centre for Addiction and Mental Health, College Street. NO CLASS MONDAY JANUARY 14**.</i>
3	January 21	fMRI (Dr. Garcia-Penton) Univariate data analysis in class
4	January 28	EEG (Dr. Nemrodov) - Introduction
5	February 4	EEG (Dr. Pérez) – ERP components and ICA
6	February 11	EEG (Dr. Pérez) – **EEG data collection at CAP Lab at room SW132B. NO CLASS MONDAY FEBRUARY 11** Due: fMRI Assignment: Feb 11
	February 18	<i>READING WEEK (NO CLASS)</i>
7	February 25	EEG (Dr. Nemrodov) – ERP Data analysis
8	March 4	EEG (Dr. Pérez) – Time-frequency analyses
9	March 11	EEG (Dr. Nemrodov) - MVPA and source localization Due: ERP Analysis Assignment: March 11

10	March 18	fNIRS (Rodrigo): Introduction to fNIRS principles and methods <i>**Sign-up for fNIRS Lab Sessions**</i>
11	March 25	fNIRS (Rodrigo): <i>**fNIRS laboratory demonstrations: SW 561**</i> <i>**NO CLASS MONDAY MARCH 25**</i> Due: EEG study proposal: March 25
12	April 1	fNIRS (Rodrigo): fNIRS signal processing basics and fNIRS applications
	April 8	Due: fNIRS Assignment: April 8 Last day of classes and last day for submission of term assignments in S courses.

Course Evaluation

- 20% - fMRI
 - 5% - Participation
 - 15% - fMRI poster
- 40% - EEG
 - 20% - Research proposal
 - 20% - Analysis of EEG data
- 20% - fNIRS
 - 5% - Participation
 - 15% - fNIRS Assignment
- 20% - Final exam

fMRI Poster Grading

A marking rubric will be used to assess the posters. Each poster will be marked out of 15 points:

1. Formatting & Organization (max 3 points)

Are all expected components of the poster present? Is the poster laid out in a clear and logical manner? Has there been a good and appropriate use of the different sections of the poster?

2. Accuracy (max 3 points)

Is the content of the poster accurate? Are there any errors in the description of the experimental details? Is the text free of spelling or typographical errors?

3. Clarity (max 4 points)

How clearly written is the text of the poster? Is the text concise? Is it evident that the aims and findings of the experimental study have been understood fully? Are figures/tables appropriate and clear?

4. Originality (max 5 points)

Are the conclusions justified on the basis of the presented data? Is there evidence of critical thinking and original ideas? Has an attempt been made to fit the present work to the wider literature? Has thought been given to possible future experiments?

EEG Research Proposal

The EEG research proposal involves designing an experiment based on a selected paper. The pdfs corresponding to these papers will be uploaded in Quercus. If you would like to use an EEG paper not listed, you can do it as well. The assignment will be performed in groups of three or four (no more, no less). There is no lower or upper minimum in the length of the proposal, though, 2-3 pages would be enough.

Once a paper is chosen:

1. Design one (or two, if necessary) experiments related somehow to the main experiment contained in the paper you choose.
2. Cover the background, problem, hypothesis, methods, and your design.
3. Your final paper should read like a journal article. Please use the document: "EEG Research Proposal template" as the template for your paper.

A marking rubric will be used to assess the proposals. Each proposal will be marked out of 20 points:

1. Research question (max 5 points)

- a. Is the research problem well motivated in the proposal?
- b. Is the formulation of the research question relevant to the research problem, feasible?
- c. Are operational definitions of the research variables provided?
- d. Is the relevant literature provided? (max 3 sources)
- e. Is the hypothesis correctly formulated?

2. Is EEG appropriate? (max 5 points)

- a. Is EEG an appropriate and effective tool to answer the research question?
- b. Does the proposal make use of the unique advantages of the EEG technique?

3. Analysis (max 5 points)

- a. Is the suggested analysis appropriated?

- b. Are possible conclusions described?
 - c. Are the appropriate future experiments suggested?
4. Clarity and originality (max 5 points)
- a. Is the language of the proposal clear and succinct?
 - b. Is the proposal original?

