General course information:

Course title:	**Hydrology**		**Course code:**	ΓΚ2800	
Credits:	5		**Work load (hours):**	150	
Course level:	Undergraduate	☑	Graduate		☐
Course type:	Mandatory	☑	Selective		☐
Course category:	Basic	☑	Orientation		☐
Semester:	6th		**Hours per week:**	4	

Course objectives (capabilities pursued and learning results):

Scope of the course is the introduction to the phenomena and natural processes of surface hydrology and hydrologic cycle, the understanding of the phenomena and the analysis of precipitation and discharge data aiming at the development of design storm and flood for the study of water resources works.

This course strengthens students' technical and intellectual competency, preparing them for engineering employment or advanced study. The course exposes students to computational techniques of Engineering Hydrology used in modern professional civil engineering practice.

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

- Understanding of hydrological cycle and the natural hydrological processes
- Ability to define a watershed and its basic geomorphological characteristics
- Ability to compute or estimate the spatial and temporal distribution of precipitation in a watershed
- Ability to compute the IDF and DDF curves and a design storm over a watershed
- Ability to compute or measure the flow in a river cross section and to estimate the flow components
- Ability to compute from flow data the unit hydrograph of a watershed and to estimate from geomporphological characteristics the synthetic unit hydrograph of a watershed
- Ability to estimate the design flood of a watershed with statistical analysis of flow data or application of unit hydrograph or application of empirical methods
- Ability to estimate the flood routing with hydrological methods through a river section and a reservoir or lake

Prerequisites:

Probability Theory - Statistics
Hydraulics
Fluid Mechanics

Instructor's data:

Name:	Lampros Vasiliades
Level:	Dr.
Office:	
Tel. – email:	+302421074115 – lvassil@civ.uth.gr
Other tutors:	

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	**Preparation**
1	• Introduction to hydrological processes • Water Balance	**4**	**2**
2	• Statistics – Probabilistic analysis of hydrological information	**4**	**5**
3	• Study of atmospheric processes and precipitation • Methods of precipitation measurement • Precipitation networks • Analysis of precipitation data • Spatial distribution of precipitation • Calculation of mean areal precipitation	**4**	**4**
4	• Temporal distribution of precipitation • Synthetic methods of temporal distribution of precipitation	**4**	**3**
5	• Calculation of precipitation curves (Intensity-Duration-Frequency, IDF curves and Depth-Duration- Frequency, DDF curves • Estimation of design storm	**4**	**5**
6	• Hydrological abstractions • Methods of measurement and estimation of evaporation and evapotranspiration, interception and infiltration	**4**	**3**
7	• Net rainfall • Estimation methods of rainfall abstractions. Estimation of net rainfall with SCS method	**4**	**4**
8	• Runoff generation • Methods of flow measurement - Hydrometry • Hydrometric stations – hydrometric networks	**4**	**3**

9	• Analysis of hydrometric data • Flow Duration curves • Cumulative flow curves	**4**	**5**
10	• Flood flows • Unit hydrograph • Development of unit hydrograph • Instant unit hydrograph	**4**	**6**
11	• Estimation of concentration and lag time of runoff • Empirical methods for the estimation of design flood • Rational Formula • Synthetic unit hydrograph	**4**	**5**
12	• Flood routing • Hydrological methods of flood routing • Flood routing through a river section (Muskingum Method).	**4**	**4**
13	• Hydrological methods of flood routing • Flood routing through a reservoir	**4**	**4**
14	• Theory Revision – Theoretical Exercises	**4**	**1**

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
32	3	5	

Suggested literature:

Greek Bibliography

Mimikou M., and E. Baltas, 2012 «Engineering Hydrology», A. Papasotiriou & Sia, ISBN: 978-960-491-066-3. (in Greek)

Papamichail, D. M., 2001 «Engineering Hydrology of Surface Waters», Giachoudi- Giapoudi, ISBN: 960-7425-81-2. (in Greek)

Tsakiris G., 2012 «Water Resources I. Engineering Hydrology», Symetria, ISBN: 978-960-266-380-6. (in Greek)

English Bibliography

Anderson, M.G., and J.J. McDonnell, (eds.) 2005. Encyclopedia of Hydrological Sciences, Wiley Publications.

Beven, K.J., 2012. Rainfall-Runoff Modelling: The Primer, 2nd Edition, Wiley-Blackwell.

Brutsaert, W., 2005. Hydrology: An Introduction. Cambridge University Press.

Chow, V.T., 1988. Applied Hydrology. McGraw-Hill.

Dingman, S.L., 2015. Physical Hydrology. 3rd Edition, Waveland Press.

Karamouz, M., Nazif, S., Falahi, M., 2013. Hydrology and Hydroclimatology: Principles and Applications. CRC Press.

Maidment, D.R., (ed.) 1993. Handbook of Hydrology. McGraw-Hill.

Mimikou, M., Baltas, E. and Tsihrintzis, V., 2016. Hydrology and Water Resources System Analysis, July 2016, Textbook – 448 Pages – 208 B/W Illustrations, ISBN 9781466581302, CRC Press, Taylor and Francis Group.

Teaching method *(select and describe if necessary* - **weight***):* To impart the basic theoretical and practical understanding represented by the knowledge and skills outcomes via a mix of self-learning and formal teaching, including formal lectures and exercises with active student participation. Lectures introduce theory and concepts, which are then exemplified in exercises using specialized packages and tailored data sets. For Hydrology, the theory underpinning modern practice is taught in lectures and then is tested in practical exercises.

Teaching	☑	80%
Seminars	☐	…….%
Demonstrations	☐	…….%
Laboratory	☐	…….%
Exercises	☑	20%
Visits at facilities	☐	…….%

Other *(describe):* …….	☐	…….%
Total		100%

Evaluation method *(select)*- **weight:** A substantial piece of coursework will test the students' ability to understand and apply the knowledge they acquire, including the use of methods and software in exercises. In addition, a final exam will be used for the final evaluation of the students.				
	written	*%*	*Oral*	*%*
Homework	☑	20	☐	
Class project	☐		☐	
Interim examination	☐		☐	
Final examinations	☑	80	☐	
Other *(describe):* ……	☐		☐	