MATLAB for Experimental Research

http://matlabfun.ucsd.edu

Cogs 119/219 - Winter 2016

SYLLABUS

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TA: Vicente Malave

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When: Tu/Th 2:00 – 3:20 pm
Where: CSB 115 (Computer Lab)
Office Hours: TBD

About this class: Students, researchers, and even professors often say they wished they had the opportunity to take courses that helped them to acquire the actual skills needed for research. This course was developed to serve this purpose. MatlabFun is aimed at upper division undergraduate and graduate students in the behavioral sciences (cognitive science, psychology, linguistics, neuroscience, and related fields). The goal is to help students learn how to use Matlab and the Psychophysics Toolbox (PsychToolbox or PTB).

Matlab is a programming platform used widely in a variety of settings both in academia and industry. PsychToolbox is a free set of programs that makes it easier to develop experiments using Matlab.

The course will not "teach" you how to program and develop an experiment. Rather, the class will help you to acquire these skills. A useful analogy is thinking of us like a sports coach, personal trainer, or piano teacher. We will provide information, support, motivation, structure, and guidance. You will be doing the work. Over the quarter, incrementally, you will acquire valuable skills you can use at school and beyond.

About this syllabus: The syllabus and adherence to the procedures and policies described therein allows you to understand what is expected from you, and allows us to be fair in running the course. There is a reason this document is long. Information related to the course is comprehensively provided here. Please read this syllabus carefully at the beginning of the course and consult it as needed throughout. Most questions students have are already answered here. Attention to detail is crucial for succeeding in this class.

REQUIRED MATERIALS


Matlab is a high-level computing language and environment, used in a wide variety of academic and industry settings for data visualization, data analysis, algorithm implementation, and numerical computation. Matlab runs on Windows, Mac OSX and Linux.

Psychophysics Toolbox (Psychtoolbox or PTB3) is a free set of Matlab functions that facilitates the presentation of stimuli, recording responses, and interaction with subjects.

UCSD computer labs including CSB 115 has computers with Matlab and the Psychophysics Toolbox. While the computers in the lab are adequate for use to fulfill the basic course requirements, they may not have full functionality of Psychtoolbox (see http://psychtoolbox.org/wikka.php?wakka=SystemRequirements).
If you have a personal computer, you can bring it to class and work on it. You can download a trial version of Matlab at [http://www.mathworks.com/downloads/web_downloads/](http://www.mathworks.com/downloads/web_downloads/). For full use, you can purchase a Matlab license, which is available at a substantial discount for students ($99, available at the bookstore or online) and has nearly identical functionality to the full (very expensive!) version. You can also use UCSD’s Matlab license for free on campus or via VPN on your computer. If you have an older version of Matlab, chances are it will work, too. PsychToolbox is free.

**Textbooks:** No textbook is required. We will provide custom materials developed by the professor, documents and how-tos or from other research labs around the world. Some chapters from an earlier version of the book *Matlab for the Behavioral Sciences* by Boynton & Fine will be posted as supplementary reading and/or exercises. You may purchase this e-book as it is inexpensive, but it does not include all of the topics we will cover in class. Course materials will be distributed in class and/or on the course website. Two other books might be useful but not required are *Matlab for Neuroscientists: An Introduction to Scientific Computing in Matlab* by Wallisch et al. and *Matlab for Behavioral Scientists* by Rosenbaum.

**GRADING**

Grading will be consistent with university policies, with which you should be familiar: [http://www.ucsd.edu/current-students/academics/grades/index.html](http://www.ucsd.edu/current-students/academics/grades/index.html).

Criteria for grading individual assessments will vary. Your lowest assignment grade and your lowest quiz grade will be dropped. Work is evaluated objectively, numerically, and may be adjusted statistically. There is no preconceived notion of how many As, Bs, Cs etc are to be earned.

The percentages below reflect the raw points per assessment. Keep in mind that some points are dependent on attendance (e.g., participation, quizzes, some assignments), and some work that is already graded as assignments and participation may also accumulate toward the final project. Percentages are subject to change.

