

SYLLABUS  
Computational Methods for Psychology & Neuroscience

Psychology 327, Fall 2017  
Lecture, TR 3:40–5:00, TLC 302  
Lab, W 5:30–7:00, TLC100

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CLASS URL: <http://goo.gl/eWZIXr>

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## Basics

In this class we will have a look at the various computational tools currently used in psychology and neuroscience. We'll talk about some of the major programs used by scientists in these fields and try to learn a bit about some of them so that you won't be totally caught off guard should you encounter them in your future.

You'll do a few programming projects, a few visualization projects, and all-in-all, get a (very) broad exposure to the tools currently in use.

## Outcome Goal Objectives Buzzword Pedagogy

Students who complete this class will have a broad understanding of scientific computation writ large, and more specifically in the domains of psychology and neuroscience. They will complete several projects designed to test and demonstrate their knowledge and ability in some foundations of computer science, computer programming, *and* in the *proper* use of various higher-level scientific software packages.

Specifically,

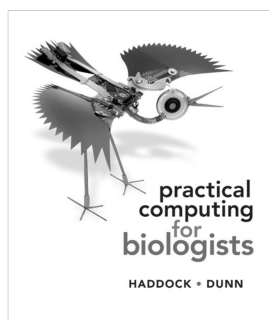
- Basic scientific programming techniques.
- Basic scientific software usage techniques.

- Ability to generalize these techniques to other languages and systems.

Assessment will be via

- Four (4) to six (6) programming projects spread through the semester.
- Three (3) to five (5) will be common across all students in the class.
- One (1) or two (2) will be team projects.
- One (1) will be a self-determined, final programming project that will carry the majority of the grade in the course.

## Materials



There is no *required* book for this class. There is a nice, optional book, *Practical Computing for Biologists* by Haddock & Dunn (ISBN 978-0-87893-391-4) that may or may not come in handy for you, depending on your generic computer knowledge.

## Software

We'll be doing a little bit of so-called 'shell' programming, so you'll need some way of accessing that. If you're using macOS or \*nix, you're already gold, there is a built in terminal app that will get you where you need to go.

If you're a Windows person, there are a *few* alternatives,

the best being with Windows 10. There are instructions on setting it up out on the interwebs. Search for windows 10 bash.

For a good part of the class, we'll be using *Mathematica* (see <http://www.wolfram.com> if you're not familiar with it). Later on, we'll use a little Python for good measure.





Skidmore's *Mathematica* license includes student access for your own personal machine. I'd recommend getting your own copy since the lab and public computers are usually a version or two behind. Instructions are here — <https://academics.skidmore.edu/blogs/flip/?p=925>.

There is a very nice (if a *bit* pedantic) book on learning *Mathematica* that we will use — <http://www.wolfram.com/language/elementary-introduction/>.



There are a bunch of different ways you can use the book. You can buy a print copy, use it directly in a web browser, with CloudMathematica™, &c. The way *I* prefer to use the book is by downloading the notebooks —

OTHER VERSIONS:

-  Online Training Series:  
[Register Now »](#)
-  Cloud edition:  
[Included in Wolfram Programming Lab »](#)
-  Notebook edition:  
[Download Directly »](#)  
*Also included in*  
[Wolfram Programming Lab for Desktop »](#)
-  Kindle edition:  
[Order on Amazon »](#)

## Some useful places

- [www.wolfram.com](http://www.wolfram.com) — Scientific computing environment
- [www.wolfram.com/language](http://www.wolfram.com/language) — The Wolfram™ Language
- [mathematica.stackexchange.com](http://mathematica.stackexchange.com) — A great (if a little brusque) place to get your *Mathematica* questions answered.
- [community.wolfram.com/](http://community.wolfram.com/) — The Wolfram Community
- [python.org](http://python.org) — official Python language site
- [continuum.io](http://continuum.io) — Commercial Python w/ free academic version
- [www.enthought.com](http://www.enthought.com) — Commercial Python w/ free academic version
- [www.psychopy.org](http://www.psychopy.org) — Python for psych & ns experiments
- [stackoverflow.com](http://stackoverflow.com) — Great place to find answers on programming
- [www.barebones.com/products/textwrangler](http://www.barebones.com/products/textwrangler) — A nice free text editor
- [www.sublimetext.com](http://www.sublimetext.com) — A great editor with advanced goodness
- [practicalcomputing.org](http://practicalcomputing.org) — The *Practical Computing* site

