

**COURSE DATA****Data Subject**

<b>Code</b>	33787
<b>Name</b>	Hydrology
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2020 - 2021

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1318 - Grado de Geografía y Medio Ambiente	Faculty of Geography and History	3	First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1318 - Grado de Geografía y Medio Ambiente	597 - Hydrology	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
CERDA BOLINCHES, ARTEMIO	195 - Geography
RUESCAS ORIENT, ANA BELEN	195 - Geography

**SUMMARY**

The course "Hydrology" presents the basic contents of the Continental Hydrology and Marina, and special emphasis on i) the role of water in the Earth system, and ii) the interaction between human activity and hydrological processes.

**PREVIOUS KNOWLEDGE****Relationship to other subjects of the same degree**

There are no specified enrollment restrictions with other subjects of the curriculum.

**Other requirements**



## OUTCOMES

### 1318 - Grado de Geografía y Medio Ambiente

- Have capacity for analysis and synthesis.
- Have oral and written communication skills in one's own language and in a foreign language.
- Be able to work independently.
- Be able to work in interdisciplinary teams.
- Show motivation for quality, responsibility and intellectual honesty.
- Learn about physical geography.
- Learn about methodology and fieldwork.
- Be able to relate the natural environment and the social and human spheres.
- Analyse and value landscapes from a spatial-temporal perspective.
- Learn basic techniques for fieldwork in geography and particularly for reading and interpreting the landscape in geographic terms.

## LEARNING OUTCOMES

At the end of first semester, the course *Hydrology* must be allowed the student to know the basic content of the hydrology, with special emphasis on the connections between the water and other land areas, with particular emphasis on interaction between human activities and natural dynamics of the hydrological cycle.

## DESCRIPTION OF CONTENTS

### 1. Introduction

The hydrological cycle. The impact of societies on the water balance. Hydrological processes and reservoirs. Hydrology History. The drainage basin as a fundamental unit.

### 2. Precipitation

Quantification. Spatial and temporal variations. Changes in precipitation due to anthropic causes.

### 3. Interception

Interception, cortical runoff, transcolation. Basic measurements, methods and data.

### 4. Infiltration

The infiltration process. Saturated hydraulic conductivity. The unsaturated zone. Basic measurements, methods and data.



### **5. Percolation**

**Infiltration, groundwater and aquifers**  
**Infiltración, agua subterránea y acuíferos**  
**Infiltration, groundwater and aquifers**  
**Infiltration, groundwater and aquifers**

Percolation and groundwater. Use and abuse of water resources

### **6. Evapotranspiration**

Evaporation. Basic measurements, methods and data. Evapotranspiration. Measurements, methods and basic data

### **7. The water in the soil**

Water on the ground. Seasonal evolution and spatial changes. Permanent wilting point. Field capacity. Useful water. Water to soil and water states. Basic measurements, methods and data.

### **8. Surface runoff**

Genesis of surface runoff. The basin response: the hydrograph. The floods. Runoff generation models. Basic measurements, methods and data.

### **9. Ground water and aquifers**

Water and rocks. Confined aquifers. Aquiclude. Underground water resources.

### **10. Marine hydrology**

The great ocean basins: oceans and seas. Sea water characteristics. Global hydrological balances. Ocean circulation.

### **11. Glaciers and lakes**

Glaciers. Glacier retreat and climate change. Lakes as identifiers of environmental changes.



## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Other activities	15,00	100
Classroom practices	15,00	100
Study and independent work	30,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	20,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	20,00	0
<b>TOTAL</b>	<b>150,00</b>	

## TEACHING METHODOLOGY

The teaching of the contents of the subject are based on four aspects:1) Theory: the face-to-face classes will consist of 60 minutes dedicated to the presentation of the basic knowledge of the subject. Students will have to review, in the manual or recommended readings, the subject to be taught in the next class to confirm that all their questions are clarified during the teacher's explanation.2) Practice: they will be taught in one-hour sessions. In these sessions the teacher will explain techniques, methods and how to carry out the exercises. The delivery of practices is mandatory to take the final theoretical exam.3) Complementary activities: they consist of field work. Attendance is mandatory and will be part of the evaluation.4) Theoretical-practical final exam.

