PS4091

Computer Aided Research

Module Outline
2019/20, 1st semester
School of Psychology & Neuroscience

Instructor
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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).

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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.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Class (9-11am)</th>
<th>Topics</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>17th September</td>
<td>Computer Room (1.03)</td>
<td>Welcome lecture: How important is computing in Psychology and Neuroscience? What comes with Matlab as programming language? How to use Matlab for basic mathematics?</td>
</tr>
<tr>
<td>2</td>
<td>24th September</td>
<td>Computer Room (1.03)</td>
<td>Matlab basics I: The very basics of programming. What are variables? What are functions? How to use control statements?</td>
</tr>
<tr>
<td>3</td>
<td>1st October</td>
<td>Computer Room (1.03)</td>
<td>Matlab basics II: What are scalars, vectors, and matrices? How to access matrices using an index? How to use matrices for basic mathematics?</td>
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<tr>
<td>4</td>
<td>8th October</td>
<td>Computer Room (1.03)</td>
<td>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?</td>
</tr>
<tr>
<td>5</td>
<td>15th October</td>
<td>Computer Room (1.03)</td>
<td>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?</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
<td><strong>Independent Learning Week</strong></td>
</tr>
<tr>
<td>7</td>
<td>29th October</td>
<td>Computer Room (1.03)</td>
<td>Programming task on data analysis (I)</td>
</tr>
<tr>
<td>8</td>
<td>5th November</td>
<td>Computer Room (1.03)</td>
<td>Programming task on data analysis (II)</td>
</tr>
<tr>
<td>9</td>
<td>12th November</td>
<td>Computer Room (1.03)</td>
<td>Programming task on experimental control (I)</td>
</tr>
<tr>
<td>10</td>
<td>19th November</td>
<td>Computer Room (1.03)</td>
<td>Programming task on experimental control (II)</td>
</tr>
<tr>
<td>11</td>
<td>26th November</td>
<td>Computer Room (1.03)</td>
<td>Programming task on experimental control (III)</td>
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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.