## Schedule

Roughly- we'll go at it like this:

PART 0: *Computer Good*

What is it? What are its parts? How to they do things?

PART 1: *The Shell*

Learn the secret of 'shell fingers.' Amaze your friends with your newfound digital dexterity.

PART 2: *Regular Expressions*

As opposed to the irregular kinds.

PART 3: *Computational Problem Solving*

We'll get a quick start into what is programming via the Picobot.

PART 4: *Mathematica*

Programming functionally in Mathematica.

PART 5: *Visualization and Analysis*

Looking at and understanding data.

PART 6: *Images and Signals*

Pictures and sounds. What to do with them.

There will be a project due at the end of each part. The requirements for each will be featured on OneNote.

## Assessment and Grading

LABS: ( $N = 3$  to  $5$ ) — 50%

FINAL PROJECT: ( $N = 1$ ) — 45%

'PRESENCE': ( $N = 1$ ) — 5%

## Office Hours & Appointments

I'm in a slightly chaotic mode, since I just got back from sabbatical (OK, honestly, I'm *always* in a chaotic mode). The easiest way to schedule an appointment is with your Skidmore Office 365 account — <http://office.com> since I keep my availability relatively up-to-date there. To do that see the instructions at <http://goo.gl/ozosaS>.

## Details

Honor Code: The Skidmore Honor Code is the main governing policy of this class. Learn it. Know it. Live it.

See <http://www.skidmore.edu/advising/integrity/index.php> for details.

Attendance: Show up. Miss more than 3 classes and I *reserve the right* to fail you. Miss the first day and I *reserve the right* to drop you from the class and admit someone on the wait-list.

Missing Exams or Labs: To be excused from an exam, except for sudden extreme illness, you must arrange with me at least 24 hours before the exam is scheduled. Anyone missing an exam who has not been excused will receive a o. Make-up exams must be scheduled within the week following the exam.

Lateness: Work presented late without prior notice will receive a o. If something is going to be late get in touch with me. I reserve the right to give late work whatever penalty I feel is appropriate.

Extra Credit: I don't offer 'extra credit.'

Plagiarism: *Any* act of plagiarism will result in a failing grade for the course and whatever procedures / processes I am obligated to undertake on behalf of the department & college. I take this pretty seriously. If you're not sure if something is plagiarism, **ask**.

ADA: Services and accommodations are available to students covered under the Americans with Disabilities Act. If you have any visual, perceptual, or physical challenges that might result in the need for some form of accommodation I am more than willing to help you help yourself. Contact me and/or Student Academic Services

[http://www.skidmore.edu/academic\\_services](http://www.skidmore.edu/academic_services) for assistance.

Slack: Generous swaths of slack shall be cut to those who exhibit respect for the learning process and the class in general. This means that the above restrictions, limits, penalties, punishments, &c are somewhat malleable based on *your* attitude.

CYA Clause: This document subject to random changes at my discretion or via *vis major* — with proper notice in class / via email, web site, and/or carrier pigeon.

### Note!

In this class, you could be exposed, at any moment, *and without warning of its imminence* to: ideas, comments, imagery, sounds, feels, readings, people, and other things that you may find: shock-

ing, offensive, absurd, annoying, racist, sexist, homophobic, discriminatory, or generally obnoxious.

This called 'education.' — after J Rauch

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Last updated: January 18, 2017