**Cogs 119:** Quizzes (2-3): 10%; Assignments (most weeks): 40%; Final Project: 10%; Project Presentation: 10%; Final Paper: 20%; Participation/Attendance: 7% (+ 0-1% extra credit); Experiment Participation: 3%

**Cogs 219:** Quizzes (2-3): 8%; Assignments (most weeks): 40%; Final Project: 10%; Project Presentation: 10%; Final Paper: 24%; Participation/Attendance: 7% (+ 0-1% extra credit); Experiment Participation: 1%

Although we may adjust the scale to be more lenient, here is the default grading scale:

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<tr>
<th>Grade</th>
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<tr>
<td>A+</td>
<td>97</td>
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**COURSEWORK**

Developing skills takes practice. This class is designed to structure and guide your acquisition of programming and experimental research skills at a steady pace. The class features different types of work (e.g., in class quiz vs. homework; individual vs. group work) so that you can experience multiple learning modalities. The grading is not too heavily weighted on any one type of assessment.

There will be a shift about halfway through the class from acquiring the building blocks, to developing and working on the final project. But throughout the quarter, the course will require you to put in work regularly in order to stay on top of the workload. Your knowledge as well as your grade will accumulate every week. The workload is highly distributed across the quarter.

**Participation and Attendance**

Schedule your other classes and activities such that you can attend class, arrive on time, and stay until the end. Since participation is a significant part of your grade (10%), you will lose points for each class you miss. Note that we will give more weight to attendance in the second half of the quarter when you are doing group work in class. Quizzes
will take place in class, and assignments can also depend on work done in class. Importantly, since we will be doing a lot of work in class, you will fall behind if you don’t attend. In our experience, it takes students significantly longer than the class time they have missed to catch up otherwise. In sum, it is in your best interest to not miss class.

That said, do not come to class if you’re sick & contagious! Go to your doctor for treatment and bring a letter, report or note. See Make-ups and Excused Absences.

Other aspects of participation are discussion and collaboration, helping each other in and out of class, asking questions, explaining solutions, and so on.

See also Quizzes, Homeworaks, Make-ups and Excused Absences and Final Project.

Quizzes

Quizzes will be programming exercises to be done and submitted in class. Quizzes will be similar to the assignments and the materials presented in class so make sure you have done the assignments up to that point and understood the material covered since then. There are no midterms, only quizzes. There are no make-ups, but your lowest quiz will be dropped from your grade.

Assignments

Assignments are to be done individually, not in groups or pairs. The first ~6 weeks of the course will have specific weekly programming problems. Depending on your level of programming experience, be prepared to spend significant time on assignments. Do not leave them to the last minute. In the latter part of the class, the assignments may still include problems, but you will also be asked to turn in a weekly lab report, where you will write about your contribution to the group project and describe your progress. Please submit your work in time as late work may not be accepted, or may receive a severe penalty (see Punctuality). Your lowest assignment grade will be dropped.

Final Project

A sizable programming project constitutes the last 4-5 weeks of this course. You will find out more about projects a few weeks into the course. There are three aspects of the programming project you will submit or present: 1) code and documentation; 2) presentation in class (see final exam); and 3) final paper. The first two are developed as a group; final papers are written individually. Details of each are listed below.

Details:

Your project is a big percentage of your grade. It is not something you can do at the last minute or by working in small bursts. You need to work steadily on it through the second half of the quarter.

Final projects will be done in groups. Group work will not only enable you to achieve more in terms of output, but will also provide learning opportunities through peer discussion and joint problem solving. Group work is also a chance for you to practice communication, collaboration, and management skills that you will benefit from in your education and beyond. We will be working on group projects during class time. This will reduce the time and effort involved in getting together with your group, though you probably will need to meet or at least communicate also outside of class. Use class time wisely to plan and manage your project.

As already mentioned, doing = learning when it comes to programming, so we expect that each student will put in a fair amount of effort into the project. Be fair and courteous to your peers (see Classroom Conduct).

