Universidad de Navarra

Hidrología e Hidrogeología (F.Ciencias)

Teaching guide 2026-27

INTRODUCTION

Course description:

Hydrology & Hydrogeology addresses the characteristics and movement of water on land beneath the surface of the earth. The hydrologic cycle is the framework for understanding the dynamics of water on the earth's surface. An in-depth exploration of evaporation, condensation, precipitation, interception, and runoff will be explored in the course. Subsurface phenomena such as deep seepage, aquifers, below-ground rivers, seeps and springs will be addressed in the section on hydrogeology. Application of this information will be presented in the context of floods, water supply management and land use planning for flood plains. Field trips will examine the characteristics of rivers, karst topography, water in caves, springs, seeps, issues of water allocation and water resource management. Students will be introduced to field techniques for the measurement of key paramenters. A brief introduction to ocean & coastal dynamics will also be provided, so that the students obtain a basic understading of the main processess.

- **Degree:** Environmental Sciences
- **Module in the Degree Program**: Module II. Topic 2: Basis of Environmental Science.
- **Number of credits:** 3 ECTS
- **Year:** Second, 2º semester
- **Type of course:** Required
- **Instructors**: Dr. D. Raúl Bermejo Orduna
- **Language:** English
- **Department:** Environmental Biology
- **Lecture schedule:**

LEARNING OUTCOMES (Competencies)

Specific competences:

CE15 Identification of techniques for the measurement, registration and storage of meteorological variables.

CE16 Analysis of meteorological, climatic, and hydrological processes.

General competences:

CG2 Holistic thinking, being able to approach issues from different perspectives.

CG3 Development of critical thinking.

CG4 Team work.

CG6 Description of the physical environment, including its geological aspects.

CB2 Enabling the students to put their skills at work in a profesional manner, and providing them with competences related to reasoning and solution of problems within their field of study.

PROGRAMME

1. **Introduction: On Water:**
2. **The Hydrologic Cycle:**
3. **The Drainage Basin:**
4. **Rivers:**
5. **Floods:**
6. **Lake Hydrology:**
7. **Groundwater:**
8. **Water Resource Management & Conservation:**
9. **Planet Oceanus:**
10. **Impacts on the Water Cycle:** The Global Climate Crisis.

EDUCATIONAL ACTIVITIES

Classroom teaching activities

- *Lectures:* Lectures are given by the professor on the themes indicated in the syllabus with the help of the blackboard, power point presentations, videos and animation movies. The professor will post on ADI the power point presentation, the notes for each topic and some recommendations for further reading.
- *Seminars:* group review of the assignments proposed by the professor in connection with the themes considered in the syllabus, and responses to questions. These seminars will serve as an introduction to the themes considered in the syllabus.
- *Presentations* by the professor of current scientific issues & breaking news related to the course.
- *Student presentations* on topics proposed by the professor. At the end of the presentation a round of questions will be opened, which will have to be answered by the speakers.

Field teaching activities:

There will be a number of field lectures organized as fieldtrips, integrated in the E&LP. These focus on case studies at several locations, and rely on the student's first-hand experience as a means to address some of the themes considered in the syllabus. They will also be supported and expand the classroom teaching activities. The activities include outdoor lectures, group activities, field labs, hikes, and guided visits. Notes and materials will be provided whenever required. During the fieldtrips, a series of brief mock exams will familiarize the students with the dynamics of the subbject's final exam.

Personal work:

Students must understand themes covered early in the course to be able to comprehend information presented later in the course, and will have to be able to integrate material learnt throughout the course. Therefore, it is important that they do not fall behind and try to set aside regular times outside of class to work on the course material on a daily basis.

- Students must complete simple assignments proposed by the professor on a number of topics in connection to the syllabus, and the subsequent in-class discussion of each of which will serve as an introduction to a lecture session. Being familiar with topics beforehand will allow students to get the most out of the lecture.
- Students should conduct personal study using their own notes, the references provided for each topic, plus any recommended reading or additional material provided by the instructor.
- Students are expected to produce their presentations in English.

Evaluation:

Exams to assess the successful accomplishment of the objectives. Please refer to the 'Evaluation' section for further information on this aspect.

Credits/hours distribution of the activities. 3 ECTS= 75 h (25 h/ECTS):

1.Total in-person activities	1.24 ECTS	34 h	(45.3 %)
• Classroom sessions	0.64 ECTS	16 h	(21.3 %)
• Field sessions	0.60 ECTS	15 h	(20.0 %)
• Evaluation	0.12 ECTS	3 h	(4 %)
2.Personal work	1.64 ECTS	41 h	(54.6 %)

ASSESSMENT

The progress of the sudent will be assessed during the course as follows

Assignments:

1. Topic exercise (individual/team work): Must be submitted. Will be reviewed & discussed in class.
2. Field trips: Complete data form during field trip. Forms will be collected after the trip

Final Exam:

- Must score a minimum of 4/10 to average
- **I**t will take place in May in the field. The exam will be a combination of the analysis excercises on a number of cases, which will be visited along an itinerary on the examination day, plus a series of short-answer questions related with the theoretical contents addressed during the course.

FINAL MARK = Assignments (50%) + Field Final (50%).

- Pass: a minimum final mark of 5/10

Exams review

- Students will be able to review the exams in an interview with the professor, after publication of the grades, in a day and place that will be indicated.

Evaluation in the extraordinary call

- For those who do not pass the course in May or did not take the exam (grades *Suspenso* or *No presentado*) there will be an extraordinary multiple choice test exam in June which will account for 50% of the final grade.

Students with special learning needs

- Accommodation will be provided for students with special learning needs, either regarding the methodology and/or evaluation of the course, but they will be expected to fulfill all course objectives.

OFFICE HOURS

Dr. Raúl Bermejo Orduna (rberord@unav.es)

- Office: 3C05
- Building: Ciencias
- Floor: 3rd floor
- Please contact the instructor to arrange a meeting

BIBLIOGRAPHY & RESOURCES

Textbooks

- Fetter C.W. "Applied Hydrogeology" Waveland Press Inc. ISBN 978-1-4786-3709-7 (2001) Localízalo en la Biblioteca
- Sánchez San Román, F.J. "Hidrología superficial y subterranea" ISBN 978-1975606602 https://hidrologia.usal.es/temas.html
- Leopold L.B, Langbein W.B. “A Primer on Water”. U.S. Government Printing Office, Washington, 1960. https://water.usgs.gov/edu/files/A-Primer-on-Water-USGS.pdf

References

- WMO "International Glossary of Hydrology" 2021 Edition. ISBN 978-92-63-03385-8 https://library.wmo.int/doc_num.php?explnum_id=8209
- WMO "Guide to Hydrologycal Practice"
  - Volume I - "Hydrology: from Measurement to Hydrological Information" https://library.wmo.int/doc_num.php?explnum_id=10473
  - Volume II - "Management of Water Resources and Application of Hydrological Practices" https://library.wmo.int/doc_num.php?explnum_id=222
- Mingteh Chang. "Forest Hydrology. An introduction to Water and Forests" Localízalo en la Biblioteca
- Moss B. "Ecology of Freshwaters" Wiley-Blackwell ISBN 9786612548550 Localízalo en la Biblioteca
- Pinet P.R. "An Invitation to Oceanography" John & Bartlett Learning. ISBN 9781284164695 Localízalo en la Biblioteca
- Instituto Geológico y Minero de España: http://www.igme.es/
- US Geological Survey: https://www.usgs.gov/centers/cfwsc/science/hydrology-monitoring-tools