COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Environment		
ACADEMIC UNIT	Department of Environment		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	240Y	SEMESTER	4
COURSE TITLE	Hydrogeology		

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
Lectures	3	
Tutorial		
TOTAL	3	5
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, specialised general knowledge, skills development*	specialised l knowledge, skills development
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (tutorials)
COURSE WEBSITE (URL)	https://www.env.aegean.gr/all_courses/hydrogeology/

(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*

Students:

- Understand the basic characteristics of groundwater flow and mass transport in the subsurface.
- are able to make simple calculations regarding flow and transport characteristics.
- are familiar with simple groundwater models.

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

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Project planning and management
- Respect for the natural environment
- Production of free, creative and inductive thinking

(3) SYLLABUS

During the course, we will focus on understanding and analysis of the characteristics and functions of the water system with emphasis on the environmental component. We'll start with a general description of the water flows in the environment, followed by a relatively short reference to atmospheric and surface component. Then, we will move underground for the description, study and analysis of the characteristics and dynamics of groundwater, including transport processes, spreading and natural attenuation of contaminants in the subsurface.

Throughout the course there will be applications using numerical simulation models

Lecture topics:

1. Introduction, water cycle, water budget
2. Groundwater, Basic principles, reservoir types, Storativity
3. Principles of groundwater flow, Darcy's law, Hydraulic conductivity
4. Hydrogeologic systems in local and regional scale
5. The flow equation, solution methods
6. Flow nets, Groundwater flow in the unsaturated zone
7. parameter estimation, Wells and effects
8. Introduction to groundwater pollution, sources, physical and chemical properties of groundwater pollutants
9. Mass transport, advection, diffusion
10. Dispersion, adsorption, degradation
11. Advection dispersion equation
12. Applications, Non aqueous liquids
13. Groundwater pollution prevention and remediation

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*	Students have access to all lectures, lecture notes, assignments and related material through the MOODLE platform (https://aegeanmoodle.aegean.gr/)
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	36
Tutorials	6
Study hours	72
Assignments	13
Exams	6
Course total	***133***

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.*	Language of evaluation: Greek methods of evaluation: Assignments Midterm exam Final Exam

(4) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Βουδούρης Στ. Κώστας, (20090 , «ΥΔΡΟΓΕΩΛΟΓΙΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ. ΥΠΟΓΕΙΑ ΝΕΡΑ &ΠΕΡΙΒΑΛΛΟΝ»
- Χρυσικόπουλος Κωνσταντίνος (2020), Φαινόμενα Μεταφοράς στο Υπέδαφος και σε Περιβαλλοντικά Συστήματα

-F.W. Schwartz and Zhang (2003), "Fundamentals of Ground Water", John Wiley and Sons, Inc., New York
-Domenico P.A. and F.W. Schwartz, (1990), "Physical and Chemical Hydrogeology", John Wiley and Sons, Inc., New York

- Related academic journals: