



Module name: Python in the enterprise

Academic year: 2017/2018 Code: JFT-1-006-s ECTS credits: 5

Faculty of: Physics and Applied Computer Science

Field of study: Technical Physics Specialty: —

Study level: First-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 0

Course homepage: —

Responsible teacher: dr hab. inż, prof. AGH Szumlak Tomasz (szumlak@agh.edu.pl)

Academic teachers: dr hab. inż, prof. AGH Szumlak Tomasz (szumlak@agh.edu.pl)

Module summary

If you are interested in learning some advanced features of Python and going beyond the Python standard library this is something for you!

Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence			
M_K001	A student can communicate his/her results and discuss them	FT1A_K03, FT1A_K03, FT1A_K01, FT1A_K01	Project
Skills			
M_U001	A student can write complete applications, use both scripts and classes.	FT1A_U01, FT1A_U05, FT1A_U01, FT1A_U05	Project
M_U002	A student can work as a part of a team and can interact properly with his/her co-workers	FT1A_U08, FT1A_U09	Project
Knowledge			
M_W001	A student gains knowledge on advanced topics related to the Python language	FT1A_W01, FT1A_W01	Activity during classes, Examination, Project

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Others	E-learning
Social competence												
M_K001	A student can communicate his/her results and discuss them	-	-	-	+	-	-	-	-	-	-	-
Skills												
M_U001	A student can write complete applications, use both scripts and classes.	-	-	-	+	-	-	-	-	-	-	-
M_U002	A student can work as a part of a team and can interact properly with his/her co-workers	-	-	+	+	-	-	-	-	-	-	-
Knowledge												
M_W001	A student gains knowledge on advanced topics related to the Python language	+	-	+	-	-	-	-	-	-	-	-

Module content

Lectures

Introduction

Python is an extremely popular programming language that can be used for solving diverse problems ranging from complicated scientific simulations to writing robust Web 2.0 MVC applications. The first two lectures focus on providing a condensed overview of the language and its specific features. This is not intended as an exhaustive description of Python but rather as a hands-on approach to learn what the language is capable of.

Data structures and abstraction in Python

Whatever it is you are after - a sophisticated statistical analysis or an e-commerce application to earn some money - you need to be aware of how to represent, store and handle your data. These will be covered in this lecture where some of the most sacred concepts of the object oriented programming will be discussed. So, brace yourself for the polymorphism, encapsulation and inheritance. An example implementation of the binary search algorithm will be detailed here to illustrate the material.

Be lazy - reuse

No matter what problem you are suppose to solve you can be almost certain

somebody else

has already wrote the appropriate code for you! So, do not hesitate – reuse the existing libraries.

Python comes with zillion of modules that can be exploited by you – do it! Here we learn how

to look for and how to use Python modules.

Be ambitious - modify and extend

Reusing existing code does not mean you cannot be inventive and creative! Python gives you

unique opportunity to be a part of the development team if you only want. This is much easier

than you think. Preparing modules that can be used by others is both easy and very rewarding.

Let's see how it's done.

Django

Django is a web development framework that can significantly facilitate the process of web

applications. Here we discuss what a framework actually is and why it is worth to invest some

time to know and use Django.

Effective silicon energy band

To give this course also some physics twist we take a look at the radiation damage in silicon

devices that are design to detect charged particles that are produced by crushing protons

in Large Hadron Collider. One way of doing this can be by measuring reverse bias current

as a function of temperature. A complete application that is used to process the data and perform physics analysis will be presented.

Laboratory classes

Introduction

Here we learn all about installing and running Python on Win or Linux platforms. Using the Python interpreter for fast checks and prototyping. Putting your scripts into files and executing them.

Creating modules

Building and importing modules. Inheritance hierarchy – dividing your code – many source files and locations. Providing encapsulated solutions for your fellow students.

Using Django

Basic introduction to the Django framework. Creating simple application. Where to go from there, i.e., internet resources.

Pattern recognition

Even more advanced example of real-life application for looking for specific patterns in a data sample. We discuss how to start designing an algorithm. Then implementation and testing follow. Things to remember here are: when writing code mind other users – provide documentation, the code you wrote is not something that is going to last forever – the application will need maintenance and finally remember modularity, i.e, you may reuse your own code – be generic.

Project classes

Physics or e-commerce

A number of projects will be provided for students depending on an individual interest. It is possible to cluster students together to work on a single project (no more than 3 people working the same problem)

Method of calculating the final grade

The final mark will be determined by observing the general rules set by the AGH University

The final mark (FM) E - exam, L - computer lab, P - project

$$FM = 0,5 \times E + 0,2 \times L + 0,3 \times P$$

Prerequisites and additional requirements

- basic knowledge of Python is an asset but not compulsory to take this course

Recommended literature and teaching resources

- web resources: python.org

- books, a bit of a problem since time flies fast and many today's latest and greatest are obsolete tomorrow, anyhow, check out:

1) Professional Python Frameworks: Web 2.0 Programming with Django and Turbogears

Dana Moore, Raymond Budd, William Wright; ISBN: 978-0-470-13809-0

2) The Definitive Guide to Django: Web Development Done Right

Jacob Kaplan-Moss, Adrian Holovaty; ISBN-10: 1590597257

Scientific publications of module course instructors related to the topic of the module

According to the WoS.

Additional information

Absences on lab classes and tutorials will have to be negotiated with the tutor.

Student workload (ECTS credits balance)

Student activity form	Student workload
Participation in lectures	15 h
Realization of independently performed tasks	40 h
Participation in laboratory classes	18 h
Preparation for classes	20 h
Participation in project classes	10 h
Contact hours	20 h
Examination or Final test	2 h
Summary student workload	125 h
Module ECTS credits	5 ECTS