Sometimes students fear there will be inequities in group work. We don’t want you to worry about how other group members’ work will affect your grades. Only a small percentage of your grade will be assigned as a group so you have many means through which you can show your competence and earn your grade. Even for the group project, you will submit individual weekly assignments and final papers. In addition, you will evaluate other members of your group at the end of the quarter based on their work in the group, and this peer-grading will be part of your Final Project grade.
DEADLINE for Projects (code and documentation): TBD, Usually end of week 10 or first day of finals week

See also Submitting Code, Citations, Copyright and Fair Use, Academic Misconduct, and Punctuality.

Final Exam (Final Presentation)

There is no standard final exam for the class. The final is in the form of project presentations. Everyone must attend the final presentations to pass the course. The specific date is TBD, but presentations will occur either on the last day of class (March 10) or during the university specified final date and time (March 17, 3-6pm). Final times and dates are set by the university and cannot be changed by the teaching team. There cannot be any make-ups on the project presentations.

Details:

Each group will present their project to the class at the scheduled final time. You must attend the final to pass the course.

Your presentation should 1) briefly outline the experimental question or research field your project addresses, 2) show what you have programmed (doesn’t have to be “live” Matlab but it’s recommended) and any data you may have collected, or analyses performed.

Each group has: 1 min setup time (if needed, if not you can use the time toward your presentation), 5 min presentation, 2 min for questions. You will be evaluated on clarity of presentation, content, and “effectiveness”. You are free to present your project however you want within those 5 minutes. The format of the presentation is up to you. You can use powerpoint, movies, the board, demos, or whatever you think is most effective. However, you are responsible for bringing or setting up any equipment you need.

Students will participate in the assessment of final presentations. There will be a prize for the best project(s)!

Final Paper

While you will have worked on your project in a group, and you obviously will have talked about your project with your classmates, final papers are individual work. That means you will write your own ideas, in your own words.

Details:

Your paper should have a cover page and Abstract, and separate sections titled Introduction, Design, Implementation, Results, Discussion and References, even though you will not have the same amount of content to write for each section. The emphasis will be heavily on Design and Implementation. Some sections (e.g. Results & Discussion) may be short. Your Design, Implementation, Results & Discussion sections together should be about 4 pages not including cover page, figures, plots or charts. Longer papers are fine, but if your paper is much shorter you probably are not including enough detail.

Papers should be e-mailed as pdf files (not doc, odt or text), typed double spaced with 1 inch margins, in 11 or 12 point Times New Roman or similar font. Please also print your paper and turn it in to the professor, as well as e-mail a pdf copy. You must submit both the electronic and paper version by the deadline. Include page numbers and staple your paper.

Introduction: Describe the overall objective of the project (approx 1 – 2 double spaced pages). Design: This is where you describe the design of your program. Do not go into details of the code here – that should be in the next part Implementation. Here, describe your design at a conceptual level. Break down your problem into sub-problems and explain the details of each ("divide and conquer"): e.g. each sub-problem can be a module (corresponding to a function or a set of functions in Matlab). Describe how your modules interact. Implementation: This is the part you describe what you did and it is the bulk of your paper. Describe your functions and the flow of your program (which function calls which, etc). Each group member must describe the functions they wrote in detail, the other functions can be described with less detail. Results: Present any data using plots, charts and statistics. If you do not have results yet, describe what kind of data is to be collected and how you would analyze and present the data. This can be 1-2 paragraphs, or if you have results, several pages.
Discussion: Briefly address how your project addressed the questions outlined in the Introduction. Again this can be short if you don’t have results. Also include the challenges that you have encountered in the project and any future work. References: All work you refer to, whether it is a paper or software or website goes here (see Citations, Copyright and Fair Use).

Tip: Your weekly lab reports will be useful in putting together your final paper.

Graduate students enrolled in COGS 219 are expected to write longer and more detailed papers. Details forthcoming.

DEADLINE for papers: TBD. Usually last day of week 10 or first day of finals week. See also Punctuality.

