UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course:	HYDROLOGY AND HYDROLOGIC RESTORATION OF FORESTS	**Code:**	62325
Type:	CORE COURSE	**ECTS credits:**	6
Degree:	365 - UNDERGRADUATE DEGREE PROGRAMME IN FOREST AND ENVIRONMENTAL ENGINEERING	**Academic year:**	2022-23
Center:	601 - E.T.S. AGRICULTURAL ENGINEERS AND MOUNTS AB	**Group(s):**	10
Year:	3	**Duration:**	C2
Main language:	Spanish	**Second language:**	English
Use of additional languages:		**English Friendly:**	Y
Web site:		**Bilingual:**	N

Lecturer: **MANUEL ESTEBAN LUCAS BORJA** - Group(s): **10**

Building/Office	Department	Phone number	Email	Office hours
ETS Ingenieros Agrónomos y de Montes. Edificio Manuel Alonso Peña. Planta alta, 1º módulo.	CIENCIA Y TECNOLOGÍA AGROFORESTAL Y GENÉTICA	926053400	manuelesteban.lucas@uclm.es	

2. Pre-Requisites

It is recommended that students have previously acquired knowledge in the following specific subjects: hydraulics, construction and concrete structures, pedology and climatology, forestry, reforestation, environmental impact assessment, forest ecology, forest management and forest planning.

3. Justification in the curriculum, relation to other subjects and to the profession

Hydrological-forestry restoration comprises the set of actions required to protect the soil against erosion, defend the territory against drought and floods, increase the water supply capacity and contribute to the conservation and improvement of the functionality of the soil. Furthermore, hydrological-forestry restoration contributes to the creation of rural employment, to the conservation and improvement of biodiversity, to the mitigation of climate change by increasing carbon sinks, and to the improvement of the landscape and recreational value of the mountains. The main forest hydrological restoration actions consist of the execution of reforestation, correction or hydrotechnical works and forest improvement treatments. The hydrological-forestry restoration techniques are based on the fundamentals of forest hydrology, considered as a speciality of hydrology that studies the relationship between water and soil, within the framework of work that constitutes the forests and mountains and consist mainly of the implementation of plant cover, the implementation of hydrotechnologies and the implementation of forestry treatments aimed at improving the ecological functionality of forests, with special attention to the protection and formation of soil. Therefore, hydrology and hydrological-forestry restoration represent an important discipline in the new curricula and new qualifications of the degree courses in Forestry and Environmental Engineering (GIFMN). This subject requires many other basic support subjects (due to its interdisciplinary nature), as well as knowledge of other more specific and specialized subjects related to the following subjects:

1ST COURSE:
- Physics
- Forest Botany

2ND COURSE
- Soil science and climatology
- Environmental Impact Assessment
- Forest Ecology
- Forestry buildings and facilities

3RD COURSE
- Forestry
- Hydraulics

4TH COURSE
- Reforestation
- Projects and territorial planning
- Forest management and certification

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4. Degree competences achieved in this course

Course competences

Code	Description
E16	Ability to know, understand and use the principles of Forest Hydraulics
E36	Ability to know, understand and use the principles of Hydrology and Hydrological-Forestry Restoration
G05	Organizational and planning skills
G06	Information management capacity
G07	Problem solving
G10	Teamwork
G21	Ability to apply knowledge in practice

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know how to design hydrological-forestry restoration and correction measures for the conservation of soil, vegetation and watercourses

To analyze the elements of the river basin and its relationship with the hydrological cycle.

To know the hydrological cycle and the methods for its study.

Additional outcomes

6. Units / Contents

Unit 1: Preliminary concepts. Soil-water-plant interactions

Unit 2: Introduction to surface hydrology

Unit 3: The physical complex of Cuenca and its morphometry

Unit 4: The drainage network

Unit 5: The rainfall regime

Unit 6: Extreme precipitation calculation

Unit 7: Runoff calculation. Rational Method, Number of the Curve and Garcia Nájera's Formula. Hydrological modeling with HEC-HMS

Unit 8: Longitudinal and transverse hydrotechnics in basin restoration

Unit 9: Forest management in the framework of forest hydrological restoration Hydrological-forestry restoration of burned areas.

Unit 10: Basin Management Projects. Hydrological-forestry restoration projects.

Unit 11: Erosion control plans.

