



Course syllabus

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|---------------------------|---|--------------------|----------|
| Subject | Forest soils and carbon sequestration | | |
| Qualification | Degree in Forest Engineering and Natural Environment | | |
| Plan | 449 | Code | 42211 |
| Period | Second semester | Type/Nature | Optional |
| Level | Degree | Year | 4º |
| ECTS | 3 | | |
| Language | English | | |
| Lecturers | María Belén Turrión and Francisco Lafuente Álvarez | | |
| Contact details | <p>María Belén Turrión Nieves. e-mail: bturrión@agro.uva.es Phone: 979 108 331 Edificio Principal ETSIAA (Green building, office: HF 1.07). Curriculum Vitae: https://www.researchgate.net/profile/Maria_Belen_Turrión/contributions http://sostenible.palencia.uva.es/users/bturrión</p> <p>Francisco Lafuente Álvarez. e-mail: lafuente@agro.uva.es 979 108 330 Edificio Principal ETSIAA (Green building, office HF 1.08). Curriculum Vitae: https://www.researchgate.net/profile/Francisco_Lafuente2</p> | | |
| Tutorial timetable | http://www.uva.es/export/sites/uva/2.docencia/2.01.grados/2.01.02.ofertaformativagrados/2.01.02.01.alfabetica/Grado-en-Ingenieria-Forestal-y-del-Medio-Natural/ then click on "Tutorías" and select lecturer. | | |
| Department | Ciencias Agroforestales (Área de Edafología y Química Agrícola) Agroforestry Sciences (Soil Science and Agricultural Chemistry) | | |

1. General scope

1.1 Scope

In the context of the actual global climate change, soils play a vital role in the carbon cycle. Understanding factors that control soil carbon sequestration, and evaluating management techniques for mitigation and adaptation to the climate change, related to soil fixation, are useful tools for forestry and environmental engineers.

1.2 Relationship with Academic Program

This subject provides a technical and environmental view of soil organic carbon that is one of the principal factors of soil fertility and global carbon cycle.

1.3 Pre-requisites

Basic concepts of Chemistry, Biology, Soil science and Climatology are needed, as well as Agricultural and Forestry engineering concepts.

English language skills for reading, speaking and writing are needed.



2. General skills

G3: Be able to analyse and synthesise

G5: Be able to communicate effectively, orally and in writing, in specialized meetings as well as for non-expert people

G12: Ability to work in teams

G15: To show critical reasoning

G17 Learning autonomously both individually and cooperatively

3. Course Outcomes and Objectives

By the end of the course, students should be able to:

- Understand the role of forest soils on carbon fixation and how the different forestry activities affect this fixation.
- Explain the process of soil carbon stabilization and its management.
- Quantify and evaluate the carbon fixation in soils.
- Explain the structural properties, functions and process of soil organic matter.

4. General Outline of Topics Covered

Topics

1. Carbon cycle in the biosphere and in forest soils.
2. Factors influencing soil carbon sequestration.
3. Soil carbon capture quantification
4. Soil organic matter characterization
 - a. Biological aspects
 - b. Chemical aspects
 - c. Physicochemical aspects
 - d. Methodologies of study
5. Modelling and recycling of soil organic matter
6. Global climatic change and carbon capture

Recommended readings

- Fernández-Romero M.L et al. (2016) Soil quality assessment based on carbon stratification index in different olive grove management practices in Mediterranean areas. CATENA 137: 449–458
- Heath L.S., Birdsey R.A., Williams D.W. (2002) Methodology for estimating soil carbon for the forest carbon budget model of the United States, 2001. Environ. Pollut., 116: 373-380
- Lal, R. Ed. (2001) Soil Carbon Sequestration and the Greenhouse Effect. Soil Science Society of America. SSSA Special Publication Nb. 57. 236 p.
- Lefèvre, C.; Rekik, F.; Alcantara, V.; Wiese, L. (2017) Soil organic carbon: the hidden potential. FAO, ONU. Roma. <http://www.fao.org/3/a-i6937e.pdf>



5. Methods of Instruction

This subject is planned mainly of practical activities, with 14 h lab, 8 h theoretical classes and 8 h seminars.

Theoretical classes: Sessions that include explanations by the lecturers, and other activities more participatory such as facilitated discussions and debate about doubts and programmed readings.

Seminars: In which students will solve problems and questions, will present individual and team homework and will receive explanations by the lecturers about that questions.

Lab practices: In 3 h sessions the students will follow lab protocols for soil analysis. Quantity and quality of soil carbon in a specific sample and others soil properties will be determined in order to find relationships among soil carbon and soil properties. Soils under different land-use and management will be analysed. A report will be elaborated as a part of the subject grading.

An individual assignment consisting on a bibliographic review resulting in a written document it is mandatory. A 2000-2500 words document will be prepared about soil carbon sequestration, with guidance by lecturers, defended by a short (10 minutes) oral presentation on *Powerpoint* or similar software program. A rubric with grading details will be provided. Instructions will be provided at the beginning of the course.

Moodle platform on e-campus (UVa campus virtual) will be used for delivering documents, for proposing and delivering assignments, performing individual or cooperative learning activities and as a channel of communication between lectures and students and among students.

Objectives, material with topic contents questions, practical exercises and bibliography will be offered by lecturers for every topic. Solutions to the questions will be elaborated as a part of the subject grading.

6. Student Dedication to the Course

| In Class | Hours | Outside Class | Hours |
|---|-----------|---|-----------|
| Lectures | 8 | Individual study | 15 |
| Laboratory | 14 | Working in group | 10 |
| Practical lectures and Oral presentations | 8 | Preparation of writing assignment and oral presentation | 20 |
| Total | 30 | Total | 45 |

7. Grading Criteria

| Student Evaluation | Percentage on the final course grade | Comments |
|---|--------------------------------------|--|
| Lab work and report | 30 % | Mandatory assignment |
| Writing assignment and oral presentation about soil carbon sequestration in soils | 30 % | Mandatory assignment |
| Deliveries and participation on classes | 40 % | Active participation in classes (10%) and three reports (about programmed topics) representing a 30% of the final grade. |

Students who do not follow the subject must take an exam to pass the subject.



Course Policies

- **Attendance:**

Lectures and laboratory work form a core component of this course. Students must ensure that they are available to attend lectures and arrive with punctuality. They should pay close attention to the class schedule and read the material prior to class. They are welcome to share new ideas during class and are encouraged to read related papers.

- **Technology in the classroom:**

Mobile phones are not allowed. Please, turn-off your cell phone prior to the start of class. You will be asked to leave the course for the day if you are using your phone.

- **Policy on Academic Ethics and Honesty:**

The University of Valladolid (UVa) regards cheating as a serious academic offence. Anyone caught cheating will automatically receive a 0/10 for the quiz/exam/assignment, and will be reported to the dean. Your responsibility, besides maintaining a high standard of personal honesty, includes taking precautions to prevent others from copying your work. A student's assessed work may be reviewed against electronic source material using computerised detection mechanisms.

8. Final considerations

General competences considered in this subject will be **evaluated** as follows:

- G3 *Be able to analyse and synthesise*, with short questions throughout the course and written assignment.
- G5: *Be able to communicate effectively, orally and in writing, in specialized meetings as well as for non-expert people*, with the written assignment and the oral presentation.
- G12 *Ability to work in teams* in the lab sessions and its assignments, with teams monitoring.
- G15 *To show critical reasoning* with the written assignment and comments of the results in lab sessions.