SUBJECT TEACHING GUIDE

G1448 - Hydrology

Degree in Civil Engineering
BILINGUAL UC-CU CIVIL ENGINEERING PROGRAM

Academic year 2023-2024

1. IDENTIFYING DATA				
Degree	Degree in Civil Engineering BILINGUAL UC-CU CIVIL ENGINEERING PROGRAM		Type and Year	Compulsory. Year 2 Compulsory. Year 1
Faculty	School of civil Engineering			
Discipline	Obligatory Subjects FUNDAMENTALS OF HYDRAULIC ENGINEERING			
Course unit title and code	G1448 - Hydrology			
Number of ECTS credits allocated	6	Term	Semester based (1)	
Web				
Language of instruction	English		Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DEL AGUA Y DEL MEDIO AMBIENTE
Name of lecturer	MANUEL DEL JESUS PEÑIL
E-mail	manuel.deljesus@unican.es
Office	E.T.S. de Ingenieros de Caminos, Canales y Puertos. Planta: + 0. DESPACHO DE MANUEL DEL JESUS PEÑIL (0026)
Other lecturers	

3.1 LEARNING OUTCOMES
- Students will acquire an operative knowledge of the hydrologic cycle and all the physical processes involved in it. Students will be able to quantify all these physical processes.
- Students will learn the basics of precipitation as a physical process. They will learn the best ways to quantify the process by means of different mathematical models for hydrologic modeling and calibration purposes.
- Students will learn to model the water balance including all the important processes required for specific situations. Students will develop basic computational models.
- Students will learn the basics of groundwater movement and redistribution.
- Students will understand the physical basis of evapotranspiration and how to model under different conditions.
- Students will learn how runoff is produced and how aggregation processes end up creating streamflow. Students will learn to model streamflow transformations.
- Students will acquire the necessary competences to apply all the previous knowledge to engineering applications such as rainfall-runoff modeling or infrastructure design.

4. OBJECTIVES
The main objective of the course is to teach students the basics of the hydrologic cycle and water balance. With this basic knowledge they will have the tools required to face real world problems like water supply for irrigation or human consumption, flood-induced risk reduction or reservoir management. The course will not only focus on the theoretical aspects of hydrology but also will include important concepts of hydrologic engineering practice.

6. COURSE ORGANIZATION	
CONTENTS	
1	1.- Hydrology and Hydrologic Engineering 1.1.- Hydrology as a science 1.2.- Hydrology as an engineering discipline
2	2.- Basic hydrologic concepts 2.1.- Conservation principles 2.2.- Drainage basins 2.3.- Variability and spatio-temporal scales
3	3.- The hydrologic cycle and the climate 3.1.- The global climate 3.2.- The hydrologic cycle 3.3.- The role of hydrology
4	4.- Precipitation 4.1.- The physics of precipitation 4.2.- Precipitation at a point: measurement and modeling 4.3.-Areal precipitation: measurement and modeling 4.4.- Statistical characterization of precipitation 4.5.- Snow and snowmelt
5	5.- Water in the Soil 5.1.- Main properties of soils 5.2.- Infiltration: measurement and modeling 5.3.- Water flow within soils 5.4.- Redistribution
6	6.- Groundwater 6.1.- Basic principles of groundwater flow 6.2.- Groundwater flow: Measurement and modeling
7	7.- Evapotranspiration 7.1.- Physics of the atmospheric boundary layer 7.2.- Evaporation 7.3.- Transpiration: potential and actual 7.4.- Evapotranspiration: measurement and modeling
8	8.- Runoff and streams 8.1.-Mechanisms producing stream response 8.2.-Characterization of stream response 8.3.-Free surface flow and flow routing 8.4.-The watershed drainage network
9	9.- Hydrologic engineering 9.1.-Rainfall-Runoff modeling 9.2.-Semi-distributed hydrologic modeling

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Quick quizzes (about 20 minutes long) will be taken at the end of every block. The quizzes will be closed book and individual.	Activity evaluation with Virtual Media	No	Yes	50,00
Students will be asked to present a report of the hydrological modeling work proposed to be solved during the course.	Work	Yes	No	25,00
The students will solve and present at least two exercises per lesson of the ones proposed by the lecturer.	Activity evaluation with Virtual Media	No	No	25,00
TOTAL				100,00

Observations

If the quizzes block is not passed as a whole, the extraordinary exam will cover all the material of the course. The solved exercises and the practical work blocks can only be presented during the ordinary evaluation. If the students requires to participate in the extraordinary evaluation, he/she will keep the grades obtained at these two parts, and will average the extraordinary exam grade with them.

As accorded by the relevant committees:
+ As a general rule and unless stated otherwise anywhere in this guide, a student cannot request a reexamination if the original grade obtained in the evaluation was not a fail.
+ As a general rule and unless stated otherwise anywhere in this guide, the reexamination activity will take the same form than the original evaluation activity.
Grades are measured on a numeric scale going from 0 to 10, where values smaller than 5 are a Fail.
Only for sufficiently justified reasons (i.e. sanitary restrictions), the evaluation activities could be organized online, if authorized by the School Director.

Observations for part-time students

Part-time students will need to agree with the responsible professor a teaching and evaluation plan to ensure an adequate transfer of knowledge as well as a fair evaluation procedure. The minimum requirement for this students will be to complete a piece of homework and to assist to the final exam of the subject. The weights of each part will be proportional to the weight those parts presents in the general evaluation scheme of the subject.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Brutsaert, W. (2005) Hydrology. An introduction. Cambridge University Press. New York.

Dingman, S.L. (2008) Physical Hydrology. Waveland press Inc. Long Grove, IL.

Andy D. Ward et al. (2015) Environmental Hydrology. CRC Press.

Ven te Chow. (1988) Applied Hydrology. McGraw-Hill Publishing Company.