Universidad de Navarra

Soil and waste treatment (F. Ciencias)

Guía docente 2026-27

PRESENTACIÓN

- **Breve descripción**:
- The subject **Soil and Waste Treatment** provides the basic tools to understand the technologies which are being used to minimize human impacts related to the wastes generated and the impact on the soil. It is included in Module III: Environmental Technology of Curriculum structure
- **Carácter**: Compulsory.
- **ECTS**: 6
- **Curso y semestre**: Third-year. First Semester.
- **Idioma**: English.
- **Título**: Bachelor in Environmental Sciences.
- **Módulo y materia de la asignatura**: Module III
- **Profesor responsable de la asignatura**: Dr. Jordi Garrigó Reixach (jgarrigo@unav.es)
- **Profesores**:

Dr. José María García-Mina (jgmina@unav.es) –SOIL TREATMENT

Department of Environmental Biology - School of Science

Dr. Jordi Garrigó Reixach (jgarrigo@unav.es) – WASTE TREATMENT

Department of Chemistry – School of Science.

- **Horario**: 3 h/week (Monday 9 - 10h, Wednesday 10- 11h and Thursday 11-12h
- **Aula**: 34

RESULTADOS DE APRENDIZAJE (Competencias)

The contents of the materials in the module III will equip students with the skills related to environmental technology, with the aim of training professionals engaged in activities with a strong technical foundation for the improvement of the environment and treatment techniques and control of pollution of air, soil, solid waste and water treatment systems (Memory for the application of the Degree, 2013)

Specific skills

• CE2 Apply terminology and units of measurement of physical processes.

• CE3 Describe the structure, physicochemical properties and reactivity elements and compounds involved in biogeochemical processes.

• EC4 Using laboratory techniques and instruments of the scientific experimentation.

• CE5 Interpret experimental and field results.

• EC7 Knowing soils, their characteristics and types.

• CE27 Manage waste from the point of view of eco-efficiency.

• CE33 Know the basic instrumental techniques and environmental analysis for the quantification of the contamination.

General and basic skills

• CG1 Managing the training.

• CG2 Thinking integrated method and solving problems from different perspectives.

• CG3 Having critical thinking.

• CG4 Teaming

• CG5 Having a sense of responsibility towards the environment and ecosystems.

• CG6 Managing information.

• CG7 Communicating

• CB1 Students have demonstrated knowledge and understanding in a field of study that part of the basis of general secondary education, and is typically at a level that, although advanced textbooks support it, includes some aspects involving knowledge of the forefront of this field of study

• CB2 Students can apply their knowledge to their work in the career and have competences typically demonstrated through arguments and solving problems within this field of study

• CB3 Students have the ability to gather and interpret relevant data (usually within this field of study) to inform judgments that include reflection on relevant social, scientific or ethical

Objectives

With regard to knowledge:

- Knowing the main classifications of soils and wastes.

- Analysing the main effects of human activities on the soil and the impacts of the generated wastes.

- Providing an overview of the most used engineering processes to avoid the impact caused by human activities on the environment.

Skills and Attitudes:

- Encourage participation in seminars related to proposed topics.

- Promoting the use of information sources on issues related to the subject.

Students should (according to the evaluation):

- Attend and, actively, participate in both theoretical and practical sessions.

- Resolve the issues and problems from the lessons.

- Attend to the outing sessions.

- Conduct a final written exam to assess the knowledge acquisition.

PROGRAMA

• **SECTION**: SOIL TREATMENT

- Introduction to soil properties
- Main Soil contaminants
- Soil remediation strategies and technologies

- Microbiological processes
- Chemical-based processes
- Phytoremediation

- Conclusion and perspectives

• **SECTION**: WASTE TREATMENT

• UNIT 1:

- Sources and types of wastes.
- Problem of wastes.

• UNIT 2:

- Waste minimization.
- Treatment of wastes.

• UNIT 3:

- Recovery of wastes.
- Plans and waste management.

ACTIVIDADES FORMATIVAS

• **Lessons (45 hours):** At the end of each unit, the necessary documentation will be provided to support the course in ADI. ADVICE: Students should be able to answer questions during the course.

