

Course guide 340054 - RMA1-M4O37 - Strength of Materials I

Last modified: 04/02/2025

| Teaching unit: | 737 - RMEE - Department of Strength of Materials and Structural Engineering. | | |
|---------------------|---|--|--|
| _ | | | |
| Degree: | BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Optional subject). | | |
| | BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus | | |
| | 2009). (Optional subject). | | |
| | BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject). | | |
| Academic year: 2024 | ECTS Credits: 6.0 Languages: Catalan, Spanish | | |
| Academic year: 2024 | ECTS Credits: 6.0 Languages: Catalan, Spanish | | |

| LECTURER | |
|------------------------|------------------------|
| Coordinating lecturer: | Musté Rodríguez, Marta |
| Others: | Musté Rodríguez, Marta |

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

2. CE14. Knowledge and application of basics of material resistance.

3. CE22. Knowledge and ability to apply basics of elasticity and resistance of materials into behavior of real solids.

4. CE23. Knowledge and ability to calculate and design structures and industrial constructions.

Transversal:

1. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.

5. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

TEACHING METHODOLOGY

the proposed problems.

The directed learning hours consist, on the one hand, of theoretical classes in which the teacher gives a presentation of the concepts of the subject to be learnt. Subsequently, and through practical exercises, they try to motivate and involve the students so that they actively participate in their learning. Support material is used: publications and solved problems. Laboratory practicals are carried out in pairs and allow the development of basic instrumental skills as well as introducing students to electrical extensometry After each theoretical session, tasks outside the classroom are proposed, to be worked on individually or in groups. It is also necessary to consider other hours of autonomous learning, such as those dedicated to reading oriented readings and the resolution of

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the subject Resistance of Materials I is to provide the basic conceptual and theoretical training to be able to tackle the design, analysis and co-testing of simple resistant elements. It will be the basis for the study of more complex elements and structures.

The course includes the study of bending in prismatic beams of uniform section, providing the fundamental theoretical basis for the study of their strength and stiffness aspects.



STUDY LOAD

| Туре | Hours | Percentage |
|-------------------|-------|------------|
| Self study | 90,0 | 60.00 |
| Hours large group | 45,0 | 30.00 |
| Hours small group | 15,0 | 10.00 |

Total learning time: 150 h

CONTENTS

(ENG) Vector Tensió i Estat Tensional Pla

Full-or-part-time: 20h Theory classes: 6h Laboratory classes: 2h Self study : 12h

(ENG) Estat de Tensions Tridimensional

Full-or-part-time: 12h Theory classes: 4h Self study : 8h

(ENG) Estat de Deformacions en el Sòlid Elàstic

Full-or-part-time: 14h Theory classes: 4h Theory classes: 8h Laboratory classes: 2h

(ENG) Relacions entre Tensions i Deformacions

Full-or-part-time: 18h Theory classes: 6h Self study : 12h

(ENG) Anàlisi i Disseny de Bigues sotmeses a Flexió

Full-or-part-time: 42h Theory classes: 14h Laboratory classes: 2h Self study : 26h



(ENG) Càlcul de deformacions en Bigues Prismàtiques: Teoremes Energètics

Full-or-part-time: 44h Theory classes: 14h Laboratory classes: 2h Self study : 28h

GRADING SYSTEM

THE COMPLETION OF LAB PRACTICES AND THE SUBMISSION OF LAB REPORTS IS A MANDATORY REQUIREMENT TO PASS THE COURSE. AGREEMENT CG/2024/03/08 OF THE GOVERNING COUNCIL.

GRADES:

C1 = Midterm exam

C2 = Final exam. The assessable content for this part will cover the entire material of the semester.

Exams will only be rescheduled individually for those students who can justify their absence on the scheduled date due to a serious reason. During the exam, only a formula sheet on an A4-sized paper (double-sided) may be consulted in the problem-solving section. The student may fill this sheet with any useful information, and their name must be clearly stated on it. The inclusion of solved problems in this sheet is strictly prohibited. The formula sheet must be submitted at the end of the exam.

CP = Laboratory practices to be carried out throughout the course.

The composition of the groups and the practice schedule will be announced in advance. Each practice will consist of a theoretical part, which must be completed individually, and an experimental part, which may be conducted in pairs. The theoretical part will account for 40% of the grade, while the experimental part will account for 60%.

RP = Company challenge

The final grade for the course will be the highest value calculated using the following formulas:

Final Grade = 0.35*C1 + 0.50*C2 + 0.1*CP + 0.05*RPFinal Grade = 0.85*C2 + 0.1*CP + 0.05*RP

If the final grade, after completing C1 and C2, is equal to or greater than 2 and less than 5, the student will have the opportunity to take a reassessment exam (CR) covering all the material taught during the semester.

In this case, the student's grade after the reassessment will be calculated using the following formula:

Final Grade = 0.85 *CR + 0.1 *CP + 0.05 *RP

This final grade will determine whether the reassessed student passes the course or not. However, according to the school's regulations, in the official grade report, a student who passes through reassessment will receive a maximum final grade of 7. For students who, despite the reassessment, do not pass the course, the highest of the two final grades obtained will be recorded in the official grade report.

EXAMINATION RULES.

Electronic devices, such as mobile phones, may not be taken to the tests. In the course of the tests, the documentation previously established in class by the teacher and prepared by the student himself/herself in individual handwritten form may be consulted.

BIBLIOGRAPHY

Basic:

- Goodno, Barry J.; Gere, James M. Mecánica de materiales. 9a ed. Cuajimalpa, Ciudad de México: Cengage Learning, 2019. ISBN 9786075268194.



Complementary:

- Beer, Ferdinand Pierre ; Johnston, E. Russell ; DeWolf, John ; Mazurek, David F.. Mecánica de materiales [on line]. 7a ed. México: Mc-Graw-Hill Education, 2017 [Consultation: 19/02/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB BooksVis?cod primaria=1000187&codigo libro=8071. ISBN 9781456260866.