General course information:

Course title:	**Reservoirs and Dams**	**Course code:**	ΥΔ0630
Credits:	6	**Work load (hours):**	172
Course level:	Undergraduate ☑	Graduate ☐	
Course type:	Mandatory ☐	Selective ☑	
Course category:	Basic ☐	Orientation ☑	
Semester:	9th	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

Scope of the course is the introduction and the understanding of the design, construction and operation of dams and reservoirs. This course strengthens students' technical and intellectual competency, preparing them for engineering employment or advanced study. The course exposes students to hydrological methods of reservoir design, to design and construction of various types of dams, to design of hydraulic works of dams and to the management and simulation of the operation of dams and reservoirs.

Upon completion of the course, students should be able to demonstrate:

- Knowledge of the various dam types, their scope and operation
- Ability to define the location of dam construction
- Ability to calculate and design the reservoir volume with deterministic and stochastic methods
- Ability to calculate and design of hydraulic works of reservoirs (spillways, coffer dams, etc)
- Understanding of the design methods and typical tests of dams
- Understanding of the construction steps of various types dams
- Ability to design hydrodynamic-hydroelectric works
- Ability to manage and simulate the operation of dams and reservoirs single and multiple scope
- Understanding of the environmental impacts of dam construction and the methods for the impact alleviation

Prerequisites:

Hydrology
Stochastic Hydrology
Hydraulics
Groundwater Hydraulics

Instructor's data:

Name:	
Level:	
Office:	
Tel. – email:	
Other tutors:	

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	➢ **Introduction. Types and scope of dams. Dam location selection.**	**4**	2
2	➢ **Gravity dams. Construction characteristics. Conditions and stability tests**	**4**	4
3	➢ **Hollow Gravity dams. Construction characteristics. Conditions and stability tests.** ➢ **Arch dams. Types and calculation methods. Stability tests.**	**4**	4
4	➢ **Earth-fill dams. Types and construction characteristics. Stability tests.** ➢ **Rock-fill dams. Types and construction characteristics.**	**4**	4
5	➢ **Dam foundation and drainage** ➢ **Percolation under the dams and through earth dams. Computation of percolation. Measures for the minimization of percolation.**	**4**	4
6	➢ **Characteristics of reservoirs** ➢ **Deterministic design of reservoir** ➢ **Calculation of reservoir usuable volume (Rippl method, Dincer method, Stall method)**	**4**	4
7	➢ **Calculation of reservoir usuable volume (Rippl method, Dincer method, Stall method)** ➢ **Probabilistic method for the calculation of reservoir usuable**	**4**	4

	volume (Moran method)		
8	➢ **Estimation of reservoir non-usuable (dead) volume (Gavrilolovic method, U.S.L.E. method)** ➢ **Estimation of reservoir flood volume** ➢ **Definition of Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF). Estimation methods.**	**4**	4
9	➢ **Hydrologic and hydraulic design of of dam safety works. Design of dam spillway and river diversion works. Design flood of spillway. Spillway design.**	**4**	4
10	➢ **Design flood for river diversion. Flood protection during the dam construction and operation. Dam design.**	**4**	4
11	➢ **Introduction in hydroelectric energy production. Hydroturbines and their types. Hydroturbine design.**	**4**	4
12	➢ **Hydroelectric works. Design of small hydroelectric dams.** ➢ **Hydroelectric dam design. Estimation of hydroelectric energy production.**	**4**	4
13	➢ **Deterministic and stochastic simulation of reservoir operation** ➢ **Risk analysis of hydroelectric energy production.**	**4**	4
14	➢ **Deformation monitoring of dam. Pore pressure, movement and temperature measurement equipments.** ➢ **Environmental impacts from dam construction, protection works and fish passage works.**	**4**	2

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
64			

Suggested Literature:

Bibliography in Greek Language

Τσόγκας, Χ., και Ε. Τσόγκα, 2009. «Υδροδυναμικά Έργα – Φράγματα», 2η Έκδοση, Εκδόσεις Ίων, ISBN: 960-411-196-5

Μιμίκου, Μ., 2006. «Τεχνολογία Υδατικών Πόρων», 3η Έκδοση, Εκδόσεις Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Ι.Κ.Ε., ISBN: 978-960-7530-79-0. [Προτεινόμενο σύγγραμμα: Κωδικός Βιβλίου στον Εύδοξο: 9780]

Δερμίσης, Β., 2010. «Διευθετήσεις Υδατορρευμάτων», 1η Έκδοση, Εκδόσεις Τζιόλα, ISBN: 978-960-418-296-1. [Επικουρικό σύγγραμμα: Κωδικός Βιβλίου στον Εύδοξο: 18548763]

Ελληνική Επιτροπή Μεγάλων Φραγμάτων (ΕΕΜΦ) (http://www.eeft.gr/)

Bibliography in English Language

ICOLD Bulletins. International Commission on Large Dams (http://www.icold-cigb.net/GB/publications/bulletins.asp).

Eng. Found. Conf. Proc., 1977, «The Evaluation of Dam Safety», ASCE

Howard, T.R. (Ed), 1983, «Seismic Design of Embankments and caverns», ASCE

Prentice, J.E., 1990, «Geology of Construction Materials», Chapman and Hall.

Hoeg, K, 1993, «Asphaltic Concrete Cores for Embankment Dams», N.G.I.

Zipparo, V.J., Hasen, H. (Ed.), 1993, «Davis' Handbook of Applied Hydraulics». McGraw Hill, INC.

Novak, P, Moffat, AI.B., Nalluri, C., Narayanan, R. 1996, «Hydraulic Structures», E & FN Spon, 2nd Ed.

Vischer, O.I., Hager, W.H., 1998, «Dam Hydraulics», J. Wiley.

Smith, K, Ward, R., 1998, «Floods: Physical processes and Human Impacts, J. Wiley.

Cedergren, H.R., 1989, «Seepage Drainage and FIownets» 3rd Ed. J. Wiley & Sons

Herzog, M.A.M., 1999, «Practical Dam Analysis», Thomas Telford.

Hartford, D. N. D., Baecher, G. B., 2004. Risk and uncertainty in dam safety, Thomas Telford.

Teaching method *(select and describe if necessary* - **weight***):*		
Teaching	☑	40%
Seminars	☐	…….%
Demonstrations	☐	…….%
Laboratory	☑	40%
Exercises	☐	20%
Visits at facilities	☐	…….%
Other *(describe):* ……	☐	…….%
Total		100%

Evaluation method *(select)*- **weight:**				
	written	*%*	*Oral*	*%*

Homework	☐		☐	
Class project	☑	100%	☐	
Interim examination	☐		☐	
Final examinations	☐		☐	
Other *(describe):* ……	☐		☐	