ADDITIONAL COMMENTS, REMARKS

The agenda is distributed in blocks as follows:
Block I: Topics 1, 2, 3 and 4.
Block II: Themes 5, 6 and 7.
Block III: Topics 8, 9, 10 and 11.
The relationship between the contents of the report and the subjects of the course is as follows:
- Content: Surface hydrology. The movement of water on the surface: Topic 1 and 2
- Content: The watershed. Theme 3
- Content: Classification and administrative management of basins. Topic 3 and 4
- Content: The rainfall regime in the basin. Topic 5 and 6
- Content: Water runoff in the basin. Topic 7
- Contents: Hydrotechnics of the restoration of basins. Terraces. Dikes, complementary hydrotechnics (reservoirs, earthen dams, curved dikes). Topic 8 and 9
- Content: Evaluation of investments in agro-hydrological basin management. Item 10 and 11

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7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E16 E36 G05 G06 G07 G10 G21	1.15	31.05	Y	N	
Class Attendance (practical) [ON-SITE]	Projects based learning	E16 E36 G05 G06 G07 G10 G21	1.11	29.97	Y	N	
Progress test [ON-SITE]	Assessment tests	E16 E36 G05 G06 G07 G10 G21	0.22	5.94	Y	N	
Study and Exam Preparation [OFF-SITE]	Combination of methods	E16 E36	3.37	90.99	Y	N	
Group tutoring sessions [ON-SITE]	Combination of methods	E16 E36 G05 G06 G07 G10 G21	0.15	4.05	N	-	
		Total:	**6**	**162**			
		Total credits of in-class work: 2.63					**Total class time hours: 71.01**
		Total credits of out of class work: 3.37					**Total hours of out of class work: 90.99**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	40.00%	50.00%	
Theoretical papers assessment	50.00%	50.00%	
Assessment of active participation	10.00%	0.00%	
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

There will be progress tests in each of the blocks and practical work that will allow the student to pass the subject through the continuous assessment system. The subject block that is failed must be recovered in the ordinary final test of the evaluation. If more than two blocks are failed or the student does not take the continuous assessment system, the three subject blocks as a whole must be passed in the ordinary exam. In the framework of the subject, it will be valued positively:

- the student's attendance, attitude and participation in class
- the resolution of theoretical assumptions and questions or problems related to the subject previously presented by the teacher
- correct oral and written expression, and the use of scientific and technical forestry language

- the degree of achievement of the most important results and conclusions in the report drawn up by each group
- the student's attitude and participation in classes and data collection
- the correct expression and use of scientific and technical forestry language

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

In the ordinary call, the three thematic blocks will be evaluated as a whole and those students who have not passed the subject through the continuous assessment system or the blended learning system must attend

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**

Unit 1 (de 11): Preliminary concepts. Soil-water-plant interactions

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2

Unit 2 (de 11): Introduction to surface hydrology

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	3.7

Unit 3 (de 11): The physical complex of Cuenca and its morphometry

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Projects based learning]	3
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 4 (de 11): The drainage network

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Projects based learning]	3
Progress test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7
Group tutoring sessions [PRESENCIAL][Combination of methods]	2

Unit 5 (de 11): The rainfall regime

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 6 (de 11): Extreme precipitation calculation

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Projects based learning]	4
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 7 (de 11): Runoff calculation. Rational Method, Number of the Curve and Garcia Nájera's Formula. Hydrological modeling with HEC-HMS

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Projects based learning]	3
Progress test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 8 (de 11): Longitudinal and transverse hydrotechnics in basin restoration

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Class Attendance (practical) [PRESENCIAL][Projects based learning]	6
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.6

Unit 9 (de 11): Forest management in the framework of forest hydrological restoration Hydrological-forestry restoration of burned areas.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 10 (de 11): Basin Management Projects. Hydrological-forestry restoration projects.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.7

Unit 11 (de 11): Erosion control plans.

Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Projects based learning]	1
Progress test [PRESENCIAL][Assessment tests]	2
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	9.8
Group tutoring sessions [PRESENCIAL][Combination of methods]	2

Global activity

Activities	**hours**
Class Attendance (practical) [PRESENCIAL][Projects based learning]	20
Progress test [PRESENCIAL][Assessment tests]	6

Study and Exam Preparation [AUTÓNOMA][Combination of methods]	91
Group tutoring sessions [PRESENCIAL][Combination of methods]	4
Class Attendance (theory) [PRESENCIAL][Lectures]	31
Total horas:	152

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Andrés Martínez Azagra	Hidrologia Forestal. El ciclo hidrológico	Universidad de Valladolid		84-7762-588-3	1996	
Francisco Javier Aparicio Mijares	Fundamentos de hidrología de superficie	Limusa		968-18-3014-8	1992	
Leonardo S. Nanía y Manuel Gómez Valentín	Ingeniería hidrológica	Grupo Editorial Universitario		84-8491-428-3	2004	
Pablo A. García-Chevesich	Procesos de Control de la erosión	Outskirts Press, Inc.		978-1-4327-2695-9	2008	
Rafael Muñoz Carpena	Hidrología Agroforestal	Mundiprensa		84-8476-245-9	2005	
Victor Miguel Ponce	Engineering Hydrology. Principles and practices	Prontice Hall		0-13-315466-1	1989	