Analysis of EEG data

1. ERP Figure (max 6 points)
- a. Are ERPs from the two conditions present? [4]
 - b. Are axis labels and legend present? [2]
2. Topography Figure (max 6 points)
- a. Are topographies from the two conditions present? [4]
 - b. Is the legend present? [2]
3. Conclusion (max 8 points)
- a. Is the statistical test appropriate and done correctly? [4]
 - b. Is the conclusion appropriate based on the results? [4]

fNIRS Assignment

The fNIRS assignment will consist of 3 open ended questions that will require you to demonstrate your understanding of fNIRS principles, applications, and limitations. To this end, you will be asked to provide brief, yet well thought out, and empirically supported written responses (each response should be a maximum of 1 page, using APA style formatting, excluding references). Each question will be graded out of 5 points, and responses will be assessed for understanding of concepts covered in class/lab, accuracy, and empirical support (at least one peer-reviewed journal article per question).

Final Test

Duration: 1:00 hour.

Format: 50 MC questions with four choices (15 MRI, 20 EEG, 15 fNIRS).

Final examinations take place after the last day of classes.

Questions about Grading: Any questions about grading on quizzes or assignments should be made in writing to your Teaching Assistant within one week of receiving the graded material and should detail the point of contention.

Missed Term Work due to Medical Illness or Other Emergency:

All students citing a documented reason for missed term work must submit their request for accommodations within three (3) business days of the deadline for the missed work.

Students must submit **BOTH** of the following:

- (1.) A completed Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), and
- (2.) Appropriate documentation to verify your illness or emergency, as described below.

Appropriate documentation:

For missed TERM TESTS due to ILLNESS:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with an original copy of the official UTSC Verification of Illness Form (uoft.me/UTSC-Verification-Of-Illness-Form) or an original copy of the record of visitation to a hospital emergency room. Forms are to be completed in full, clearly indicating the start date, anticipated end date, and severity of illness. The physician's registration number and business stamp are required.

For missed ASSIGNMENTS due to ILLNESS:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with a hardcopy of the Self-Declaration of Student Illness Form (uoft.me/PSY-self-declare-form).

For missed term tests or assignments in OTHER CIRCUMSTANCES:

Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with:

- In the case of a death of a family member or friend, please provide a copy of a death certificate.
- In the case of a disability-related concern, if your desired accommodation is within the scope of your Accommodation Letter, please attach a copy of your letter. If your desired accommodation is outside the scope of your Accommodation Letter (ex. if your letter says "extensions of up to 7 days" but you need more time than that) you will need to meet with your consultant at AccessAbility Services and have them email Keely Hicks (keely.hicks@utoronto.ca) detailing the accommodations required.
- For U of T Varsity athletic commitments, an email from your coach or varsity administrator should be sent directly to Keely Hicks (keely.hicks@utoronto.ca) well in advance of the missed work, detailing the dates and nature of the commitment. * For religious accommodations, please email (keely.hicks@utoronto.ca) well in advance of the missed work.

Documents covering the following situations are NOT acceptable: medical prescriptions, personal travel, weddings/personal/work commitments.

Procedure:

Submit your (1.) request form and (2.) medical/self-declaration/other documents in person WITHIN 3 BUSINESS DAYS of the missed term test or assignment.

Submit to: Keely Hicks, Room SW420B, Monday – Friday, 9 AM – 4 PM

Exceptions to the documentation deadline will only be made under exceptional circumstances. If you are unable to meet this deadline, you must email Keely Hicks (keely.hicks@utoronto.ca) within the three business day window to explain when you will be able to bring your documents in person. Attach scans of your documentation.

Within approximately one week, you will receive an email response from your instructor detailing the accommodations to be made (if any). You are responsible for checking your official U of T email and Quercus course announcements daily, as accommodations may be time-critical.

Completion of this form does NOT guarantee that accommodations will be made. 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.

Instructors cannot accept term work after April 12, 2019. Beyond this date, you would need to file a petition with the Registrar's Office to have your term work accepted (<https://www.uts.utoronto.ca/registrar/term-work>).

Note that this policy applies only to missed assignments and term tests. Missed final exams are handled by the Registrar's Office (<http://www.uts.utoronto.ca/registrar/missing-examination>).

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. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@uts.utoronto.ca.

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.”

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.

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/>).

Academic health check:

Students are encouraged to use English Language Development resources. A diagnostic tool is available at <https://utsc.utoronto.ca/eld/academic-english-health-check-aehc>

Grade Scales

NUMERICAL MARKS	LETTER GRADE	GRADE POINT VALUE
90 - 100%	A+	4.0
85 - 89%	A	4.0
80 - 84%	A-	3.7
77 - 79%	B+	3.3
73 - 76%	B	3.0
70 - 72%	B-	2.7
67 - 69%	C+	2.3
63 - 66%	C	2.0
60 - 62%	C-	1.7
57 - 59%	D+	1.3
53 - 56%	D	1.0
50 - 52%	D-	0.7
0 - 49%	F	0.0