COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΓΕ1108**	**SEMESTER**	9ο
COURSE TITLE	APPLICATIONS OF PYTHON PROGRAMMING LANGUAGE IN GEOTECHNICAL ENGINEERING PROBLEMS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Special background & skills development
PREREQUISITE COURSES:	Computer Programming Soil Mechanics I, Soil Mechanics II Computational Geotechnical Engineering Foundations & Retaining Structures
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	-

(2) LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Introduction to Python

Introduction to solving geotechnical engineering problems with Python

Development of simple applications in solving geotechnical engineering problems with Python

Use of Python in finite element analysis applications

Use of Python in processing of data from field tests and laboratory tests

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

Bibliographic research and information management using ICT.
Programming skills development
Programming methods in engineering applications
Python in engineering applications
Adapting to new professional needs
Development of decision-making skills

(3) SYLLABUS

Introduction to Programming, Artificial Intelligence, and Machine Learning: Historical overview & basic concepts.
Applications of Programming and Machine Learning Methods in Geotechnical Engineering.
Introduction to programming with the Python language: Purpose. Variable types. Arithmetic operators. Comparison operators. Operator precedence. Using Python as a calculator.
Function libraries. First code. Importing and exporting folders in the code. Graphical representations in Python. Examples and practical applications.
Applications of Python in the calculation of physical soil parameters (e.g., calculation of specific weight, densities, etc.).
Using Python for creating and processing databases and experimental results of geotechnical materials to predict soil behavior and estimate the values of geotechnical design parameters.
Using Python for plotting data and experimental results of geotechnical materials (graphs).
Developing Python applications for estimating the bearing capacity and settlement of shallow foundations.
Developing Python applications for estimating lateral earth pressure on retaining walls.
Developing Python applications for calculating failure criteria of intact rock and rock masses.
Developing Python applications for solving simple static systems using the finite element method.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, communication with students

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non- directed study according to the principles of the ECTS

Activity	*Semester workload*
Lectures	56
Study	40
Semester project	60
Preparation for examinations	23
Examinations	1
Course total	*180*

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open- ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The evaluation language is Greek. The assessment includes the submission of a project, as well as an oral examination, during which the student's ability to apply the topics taught within the course will be evaluated.

(5) **ATTACHED BIBLIOGRAPHY**

-Suggested bibliography:

1. Comodromos E. (2009). Computational Geotechnical Engineering – Soil Structure Interaction. Kleidarithmos Ed., Athens (in Greek, distributed)

- Related academic journals:

1. Géotechnique
2. Journal of Geotechnical and Geoenvironmental Engineering, ASCE
3. International Journal for Numerical and Analytical Methods in Geomechanics
4. Canadian Geotechnical Journal
5. Computers & Geotechnics