



GÖTEBORGS UNIVERSITET

## Automate your GIS - Scripting in Python, 5 credits (hp)

Course period: 2017-10-23 to 2017-11-15	Last day for application: 2017-09-15
Course leader / Address for applications: Fredrik Lindberg / fredrikl@gvc.gu.se	
Course description: The aim of this course is to: - Acquire programming skills and concepts on how to perform automated analysis and data handling processes within Geographical Information Systems (GIS) - Increase general knowledge in GIS and GIT (GITechnology)  The focus is mainly on the techniques and methods but also on the concept of the interaction between GIS and programming. Development of user-friendly GIS tools is also incorporated in the course.  The structure of the course is a start-up period of intense classroom teaching (23 Oct – 27 Oct) followed by an individual project work and concluded with a seminar at the end of the teaching period.	
Responsible department and other participation departments/organisations: Department of Earth Sciences, University of Gothenburg	
Teachers: Fredrik Lindberg (Course leader and main contact) Teachers from the Department of Earth Sciences / Invited speakers	
Examiner: Deliang Chen	



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Faculty of Science; Department of Earth Sciences

## **Earth System Science, 5 hp**

*Third cycle education*

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### **1. Confirmation**

The syllabus is confirmed by the Department of Earth Science 2011-06-26. The syllabus is valid until further notice.

**Area of education:** Natural science

**Main subject:** Earth science, geography

**Department responsible:** Department of Earth Science

### **2. Position in the educational system**

Recommended course; third-cycle education.

### **3. Entry requirements**

Admitted to third cycle education.

### **4. Course content**

The aim of this course is to acquire programming skills and concepts on how to perform automated processing within a geographical information system. The focus is mainly on the techniques and methods but also on the concept of the interaction between GIS and programming. Development of user-friendly open source GIS tools is also incorporated in the course.

*In detail, the course content includes:*

- One introductory week of lectures and practical exercises
- 1 project work (appr. 2 weeks fulltime)
- Written paper and seminar

### **5. Outcome**

After completion of the course, the student is expected to be able to:



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### **Knowledge and understanding**

- understand and explain the concept of GIS scripting and programming
- describe the use and characteristics of different spatial data file formats

### **Skills and abilities**

- to develop automated processes using GIS tools and software
- to perform basic geographical analyses and format transformation using GIS
- to perform python computer programming related to GIS
- create simple user-friendly GIS tools

### **Judgement and approach**

- When to make use of GIS scripting and programming
- assess pros and cons of GIS scripting, programming and tool development both seen from a user and scientific perspective

### **6. Required reading**

The PyQGIS Programmer's Guide – Extending QGIS 2.X with Python (2014) Gary Sherman. Locale Press.

*Recommended reading:*

PyQGIS developer cookbook – Release 2.XX (2017)

### **7. Assessment**

To pass the course the project work has to be submitted in due time and graded with G (pass).

### **8. Grading scale**

The grading scale includes Fail (U) and Pass (G)

### **9. Course Evaluation**

The course evaluation is carried out together with the Ph.D. students at the end of each course.

### **10. Language of instruction**

The language of the seminars and instruction is English.



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## Automate your GIS - Scripting in Python, 5 credits (hp)

### Preparing yourself for the course I – prior knowledge

The course is designed so it is possible to participate without any previous completed courses in GIS and programming. However, if you have no prior knowledge in the subject it is strongly recommended to prepare by yourself by completing the tasks below.

#### 1. GIS competence

The course will mainly be using QGIS ([www.qgis.org](http://www.qgis.org)). Go through the training manual before the course and make sure you master basic (green) and intermediate (blue) categories in the QGIS training manual (<http://docs.qgis.org/2.14/pdf/en/QGIS-2.14-QGISTrainingManual-en.pdf>) for the first 11 chapters.

#### 2. Programming competence

The course will be using Python 2.7 programming language. There are many good online resources for learning the basics:

- <https://docs.python.org/2.7/tutorial/index.html>
- <https://www.youtube.com/watch?v=nwjAHQERL08>
- <https://www.youtube.com/watch?v=N4mEzFDjqtA>

#### 3. Recommended reading

If you are new to GIS we recommend you to go through one of the text books below to get familiar with the basic concepts of GIS.

- Heywood I, Cornelius S, Carver S 2011. An Introduction to Geographical Information Systems. *Pearson Education Limited*.
- Harrie L. (ed.) 2015. Geografisk Informationsbehandling. *Formas* (in Swedish)

### Preparing yourself for the course II – Software and computer resources

The main GIS software used in the course will be *QGIS* (version 2.X). This is an open source software and can be downloaded from [www.qgis.org](http://www.qgis.org). Go to their download page. Preferably,



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choose the **OSGEO4W Network Installer (64-bit)**, start the installation and choose *installation (64-bit) For Advanced Users*. Start the installation and choose *Express Desktop Install*. This includes a number of OSGEO-software as well as a separate python installation.

The preferred Python IDE (Integrated Development Environment) used during the course is **Jet-brains PyCharm** (<https://www.jetbrains.com/pycharm/>). This is a freeware and could be installed personally by acquiring an academic licence. For PhD-students at the Department of Earth Sciences, floating licences for PyCharm are available.