**COURSE OUTLINE**

## 1. GENERAL

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|---|---|---|---|
| **SCHOOL** | SCHOOL OF ENVIRONMENT AND AGRICULTURAL ENGINEERING | | |
| **ACADEMIC UNIT** | DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING | | |
| **LEVEL OF STUDIES** | Postgraduate | | |
| **COURSE CODE** | **630007** | **SEMESTER** | **1** |
| **COURSE TITLE** | Advanced Hydrology | | |

| **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 and Practical Exercises | 3 | 5 |
| | | |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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|---|---|
| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Scientific Area |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | |
| **COURSE WEBSITE (URL)** | https://oeclass.aua.gr/eclass/courses/5956/ |

## 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*

The purpose of this course is the in-depth understanding by the students, through theoretical units and practical laboratory exercises, of basic and advanced concepts of Hydrology and its importance in the management of water resources and design of related hydraulic projects, as well as the protection of the environment. Since hydrological processes evolve in space and their analysis is based on the use of spatial data, applications of hydrological analysis using Geographic Information Systems (GIS) are carried out.

Upon successful completion of the course, the student will be able to:

- Calculate the water balance parameters.
- Study runoff, peak flow and flood.
- Use spatial data and perform hydrological analysis using ArcGIS.
- Understand the applications of hydrology in hydraulic - land reclamation works.
- Calculate the capacity of reservoir and evaluate its operation.

**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…* |
| | *…….* |

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adapting to new situations
- Decision-making
- Autonomous work
- Teamwork
- Project planning and management
- Respect for the natural environment

## 3. SYLLABUS

- Historical review and introduction to advanced hydrology, processes.
- Hydrological basin/watershed, definitions, meaning, examples.
- Hydrological basin/watershed, features, geomorphology, mapping, calculations, examples.
- Hydrometeorology, concepts, mechanisms, data, processing-analysis of data.
- Surface Integration of Precipitation, geoinformatics, geostatistics, and applications.
- Hydrometry, theory, methods, applications.
- Hydrological balance, runoff, surface runoff, Thornthwaite, CN, applications, analysis in GIS.
- Hydrological Analysis in ArcGIS. Theory and application.
- Flood runoff, Unit Hydrograph, Spatial Distributed Unit Hydrograph, Flood routing, application in ArcGIS, Case Studies.
- Hydrological Design and Reservoir Operation.
- Water balance model and applications. Reservoir sizing, reservoir operation, applications.

## 4. TEACHING and LEARNING METHODS - EVALUATION

| | |
|---|---|
| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | In classroom |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Dedicated Hydrological Simulation Software |

**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*

| ***Activity*** | ***Semester workload*** |
|---|---|
| Lectures | 36 hours |
| Practical exercises and case studies | 50 hours |
| Exercises and presentations | 39 hours |
| | |
| | |

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|---|---|
| *visits, project, essay writing, artistic creativity, etc.*<br><br>*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* | <table><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Course total<br>(25 workload hours per credit unit)</td><td>***125***</td></tr></table> |
| **STUDENT PERFORMANCE EVALUATION**<br><br>*Description of the evaluation procedure*<br><br>*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*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | Three exercises and an oral examination on how to deal with and implement the study cases that each student faced. |

## 5. ATTACHED BIBLIOGRAPHY

***Proposed literature:***


1. Σακκάς Ι. (2004). Τεχνική Υδρολογία. Τόμος 1. Υδρολογία Επιφανειακών Υδάτων, Εκδόσεις ΑΪΒΑΖΗ.
2. Dingman S.L. (2002). Physical hydrology second edition. Prentice-Hall, Inc.
3. Nikolakopoulos, K., Katsanou, K., & Lamprakis, N. (2015). Υδρολογία με χρήση γεωγραφικών συστημάτων πληροφοριών και δεδομένων τηλεπισκόπησης [Undergraduate textbook]. Kallipos, Open Academic Editions. https://hdl.handle.net/11419/2520