Universidad Zaragoza

Year : 2019/20

28618 - Materials III

Syllabus Information

Academic Year: 2019/20
Subject: 28618 - Materials III
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
Degree: 422 - Bachelor's Degree in Building Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as theory sessions, practice sessions, workshops, and autonomous work and study.

The teaching methodology is based on a strong interaction between the teacher and student. This interaction is made a reality through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

4.2.Learning tasks

This course is organized as follows:

- **Theory sessions**: The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.
- **Practical sessions**: Problems and practical cases are carried out, complementary to the theoretical concepts studied.
- **Workshop**:s This work is tutored by a teacher, in groups of no more than 20 students.
- **Tutorials**
    - **Group tutorials:** Learning tracking scheduled activities in which the teacher meets with a group of

students to guide their autonomous work and study that requires a very high degree of counselling from the teacher.
        - **Individual tutorials**: On-site or online
- **Autonomous work and study.**
    - Study and understanding of the theory taught in the lectures.
    - Understanding and assimilation of the problems and practical cases solved in the practical classes.
    - Preparation of seminars, solutions to proposed problems, etc.
    - Preparation of laboratory workshops, preparation of summaries and reports.
    - Preparation of the written tests for continuous assessment and final exams.
- **Assisted Autonomous activities**: Although they will have a strong on-site character, they will be focused mainly on seminars and tutorials under the supervision of the teacher.
- **Reinforcement activities**: With a strong non-class character, through a virtual learning portal (Moodle) several activities that reinforce the basic contents of the subject will be conducted. These activities might be customized or not, but always under control.

4.3.Syllabus

This course will address the following topics:

Theoretical Contents

Unit 1: Aggregates and Roadbeds

1. Origin of aggregates
2. Physical and mechanical properties
3. Classification of aggregates
4. Setting of aggregates
5. Embankment, Grading & Roadbeds
6. Applications

Unit 2: Bituminous Mixtures (Asphalt concrete)

1. Production
2. Transport
3. On-site positioning
4. Mix Typologies
5. Mix Classification
6. Mix Rheology
7. Regulations
8. Pathologies

Unit 3: Metals

1. Introduction
2. Crystal structure
3. Formation and nature of alloys
4. Mechanical properties
5. Concepts
6. Physical Properties
7. Chemical properties
8. Unions
9. Forming
10. Iron and its alloys
11. Copper and its alloys
12. Aluminium and its alloys

Unit 4: Concretes

1. History
2. Manufacturing
3. Transport

4. On-site positioning
5. Fresh Concrete
6. Water
7. Aggregates
8. Durability
9. Additives
10. Concrete curing
11. Creep and shrinkage of concrete
12. Hardened concrete
13. Mechanical testing
14. Regulations
15. Pathologies

P r a c t i c a l C o n t e n t s

The theoretical knowledge of the previous section, has associated practice tasks. The Laboratory practice tasks in Materials I are an important complement to the comprehensive training of the student in the Civil Engineering degree.

It is impossible to even try to give a minimal description of the different types of gadgets and commercial devices used for measuring different magnitudes. This is not the purpose of the subject. It is to cover the learning outcomes through a comprehensive program of laboratory practice activities, including aspects related to the following issues:

- Generically, a clear idea of ??the importance of the field of material testing as well as the implementation time and their application.
- Students must, at least, acquire knowledge about the most common techniques for measuring magnitudes such as: mechanical resistance, chemical resistance, environmental resistance, etc. of the materials used in construction.

The guidelines followed to develop the contents were as follows:

- The contents proposed in the verification report were respected.
- A syllabus whose chapters are generally consistent with the titles of the specified program was developed. When this was not done it was because, due to its size and / or correlation, it was included in another.
- A large bibliography of current technical, classical and issues was selected
- The best-suited units from the bibliography were selected and turned into a single text, with our own design and layout and innovative teaching resources. The teacher didn't mean to be creative in its preparation, but he based his work on renowned prestige texts. Only the goals, organization and presentation of the material and drafting of some sections of the issues are original. The full text is available in the reprographic service of the school, as well as on digital media published in Moodle.
- The main features of the text layout can be summarized as having nine units, which coincide with the content, completely developed, avoiding summaries.
- The specific goals achieved in the making of the text itself can be summarized as follows:
    - Highlight the relationship between conceptual analysis and problem solving, using the number of examples needed to show approaches for their solution, stressing that solving is a process in which the conceptual knowledge is applied, and it is not merely a mechanized solving model. Therefore, in the text and the solved examples, the mind processes for problem-solving based on the concepts are stressed, instead of highlighting the mechanical procedures.
    - Provide students with practice in the use of analytical techniques presented in the text.
    - Show students that the analytical techniques are tools, not goals, allowing in different situations to practice in choosing the analytical method they will use to obtain the solution.
    - Encourage student interest in engineering activities, including real application problems.
    - Develop problems and exercises using realistic values ??representing feasible situations.
    - Encourage students to evaluate the solution, either with a different method of resolution or by testing to see if it makes sense in terms of the known behaviour of the circuit, machine or system.
    - Show students how the results of a solution are used to find additional information about the behaviour of a circuit, machine or system.
    - The resolution of most problems will require the type of analysis to be performed by an engineer to solve real-world problems. Developed examples, where the particular way of thinking of engineering is emphasized, can also be used as a basis for solving real problems.

4.4.Course planning and calendar

This course has 6 ECTS, which represents 150 hours of student work in the subject during the semester, in other words, 10 hours per week for 15 teaching weeks. This includes 3 hours of lectures, 1 of workshop and 6 of other activities.

Nevertheless, the previous table can be shown in greater detail, taking into account the following overall distribution:

- 32 hours of lectures, with 70% theoretical demonstration and 30% solving type problems.
- 2 hours of laboratory workshop, in 2 hours per sessions.
- 8 hours of written assessment tests, 2 hours per test.
- 8 hours of PPT presentations, 1 hour per PPT
- 90 hours of personal study, over the 15 weeks of the 2nd term.

Tasks to be developed in the laboratory will be carried out by the students in sessions of two hours.

Further information concerning the timetable, classroom, office hours, assessment dates (http://www.eupla.unizar.es/asuntos-academicos/examenes) and other details regarding this course will be provided on the first day of class or please refer to the Faculty of EUPLA website and Moodle.

4.5.Bibliography and recommended resources

Resources

Materials

Materials	**Soporte**
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-Mail
Material de ensayos	Pc's laboratorio
Guión de prácticas	Paper/repository
Maquinas multiensayos Tamices Moldes de probetas Bandejas Etc.	

Bibliography

http://biblos.unizar.es/br/br_citas.php?codigo=28618&year=2019

Web Sites

Código Técnico de la Edificación - [https://www.codigotecnico.org/index.php/menu-documentoscte.html]

EHE - [https://www.fomento.gob.es/organos-colegiados/mas-organos-colegiados/comision-permanente-del-hormigon/cph/instruccione]

PG-3 - [http://www.carreteros.org/normativa/pg3/apartados/indice.htm]