See also Citations, Copyright and Fair Use, Academic Misconduct, and Punctuality.

Experiment Participation

We ask that you participate in experiments as part of your training in experimental research and to help UCSD researchers. You can earn 1 point per hour for up to 3% via SONA. Please note you have to follow the procedures of this program very carefully to make sure you receive credit. We cannot request credits on your behalf or in any way override how that system works. See http://www.psychology.ucsd.edu/undergraduate-program/undergraduate-resources/Sona-folder/Index.html. It is possible to participate in a study without using SONA, but you must arrange this with your TA. It is also possible to substitute a written assignment or report in the place of the experimental hours (details to be discussed with your TA).

RULES, POLICIES & OTHER DETAILS

Communication: UCSD provides all students with an email account. It is your responsibility to monitor your e-mail. Not checking email is not an acceptable reason for missing deadlines and important news. You should also check the course website at http://www.matlabfun.com regularly. Assignments, material or due dates are subject to adjustment, at the discretion of the instructor.

Submitting code: Whether it is for a quiz, an assignment or your final, you should submit working Matlab code as m files. If your program is not working, we will try to give you partial credit if your code is well-documented, but this is not guaranteed.

We understand that once you get your code working without those pesky errors, you want to enjoy your success. But don’t forget to make sure you have nicely commented your code, and review your output files as these are very important (and you will be graded on them).

At the beginning of your code, include your name, student ID number, assignment/quiz number, and the date as a comment. Include your group members’ names if applicable. If you broke down your program into multiple m files, remember to include these and comment clearly wherever you call an m file that it is attached. Don’t forget to also submit any other files your code needs to run properly (e.g., images, sounds, mat files).

Classroom Conduct: You are expected to communicate clearly and respectfully with your peers, your professor, and your TA and be courteous and fair to everyone. We have zero tolerance for bullying, harassment, discrimination, or disrespect based on race, ethnicity, gender, sexual orientation, disability, national origin, age, appearance, accent, or any other personal attribute. Any evidence for harassment or bullying, any suspicion of verbal, physical or emotionally abusive behavior will result in report to the appropriate university offices and possibly the campus police. See also, Classroom Rules.

Classroom Rules: You are not allowed to eat or drink in the lab.

Research has shown that people lose a lot of productivity when they multitask. Furthermore, distracting activities can affect others around you. For these reasons we ask that everyone (including me!) do their best to minimize extraneous activities during class. Turn off or silence all cell phones, alarms, music players, and other electronic
equipment at the beginning of class, so as not to disturb other students. If you have an emergency, please leave class to take care of it. We obviously cannot ban computer use in this course. However, if we see you surfing, emailing, facebooking, youtubing, tweeting, yelping, angry birding, etc, we will ask you to stand up in front of everyone, and share the relevance of that activity to the class. Sounds like middle school? Exactly! It would embarrass and/or annoy us all to actually go through this, so let's make an effort to focus on our work.

You may not bring parents, friends, guests, children, or pets to class.

**Contact:** This class provides plenty of opportunity to ask questions and interact with your professor, your TA, and each other. There are also office hours during which we will be available to help you.

*If you have a question about grading, please follow the re-grade policy as there will be no exceptions to this.*

E-mail policy: 1) Please make sure you're writing to the correct address, which is matlabfun.ucsd@gmail.com. We can only guarantee response to emails sent to this address. Otherwise, your message may get stuck in a spam filter or not be read in time. 2) Don't forget to sign your message using your full name and the class in the body of the email even if you think it's obvious. 3) We will do our best to respond quickly but don't rely on e-mail for urgent and important requests. Please allow 48 hours for a response to e-mails.

**Feedback:** We value your feedback so that we can improve the course for you and for students taking the class in the future. In addition to the required CAPEs, we may solicit more targeted feedback on the course throughout the quarter. You are however welcome to email us with any suggestions or ideas (or maybe even praise!) at any time. Feedback can be signed or anonymous. Please be courteous and constructive, and note that the content of the class is not what is up for negotiation. But we are sincerely interested in suggestions that can facilitate your learning and/or improve your enjoyment of the course.

