POP77001 Computer Programming for Social Scientists

Trinity College Dublin 2021/22

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- **Course Website:** bit.ly/POP77001
- **ECTS Weighting:** 10
- **Semester/Term Taught:** Semester 1 (Michaelmas Term)
- **Contact Hours:** One 2-hour lecture and one 1-hour tutorial per week (11 weeks)
- **Module Coordinator:** Dr Tom Paskhalis
- **Office Hours:** Thursdays 11:00-13:00 on Zoom

Learning Aims

This module provides foundational knowledge of computer programming concepts and software engineering practices. It introduces students to major data science programming languages and workflows, with a focus on social science data and research questions.

Learning Outcomes

On successful completion of this module students should be able to:

- Describe fundamental computer programming concepts;
- Demonstrate command of the R and Python programming languages;
- Exhibit the ability to write, execute and debug scripts for social science research;
- Perform data wrangling tasks using R and Python;
- Use version control system (Git/GitHub) for engineering tasks.

Module Content

Students will be introduced to Python and R, two principal data science programming languages. This course covers basic and intermediate programming concepts, such as object types, functions, control flow, testing and debugging. Particular emphasis will be made on data handling and analytical tasks with a focus on problems in social sciences. Homeworks will include hands-on coding exercises. In addition, students will apply their programming knowledge on a research project at the end of the module.

Recommended Reading List

The following texts provide a good introduction to Python and R programming with a focus on data analysis applications:

- John Guttag. 2021. *Introduction to Computation and Programming Using Python: With Application to Computational Modeling and Understanding Data.* 3rd ed. Cambridge, MA: The MIT Press
- Norman Matloff. 2011. *The Art of R Programming: A Tour of Statistical Software Design.* San Francisco, CA: No Starch Press
- Wes McKinney. 2017. *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython.* 2nd ed. Sebastopol, CA: O'Reilly Media
- Al Sweigart. 2019. *Automate the Boring Stuff with Python.* 2nd ed. San Francisco, CA: No Starch Press
- Hadley Wickham and Garrett Grolemund. 2017. *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data.* Sebastopol, CA: O'Reilly Media

Additional online resources:

- Git Book
- Python For You and Me
- Python Wikibook
- Python 3 Documentation
- R Documentation
- R Inferno

Assessment Details

5 Programming exercises (10% each, 50% total)

Research project (50%)