

PS4091

Computer Aided Research

Module Outline

2019/20, 1st semester

School of Psychology & Neuroscience

Instructor

Thomas Otto

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University of
St Andrews

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Module Summary

As research becomes ever more computationally intense, the ability to use modern research software is becoming indispensable. The aim of the module is therefore to introduce Matlab as a scientific programming language and to provide you with the skills necessary to apply it in your research. Emphasis will be put on basic aspects of computer programming in a research context with application to stimulus presentation, response collection as well as data analysis and visualisation. The module content is designed assuming that most students have no prior experience in any programming language.

Software

The module will make use of specialised software, some of which is commercial. All software is available and readily installed on the teaching computers in the School of Psychology and Neuroscience. Please note that other modules may also use the computer rooms for exercises. Hence, your access to the computers may be limited at certain times during the week. The used software includes:

Matlab	Software for performing scientific and mathematical scripting. Matlab is the main programming language used in the module.
Psychtoolbox	Software extension that works within Matlab to provide methods to display images or animations and handle user input (e.g. key-presses).

Teaching

The course is scheduled for two hours, one hour of lecture and one hour practical/help session. Lectures will be delivered (where possible) in a computerised classroom, allowing for more interactive lectures, where student can immediately attempt what they are being taught.

Teaching Material

Handouts of lecture slides will be provided on Moodle on Monday evenings before the corresponding lecture. Please familiarize yourself with the respective documents before each class.

Reading

The module can be prepared by background reading on scientific programming such as *Matlab for Brain and Cognitive Scientists* by Mike X. Cohen (The MIT Press, 2017).

Contact

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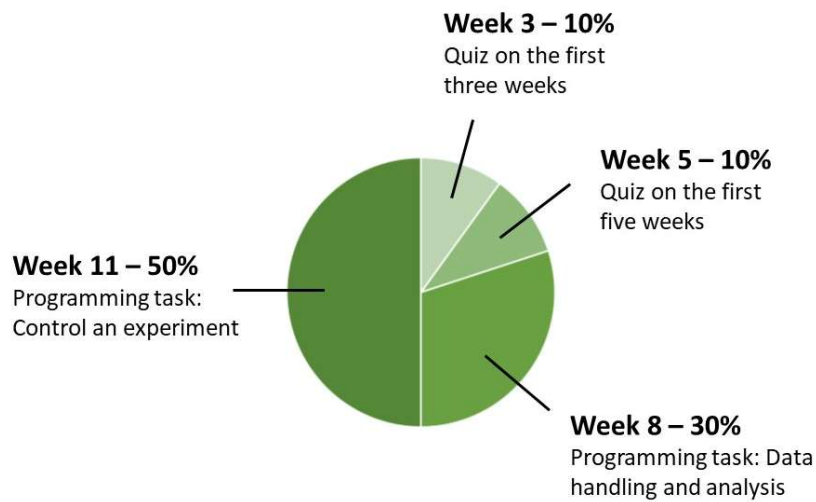
Office hour: Tuesdays 11am

Dates

The module runs on **Tuesdays** in **Semester 1** with the first session on **17th September, 2018**. The module provides one class per week, which combines lectures and exercises. Please try to attend all classes (Table 1).

Table 1: PS4091 Sessions with topics summaries.

Week	Date	Class (9-11am)	Topics
1	17 th September	Computer Room (1.03)	Welcome lecture: How important is computing in Psychology and Neuroscience? What comes with Matlab as programming language? How to use Matlab for basic mathematics ?
2	24 th September	Computer Room (1.03)	Matlab basics I: The very basics of programming. What are variables ? What are functions ? How to use control statements ?
3	1 st October	Computer Room (1.03)	Matlab basics II: What are scalars, vectors, and matrices ? How to access matrices using an index ? How to use matrices for basic mathematics ?
4	8 th October	Computer Room (1.03)	Matlab basics III: What is the difference between definite and indefinite loops ? How to change the execution of code within a loop? How to catch error messages?
5	15 th October	Computer Room (1.03)	Matlab basics IV: How to work with matrices using logic indexing ? What are the basics of Boolean algebra ? How to write code that follows best practice ?
6	Independent Learning Week		
7	29 th October	Computer Room (1.03)	Programming task on data analysis (I)
8	5 th November	Computer Room (1.03)	Programming task on data analysis (II)
9	12 th November	Computer Room (1.03)	Programming task on experimental control (I)
10	19 th November	Computer Room (1.03)	Programming task on experimental control (II)
11	26 th November	Computer Room (1.03)	Programming task on experimental control (III)



Assessment

Assessment type: 100% continuous assessment

The module assessment is organised in 4 assignments. The first section (weeks 1-5) includes 2 online quizzes on Matlab and general programming skills. In the second section (weeks 7-11), you will work on two programming tasks on data analysis and experimental control.