**Punctuality:** Please respect your professors and peers and come to class on time. If you come more than 15 minutes late, expect to lose participation points for that class. You will also lose time on any in-class quizzes.

Assignments and quizzes should be turned in electronically as indicated in the instructions for each assessment. The time of submission is the time the file is uploaded or emailed (depending on instructions on the assignment). Allow extra time for computer mishaps and make sure your submission goes through. We cannot be responsible for computer crashes or network problems. System crashes, lack of lab seating, lost files or passwords are not acceptable excuses for late work. **Allow additional time for mishaps and delays.**

Late assignments: We can grade assignments received after the deadline but before solutions are announced with a 50% grade penalty. Note that we do try to post solutions as soon as possible so that students can study for the next assignment or exam. Assignments submitted after solutions are announced are appreciated, but cannot be graded.

Lab reports (assignments in the 2nd half of class) cannot be turned in late. Quizzes cannot be accepted late.

Final papers and projects that are turned in within 24 hours of the deadline (time of the final) will be graded, but you will only earn 50% of the total grade. Work that is turned in later will not be graded.

**Late Instructor:** Remember that the "15 minute rule" is a legend. Class is only cancelled if your professor, your TA or the department says it is cancelled.

**Incompletes:** In the case of a serious and documented medical condition, you may ask to receive an incomplete grade. You must have made substantial progress towards completing the course, demonstrate how far you got before you were incapacitated, have definitive plans for completing remaining assignments within the next quarter, have persuasive reason that an extension to you would not be unfair to other students, and complete a written agreement to the effect of each of those items. If we accept your request, you can then follow UCSD policies: [http://www.ucsd.edu/current-students/academics/grades/request-remove-incomplete.html](http://www.ucsd.edu/current-students/academics/grades/request-remove-incomplete.html)

**Units:** Students enrolled in this class should sign up for 4 units even though you may be asked when you're signing up to choose how many units. The workload will be the same for all students so there really is no benefit to signing up for less than 4 units.
**Re-grade Policy:** If you want us to re-grade an assessment, you may submit a written request. No grade reviews can be made unless the procedure below is followed, without exception. Remember that after re-grading you may gain or lose points or your grade may remain unchanged. You may not request re-grade of a re-grade.

Re-grade requests must be submitted to your TA in person or via email within 7 calendar days of the return of your grade, in written form, signed and dated. E-mail submissions should be in pdf format.

Requests must include course name, course number, your full name, your student ID number, the date and number of the assignment or quiz, what you are requesting to be re-graded, the grade you received, and an explanation regarding your request. For uploaded or e-mailed work, we will use the original file(s). If the re-grade is for work on paper, include the original material, unaltered. Material cannot be re-graded if there is any additional writing on it in any location. Remember to sign and date your request. This means that if you’re e-mailing it, you will need to send a signed copy and send it as an attachment.

**Make-ups and Excused Absences:** There will be no make-ups. Do not miss class or assessments if at all possible.

If you will miss more than one class or assessment due to an emergency, email us as soon as possible and bring a formal explanation (doctor’s note or report or obituary) within 7 days of missed class or assessment. Emergencies include illness or accident requiring an immediate doctor’s visit or hospitalization, or a death in the family, and do not include locked out roommates, flight delays, computer crashes, not feeling well, oversleeping, not finding parking, needing to help a friend, family member, or pet, etc.

I realize that despite their best intentions students will sometimes miss a class, quiz, or assignment... No need to explain! Your lowest quiz grade and your lowest assignment grade will simply be dropped.

If you will be representing the university in an athletic event, competition, or performance, you need to let me know by Jan 14. You need to bring a letter from your coach, trainer, supervisor or college advisor listing the specific dates and times of these events.

If you have conflicts with scheduled classes or exams due to religious observations, you must report these in writing. Explain the time and date of the conflict. These must be submitted by Jan 14. Taking days off or being out of town around a national or religious holiday does not count.