## EVALUATION

The evaluation is based on three parts:1. Written tests: there will be a written test of the theoretical and practical contents of the subject (50%).2. Practices will be done in class in person. At the end of each class, attendance and understanding of the practice will be controlled by means of a questionnaire (40%).3. The evaluation of the assistance to the field work (complementary activities) will be done through the "field notebook" that each student will prepare before, during and after the field practice (10%).



## REFERENCES

### Basic

- Bielza, V. 1984. Geografía general. Geografía física. Tomo I, Madrid, Taurus, 325 pp.
- Bras, R.L. 1990. Hydrology. Massachusetts, Addison, 643 pp.
- Brutsaert, W. 2005. Hydrology. Cambridge Univ. Press. Cambridge, 456 pp.
- Davie, T. 2003. Fundamentals of Hydrology. Editorial Routledge, 169 pp.
- Davis, S.N. y Wiest, R. 1971. Hidrogeografía. Editorial Ariel, 350 pp.
- Jones, J.A.A. 2001. Global hydrology processes, resources and environmental management. Editorial Longman, 399 pp.
- Llamas, J. 1993. Hidrología general. Universidad del País Vasco, Bilbao, 328 pp.
- Martínez de Azagra, A. y Navarro Hevia, J. 1996. Hidrología forestal: el ciclo hidrológico. Valladolid, Universidad de Valladolid, Secretariado, 286 pp.
- Patricio Mijares, F.J. 1999. Fundamentos de Hidrología de Superficie. Ed. Limusa. México, 324 pp.
- Rodríguez, J. 1982. Oceanografía del Mar Mediterráneo. Madrid, Pirámide, 174 pp.
- Todd, D. K. y Mays, L. W. 2005. Groundwater Hydrology. John Wiley, 453 pp.
- Thurman, H. V y Trujillo, A.P. (2003) Introductory Oceanography, Pearson, 10th Edition, 624 pp.
- Viessman, W. y Lewis, G. L. 2003. Introduction to Hydrology. Prentice Hall, 342 pp.
- Ward, R.C. y Robinson, M. 2000. Principles of Hydrology. London, McGraw-Hill, 450 pp.

### Additional

- Articles científics

## ADDENDUM COVID-19

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

### 33787 HIDROLOGY

#### SEMI-PRESENTIAL TEACHING

##### 1. Contents

The contents initially included in the teaching guide are maintained

##### 2. Workload and time schedule

The activities and their hours of dedication in ECTS credits marked in the original course guide will be kept. If the classrooms capacity according to the sanitary norms allows it, the theoretical and practical class attendance will be 100% (if the capacity couldn't be guaranteed, the class attendance would be reduced). Supplementary activities (weekly hour O: total 15 h.) may require attendance (field trips, seminars) or could be online, and will be specified at the beginning of the term in the Annex to the Course Guide, like the rest of the teaching planning.

If the sanitary situation changes and no access to the University facilities is possible, all teaching activities will be carried out completely online. In this case, the adaptations will be communicated to the students through the Virtual classroom.



### **3. Teaching Methodology**

Theory and practice classes that may be complemented with different types of materials and activities in the Virtual classroom.

Tutorials will be done online (through the UV corporate mail) or face-to-face by prior appointment with the teacher.

If the sanitary situation changes and no access to the University facilities is possible, teaching and tutorials will be carried out completely online. In this case, the adaptations will be communicated to the students through the Virtual classroom.

### **4. Evaluation**

The evaluation criteria established in the Course Guide are kept.

If the University facilities were closed on the dates set in the official calendar for the final exam, the face-to-face exam would be replaced by an online test.

### **5. Bibliographic references**

The recommended bibliography in the Course Guide is kept. If the sanitary situation changes and the access to the recommended bibliography is not possible, it will be replaced by materials accessible online.