Introduction to MATLAB
Organizers: Meritxell Bach-Cuadra, Jean-François Knebel

2 ECTS

Summary
This course is an introduction to the basics of computer programming via MATLAB, mathematical computing environment. No previous programming experience is required (students already familiar with the topics described hereafter are discouraged to take the course). Our aims are to show how programming can be used for developing tools in support to our daily research and to incentivize scientific reflection.

Goals
At the end of the course students:

- should be able to develop simple codes for their own projects and
- should have the basics to improve their programming skills by taking further courses and by training and exercising on their own.

The course is organized in 3 one-day workshops (each of them alternates between theory and hands-on exercises), and 3 half-day sessions, one (optional) for project development and 2 for the exam. The topics are organized as follows (*dates to be confirmed*):

**Session 1 - 24th October 2017 (Tuesday)** - (9-12h and 13h30-16h30)

*Morning*
- Course description
- User interface
- Path directory and ‘Help’
- Vectors & Matrices

*Afternoon*
- Arithmetic operators and basic functions with matrices
- Structures & Cells
- Importing / exporting data (reading / writing text files, csv & xls files)
- Define and analyze the needs of your own project (with the filled form).

**Session 2 – 30th October 2017 (Monday)** - (9-12h and 13h30-16h30)

*Morning*
- Control flow statements (if-else-end, for-end, while-end)
- User interaction (disp, input)

*Afternoon*
- Students present (power point presentation) the project they would like to implement in the context of their research interests and needs. The filled form of Session 1 should help them in defining their project. After approval of the project by the organiser, students should start with a simple Exercice to import their data in Matlab (within vector,matrices, cells or any relevant structure), to be delivered by Session 3 – Afternoon.

**Session 3 – 14th November 2017 (Tuesday)** - (9-12h and 13h30-16h30)

*Morning*
- Function & Scripts
- Plotting
- Share of code and scripts in Mathworks
Afternoon
- Check on input data import in MATLAB structures.
- Develop your own project. This is a hands-on session where students develop their Matlab project with the help of the organizers. Exercise on importing data must be completed by the beginning of the session.

OPTIONAL - Session 4 – 21st November 2017 (Tuesday) - (half day only – to be determined)
Support for project development.

Sessions 5 - 14th December 2017 (Thursday) - (9h-12h and 13h30-16h30)
Exam sessions.

Location
The practical sessions will take place in room 204.2 in the basement of the Amphipôle building at UNIL- Sorge.

Evaluation
Participants will develop a short project using MATLAB, related to their own research activity. The project must contain (at least) the following:
1. Lecture/creation of data
2. Processing
3. Visualization of the results
4. At least one ‘own’ function
5. Proper comment of the code

The use of external functions or libraries is allowed but should remain minority. It has to be clearly identified what it is written by you (your own code) from external sources, for instance by comments.

Evaluation criteria: all the following point will be graded and weighted for the evaluation.
- Clear and precise definition of the research context and project’s goals (Filled form by Session 1 – Afternoon and Presentation 1 during Session 2, 20% of total grade).
- Exercise to import their data in Matlab (within vector, matrices, cells or any relevant structure), to be delivered by Session 3 – Afternoon, 10%.
- Students will send their script and data by 8th December 2017 to the course organizers. The course organizers should be able to run and understand the scripts based on students’ written instructions (weight of 30 %)
- Session 5: written exam (20%)
- Session 5: students will explain their code and results in a presentation format (Presentation 2, weight of 20%).
- Participation to Sessions 1, 2, 3 and 5 is mandatory.

Registration
The course is limited to 20 participants. Register before October 2nd by writing a mail to lndscourses@gmail.com (with your supervisor in copy) and stating "Introduction to MATLAB" as subject.

Reading materials
Course materials are stored on the UNIL e-learning platform Moodle. You can access by doing the following:
- go to "https://moodle2.unil.ch"
- log in with your institutional/university address
- click on "Faculté de Biologie et de Médecine" > "Ecole doctorale / doctoral school" > "Lemanic Neuroscience Doctoral School"

The materials are stored under "Introduction to MATLAB". Please use the self-enrollment method to access them.