No other absences can be accommodated.

**Special needs:** Students requesting accommodations and services due to a disability need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD). OSD Academic Liaisons also need to receive a current AFA. For additional information, contact the OSD at 858.534.4382 (V); 858.534.9709 (TTY) or see [http://osd.ucsd.edu](http://osd.ucsd.edu).

Please schedule an appointment by Jan 14 to discuss your case after you have obtained your AFA. Receipt of AFA’s in advance is necessary for appropriate planning for the provision of reasonable accommodations.

**Citations, Copyright and Fair Use:** Any copying or paraphrasing of another’s words, ideas, materials, or code without citation is plagiarism and a violation of the UCSD standards of academic integrity.

You may use any Author-Date citation format in your written work as long as you use one systematically (e.g., APA, Medline/Pubmed).

You may use open source or published code, but you are responsible for following the citation, copyright and fair use agreements. If you use such resources in any work you submit for the class, you must give a specific reference both in your code as a comment, and in any other document you submit that relates to the work, such as your homework, lab report, or final paper to avoid academic misconduct.

**Academic Misconduct:** Cheating, plagiarism, and academic dishonesty will not be tolerated. If any evidence of misconduct is found you will 1) receive at minimum an F for the work, and likely an F for the entire class (academic sanction); 2) be reported to the Academic Integrity Office (and face administrative sanctions).
It is very important to write your own ideas, in your own words. You may not submit work performed by anyone other than yourself for this class, regardless of whether the work was solicited, paid for, took place as part of a tutoring agreement, or volunteered. This will be considered cheating. Other examples of cheating are altering exams or assignments submitted for regrading, submitting someone else’s work as yours, copying and pasting text or code from the internet without attributing credit.

Do not allow others copy your work as this will also be considered academic dishonesty.

Here’s more on university policy on academic integrity and consequences for failure to follow the policy:

*Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind.*

*All suspicions of academic misconduct will be reported to the Academic Integrity Office according to university policy. Academic misconduct is not just blatant cheating (e.g., copying off another student during an exam), but what you might have thought of as "minor cheating" in high school, for example: copying other students' papers or homework; copying or using old papers/report; working with others on individual assignments; forgetting to cite material you took from an outside resource; turning in work completed in total or part by another. The Policy on Integrity of Scholarship (academicintegrity.ucsd.edu) and this syllabus list some of the standards by which you are expected to complete your academic work, but your good ethical judgment (or asking me for advice) is also expected as we cannot list every behavior that is unethical or not in the spirit of academic integrity.*

*Those students found to have committed academic misconduct will face administrative sanctions imposed by their college Dean of Student Affairs and academic sanctions imposed by me. Academic sanctions can range from an F on the assignment to an F in the class. The standard administrative sanctions include: the creation of a disciplinary record (which will be checked by graduate and professional schools); disciplinary probation; and attendance at an Academic Integrity Seminar (at a cost of $75). Students can also face suspension and dismissal from the University; those sanctions are not at my discretion. The appropriate sanctions are determined by the egregiousness of the Policy violation. Students who assist in or are complicit with cheating could also be in violation of the Policy. Thus, students who become aware of their peers either facilitating academic misconduct or committing it should report their suspicions to me for investigation.*

The instructor reserves the right to make changes to the syllabus as needed during the course. Students enrolled in the class agree to the syllabus as well as all university policies.

**Useful Links:**

UCSD Battle Hate: [http://battlehate.ucsd.edu/index.php](http://battlehate.ucsd.edu/index.php)
Sexual Harassment: [http://oshpp.ucsd.edu](http://oshpp.ucsd.edu)
Academic Integrity Office: [http://academicintegrity.ucsd.edu](http://academicintegrity.ucsd.edu)
Office for Students with Disabilities: [http://osd.ucsd.edu](http://osd.ucsd.edu)
Privacy Act and Confidentiality of Student Records: [http://www.ucsd.edu/parents-families/RightsPriv.html](http://www.ucsd.edu/parents-families/RightsPriv.html)