Geographisches Institut

Universität Zürich
Geographisches Institut
Winterthurerstrasse 190
CH-8057 Zürich
www.geo.uzh.ch

27.12.2022

Recommendations on Programming Modules for Geography Students

Most Important Programming Languages for Remote Sensing and GIScience: Python, Matlab (RS), R (GIScience)
Python can be a good choice for beginners. These modules are not mandatory but can be helpful for the masters with emphasis on GIS or Remote sensing.

Introductory courses

Bachelor's program
- GEO 246 Statistik (introduction to R during the exercises – for GEO Students)
- ESS 341 Python programming in remote sensing (introduction to Python - for ESS Students)
- GEO 371 Remote Sensing Technologies and Methods (introduction to Matlab during the exercises)

Master's program — Physical Geography
- Geo 475 Hydrological Modelling and Programming (Matlab/R)

Master's program — Remote Sensing
- GEO 717 Google Earth Engine (basic programming in JavaScript involved)
- GEO 803 Solving Geospatial Problems using Matlab (Matlab block course)

Master's program — GIScience
- GEO 812 Getting Started with R for Spatial Analysis (block course on spatial packages in R)
- GEO 876 Introduction to Programming for Spatial Problems (Python)

Note that many GIScience courses of the MSc program (GEO 87x, GEO 88x)
rely partly or fully on programming in R or Python.

Introductory courses from other faculties

BIO 134 Programming in biology (basic Python, image processing, no object-oriented programming)

BIO 144 Data analysis in biology (basic R, introduction to dataframes and tidyverse, focus on linear models)

Informatics I (basic Python, functional programming, object-oriented programming, this MIT course can be a helpful addition: https://www.edx.org/new/course/introduction-to-computer-science-and-programming-7)

STA 120 (basic R, linear regression etc.)

STA 121 (R, tidyverse, statistical modelling, in depth statistics)

MAT 101 (basic Python, focus on data types, data science and mathematics)

PHY 124 Scientific Computing (basic Python)

Any additional comments or more helpful courses are always welcome and can be sent to: student-advice@geo.uzh.ch

Geographisches Institut

Universität Zürich
Geographisches Institut
Winterthurerstrasse 190
CH-8057 Zürich
www.geo.uzh.ch

Advanced courses

Informatics II (databases and software construction, in depth)

PHY 231 (Python, focus on data analysis of physical measurements, physic knowledge helpful for example Physik I & II)

PHY 371 (Python, Introduction to machine learning, prior knowledge: basics in linear algebra and analysis as well as python)

Examples of books which are helpful to learn programming:

Cresson, R. (2020) Deep Learning for Remote Sensing Images with Open Source Software. First edition. Boca Raton, Florida: CRC Press. Digital version at https://uzb.swisscovery.slsp.ch/discovery/fulldisplay?docid=alma99117098428705508&context=L&vid=41SLSP_UZB:UZB&lang=de&adaptor=Local%20Search%20Engine

Lawhead, J. (2015) Learning Geospatial Analysis with Python: an Effective Guide to Geographic Information System and Remote Sensing Analysis Using Python 3. 2nd ed. Birmingham: Packt Publishing. Digital version at Learning Geospatial analysis with Python

Brunsdon, C. and Comber, L. (2018): Introduction to R for Spatial Analysis and Mapping. Second Edition. SAGE Publications. Digital version at https://uk.sagepub.com/en-gb/eur/an-introduction-to-r-for-spatial-analysis-and-mapping/book258267

Comber, L. and Brunsdon, C. (2020): Geographical Data Science and Spatial Data Analysis — An Introduction in R. SAGE Publications. Can be bought at Orellfüssli

Lovelace, R., Nowosad, J., Muenchow, J. (2019): Geocomputation with R. CRC Press. Digital version at https://geocompr.robinlovelace.net

Any additional comments or more helpful courses are always welcome and can be sent to: student-advice@geo.uzh.ch