• **Outing activities (12 hours):** Practical seminars will be done.

• **Tutoring (20 hours):** By appointment (jgmina@unav.es SOIL TREATMENT /juanafernandez@unav.es WASTE TREATMENT)

• **Tests (4 hours):** one test will be done at the end.

• **Personal work (107 hours).**

EVALUACIÓN

ORDINARY SESSION:

• Test: **70 %**

• Outing activities (report and exam): **15%**

• Presentation about topic: **15 %**

To pass the course:

• As minimum 5 (over 10)

To do the average mark:

• As minimum 5 (over 10)

• Test

• Presentation

• Outing activities outline

REPEAT STUDENTS:

• Test: **70 %**

• Extra activities outline: **15%**

• Presentation about topic: **15 %**

To pass the course:

• As minimum 5 (over 10)

To do the average mark:

• As minimum 5 (over 10)

• Test

• Extra activities outline

If the student has passed the outing activities and the presentation exercise, this mark will be kept one academic course. In this way, the student must pass the test during the following academic course if he/she wish to pass the subject that academic course. If any change affects to the teaching guide, the students will be inform properly.

STUDENTS WITH SPECIAL NEEDS: students with special educational needs must first contact the Coordination of Studies of the Faculty of Sciences to obtain the corresponding authorization for the adaptations (for example, having more time in the exams). This authorization must be sent by the student to the teacher. It is recommended to carry out this procedure at the beginning of the semester.

ATTENTION: It is recalled that any attempt at fraud, copying, plagiarism or other irregular behaviour is a serious infraction, as contemplated in Title IV "Rules of academic discipline of students" within the System of rules on coexistence at the University of Navarra.

ALUMNOS CON NECESIDADES ESPECIALES: *los estudiantes con necesidades educativas especiales deberán ponerse previamente en contacto con la Coordinación de Estudios de la Facultad de Ciencias para obtener la autorización correspondiente a las adaptaciones (por ejemplo, disponer de más tiempo en los exámenes). Dicha autorización deberá ser enviada por el alumno al profesor. Se recomienda realizar esta gestión al comienzo del cuatrimestre.*

ATENCIÓN: *Se recuerda que cualquier intento de fraude, copia, plagio u otro comportamiento irregular supone una infracción grave, tal y como está contemplado en el título IV "Normas de disciplina académica de los estudiantes" dentro del Sistema de normas sobre la convivencia en la Universidad de Navarra.*

HORARIOS DE ATENCIÓN

If after attending the lessons and working, at home, on the contents presented in the classroom, the student has any questions, a tutoring can be requested by email.

Dr. José María García-Mina (e-mail: jgmina@unav.es)

Dr. Jordi Garrigó Reixach (e-mail: jgarrigo@unav.es)

Office 1080-1100. First Floor. Research building. Department of Chemistry_School of Sciences

It is recommended that students attend at least two sessions in personalized tutoring during the course. They can be online. Please, make an appointment by e- mail: jgmina@unav.es SOIL TREATMENT /jgarrigo@unav.es WASTE TREATMENT.

BIBLIOGRAFÍA

WASTE TREATMENT

Recommended reading:

• Tchobanoglous, George. (1996). **Gestión integral de residuos sólidos.** Madrid. McGraw-Hill. Find it in the Library

• Puigjaner, L (2011). **Syngas from Waste. Emerging Technologies**. Springer. Find it in the Library (ebook)

• Office for Official Publications of the European Communities (2013). **Managing municipal solid waste: a review of achievements in 32 European countries**. Find in the Library

Complementary reading:

• Mackenzie Davis, David Cornwell (2013). **Introduction to Environmental Engineering**. McGraw-Hill. Find it in the Library

• Harrison, R.M., Chester, Roy, Slater, David (2001). Pollution: Causes, Effects and Control. Royal Society of Chemistry. Find it in the Library

• Bisesi, Michael; and Koren, Herman, (2002). Pollutant Interactions in Air, Water, and Soil.

• Seoanez, Mariano. Tratado de la Biomasa. Mc Graw Hill; (2013) Localízalo en la Biblioteca