

Advanced Scientific Programming in Python

a G-Node Summer School

Many scientists spend much of their time writing, debugging, and maintaining software. But while techniques for doing this efficiently have been developed, only few scientists actually use them. As a result, they spend far too much time writing deficient code and reinventing the wheel instead of doing research. In this course we present a selection of advanced programming techniques with theoretical lectures and practical exercises tailored to the needs of the programming scientist. To spice up theory and foster our new skills in a real-world programming project, we will team up to develop an entertaining scientific computer game.

We will use the Python programming language for the entire course. With a large collection of open-source scientific modules and all features of a full-fledged programming language, Python is rapidly gaining popularity in the neuroscience community. It enables the scientist to quickly develop powerful, efficient, and structured software and is becoming an essential tool for scientific computing.

The summer school is targeted at Post-docs and PhD students from all areas of neuroscience. Substantial proficiency in Python or in another language (e.g. Java, C/C++, MATLAB, Mathematica) is absolutely required. An optional, one-day pre-course is offered to participants without Python experience to familiarize with the language.

Date and Location

August 31st, 2009 — September 4th, 2009. Berlin, Germany.

Preliminary Program

Day 0 (Mon Aug 31) — [Optional] Dive into Python

Day 1 (Tue Sep 1) — Software Carpentry

- Documenting code and using version control
- Test-driven development & unit testing
- Debugging, profiling and benchmarking techniques
- Object-oriented programming, design patterns and Extreme Programming

Day 2 (Wed Sep 2) — Scientific Tools for Python

- NumPy, SciPy, Matplotlib, IPython
- Neuroscience libraries
- Programming project in the afternoon

Day 3 (Thu Sep 3) — Parallelization

- Python multiprocessing for SMP machines
- Distributed parallelization for cluster computing
- Programming project in the afternoon

Day 4 (Fri Sep 4) — Practical Software Development

- Software design
- Efficient programming in teams
- Quality Assurance
- Finalizing the programming project

Applications

Applications should be sent before May 31st, 2009 to python-summerschool@bccn-berlin.de. No fee is charged but participants should take care of travel, living, and accommodation expenses.

Applications should include full contact information (name, affiliation, email & phone), a short CV and a short statement addressing the following questions (maximum 500 words):

- What is your educational background?
- What experience do you have in programming?
- Why do you think "Advanced Scientific Programming in Python" is an appropriate course for your skill profile?

Candidates will be selected based on their profile. Places are limited: early application is recommended.

Faculty

Pietro Berkes, *Volen Center for Complex Systems, Brandeis University, USA*

Jens Kremkow, *Bernstein Center for Computational Neuroscience Freiburg, Germany*

Eilif Muller, *Laboratory of Computational Neuroscience, Ecole Polytechnique Fédérale de Lausanne, Switzerland*

Michael Schmuker, *Neurobiology, Freie Universität Berlin, Germany*

Bartosz Telenczuk, *Charité Universitätsmedizin Berlin, Germany*

Niko Wilbert, *Institute for Theoretical Biology, Humboldt-Universität zu Berlin, Germany*

Tiziano Zito, *Bernstein Center for Computational Neuroscience Berlin, Germany*

Organized by Michael Schmuker and Tiziano Zito for the German Neuroinformatics Node of the INCF.

Website: <http://www.g-node.org/Teaching> Contact: python-summerschool@bccn-berlin.de