

Eye Movements and Perception

PSYC 734: Advanced Topics in Cognitive Science

Last updated 8/18/2023

Instructor: **Matt Peterson**
2058 David King Hall
Ph: 993-4255
Email: mpeters2 at gmu dot edu
Office Hours: Wed. 11-11:50

Time: 1:30 – 4:10pm Thursdays

Classroom: David King ArchLab Conference Room (2073a)

Recommended (not required!!) **Text:** [Oxford Handbook of Eyemovements \(2011\) Eds: Liversedge, Gilchrist, & Everling; ISBN 13: 9780199539789](#)

The majority of our readings are journal articles, which can be freely download.
The remainder will be uploaded to Blackboard

Prerequisites: Psychology 530, 701, or consent of instructor.

Objectives: In this course we will be exploring the neural and cognitive circuits that produce eye movements, as well as well as the use of eye tracking in applied applications. Topics will include

- Neurological development
- Saccade targeting
- Scene perception
- Memory and eye movements
- Problem Solving
- Human Factors
- Transportation
- Usability
- Eye movement measures and methodology

This course will be taught in a combined lecture and seminar format -- the classes will be largely discussion (it's a seminar), with two (or more students) leading a discussion of one of the papers each week. At times, I will lead the discussion or lecture on background topics (e.g. explaining neuroanatomy, using entropy as an eye movement measure, etc.). I expect everyone (especially the discussion leaders!) to read the assigned articles before class.

My primary goal for this course is for you to leave with a solid theoretical foundation and understanding of what drives eye movements. It is easy to use eye tracking to produce junk research and 'wow' the uninformed – I don't want you to do that. I want you to leave this course with the ability to be good producers and good consumers of research, whether in academia or industry.

For those who wants hands-on eye tracking experience, I will be providing optional hands-on training as part of the group projects.

Official Communications via GMU E-mail: Mason uses electronic mail to provide official information to students. Examples include communications from course instructors, notices from the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their mason e-mail account, and are required to activate that account and check it regularly. I will communicate only through GMU email accounts.

Attendance Policy: Although I do not grade on attendance, this is a graduate level course and I expect (barring unforeseen circumstances) to see you in class each week. Having said that, I do understand that there are occasionally situations that take precedent over this class (conference presentations, job interviews, illness).

Cancellation Policy: This course follows GMU cancellation policy for inclement weather, and GMU will send an alert to your GMU email account and/or cell phone if any of their facilities are closing for inclement weather. If I need to cancel a class meeting, I will email the class about the cancellation.

GMU Honor Code: George Mason University has a code of Honor that each of you accept by enrolling as a student. My expectation is that all of the work you do for me in this class will be the work of one individual. Having said that, I fully encourage you to discuss the readings and topics raised in this class with your fellow students.

Disabilities: If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office."

Exam Make-up Policy: You may take a test after (or before) the scheduled date only if you (a) receive my permission before the day of the test, or (b) have a valid excuse (note from a doctor, judge, sergeant, etc.). Papers will not be accepted beyond the due date. Homework assignments will not be accepted late.

A+	97+		
A	93-96	Grading	
A-	90-92	Discussion Lead (x1)	30
B+	87-89	Participation	20
B	83-86	Final Presentation	30
B-	80-82	<u>Summaries (2)</u>	<u>20</u>
C	70-79		100 points total
F	0-69		

Discussion Lead and Commentary (30%): 30% of the grade will be based on preparing, leading, presenting, and participating in class discussions. Most classes will follow a format in which the instructor will present information and conduct activities to demonstrate principles and techniques. The remainder of the class will consist of discussing the reading materials, providing feedback on the applicability and value of the techniques and concepts presented in the readings, and developing ideas that can be applied to eye movement research. All students are expected to read

the assigned materials before class, and participate in the class discussion. If you miss the class, or fail to read the assigned materials, your class discussion grade will be adjusted accordingly.

To facilitate class discussion, non-presenting students will be responsible for posting, at least 24 hours prior to class, a question or comment about the assignment that would be an interesting point for discussion. The presenters, of course, do not have to address each of the questions or comments, but the information from non-presenters can form the basis for some of the discussion of each article. The postings will be on Blackboard.

Discussion leaders will prepare presentations to organize the class discussion and ensure that enough time is allotted for each topic. *Discussions* should cover the following (when appropriate): *summary* of the material, *research questions* under investigation, experimental *techniques* used, specific *variables* investigated, *eye movement measures* used, the *analysis approach* to find meaning in the eye movement measures, *findings* reported, *applicability* of the techniques to the research problem, *additional research questions* that can be investigated, and specific points and questions for class discussion.

Each student will need to lead at least **2** discussions during the semester.

Participation (20%): Part of the class time will be spent having lively discussions about the papers covered in class. If you do not participate, it *will* affect your grade.

Summaries (20%): Students are required to write a 2-page summary of a week's readings. Two (2) summaries will be due – it is your choice of which weeks you wish to summarize.

Project Presentations (30%): Part of your grade will be based on team projects. Projects provide an opportunity to apply techniques and theories from class to real research questions. Activities include the following: identifying a research question that can be investigated using eye movement measures, conducting a literature review of the relevant research in the area, designing a study to provide answers to the question, [potentially] analyzing the results, identifying shortcomings and research opportunities, and presenting the results to the class.

Optional Hands-On Eye tracking Project: We have several eye trackers available for students to use (particularly the Tobii system) for their group projects. If you decide to take that route, I work hand-in-hand with the groups to design, implement, run, and the analyze data for the project.

To ensure that all group members contribute equally to the project, each member will submit a confidential evaluation of each team member's contribution. If there is a clear trend that an individual did not contribute equally, then the portion of the group grade for that individual will be adjusted accordingly.

My goal is to have the groups formed and topics approved by October 17.

Calendar:

Note: The schedule below is tentative, and though I will try to follow it as closely as possible changes may occasionally be necessary.

Note that August 28th is the last day to add this class and September 12th is the last day to drop this class.

Date	Topic	Assignment due
24-Aug	Introduction, History, + anatomy	sign-ups
31-Aug	Low-level development, eyetracking technology, advanced analysis	
7-Sep	Neural Control	
14-Sep	Attention & memory	
21-Sep	Scene Perception	
28-Sep	Problem Solving	
5-Oct	Usability 1	
12-Oct	Usability 2	
19-Oct	Work on projects	
26-Oct	HFES	No Class
2-Nov	Aviation and Driving	
9-Nov	Work on projects	
16-Nov	Clinical Populations & Developmental Disorders	Presentations
23-Nov	Thanksgiving	No Class
30-Nov	Work on projects / Presentations	
7-Dec	Presentations	Presentations