



IDENTIFYING DATA

Resistance of materials

| | | | | |
|---------------------|--|-----------|------|------------|
| Subject | Resistance of materials | | | |
| Code | V12G380V01402 | | | |
| Study programme | Grado en Ingeniería Mecánica | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 2nd | 2nd |
| Teaching language | Spanish Galician | | | |
| Department | | | | |
| Coordinator | Cabaleiro Núñez, Manuel Riveiro Rodríguez, Belén | | | |
| Lecturers | Cabaleiro Núñez, Manuel Caride Tesouro, Luís Miguel Fernández Abalde, Félix Filgueira Crespo, Manuel Fuentes Fernández, Eugenio Ignacio Pereira Conde, Manuel Riveiro Rodríguez, Belén | | | |
| E-mail | mcabaleiro@uvigo.es belenriveiro@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | (*)Nesta materia estúdase o comportamento dos sólidos deformables, analizando as relacións entre solicitacións, tensións e deformacións. Estúdanse os principios básicos da Resistencia de Materiais, especialmente en elementos tipo barra. | | | |

Training and Learning Results

| | |
|------|--|
| Code | |
| B3 | CG3 Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations. |
| B4 | CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering in Mechanical specialty. |
| C14 | CE14 Knowledge and use of the principles of strength of materials. |
| D1 | CT1 Analysis and synthesis |
| D2 | CT2 Problems resolution. |
| D9 | CT9 Apply knowledge. |
| D10 | CT10 Self learning and work. |
| D16 | CT16 Critical thinking. |
| D17 | CT17 Working as a team. |

Expected results from this subject

| | |
|------------------------------------|-------------------------------|
| Expected results from this subject | Training and Learning Results |
|------------------------------------|-------------------------------|

| | | | |
|---|----|-----|------------|
| To know the differences between rigid solid and elastic solid. | B3 | C14 | D1 |
| To know the stress and deformation states in a deformable solid and the relationship between them. | B4 | | D2 D9 |
| Apply the acquired knowledge to the determination of the maximum values of stress at a point of a deformable solid. | | | D10 D16 |
| To know the basic principles governing the Mechanics of Materials. | | | D17 |
| To know the relationships between the different stress resultants and the stresses. | | | |
| To apply the knowledge acquired to the determination of stress resultant diagrams. | | | |
| To apply the acquired knowledge about stresses applied to bar elements. | | | |
| To know the basics about deformations of bar elements. | | | |
| To apply the knowledge acquired to the dimensioning of bar elements. | | | |

Contents

| Topic | |
|--|---|
| 1. Introduction | 1.1 Introduction 1.2 Review of statics fundamentals and applied concepts for further progress in solid mechanics and stress analysis |
| 2. Basic principles of elasticity and mechanics of materials | 2.0 Stress and strain. Linear elastic materials 2.1. Normal stress in an axially loaded prismatic bar. 2.2. Equilibrium of a deformable body. 2.3. Stress-Strain diagram of ductile materials. Hooke's Law. 2.4. Stress resultants. Diagrams. |
| 3. Axial Loads | 3.1. Normal forces. 3.2. Elastic deformation of an axially loaded member. 3.3. Statically governed problems. 3.4. Statically indeterminate problems. 3.5. Thermal stress and assembly misfits. |
| 4. Bending | 4.1 Beams: definition and types. Loads on beams. 4.2 Internal shear forces and bending moments. 4.3 External load, shear force and bending moment relationships. 4.4 Shear and moment diagrams 4.5 Pure bending and non-uniform bending. Hypothesis and limitations. 4.6. Normal stresses in unsymmetric bending. 4.7 Symmetric bending. The flexure formula (Navier's Law). 4.8 Section modulus of a beam. Ideal beam cross-section. 4.9 Deflection of beams and shafts. Slope and deflection. Mohr's Theorems. Conjugate Beam. 4.10 Hyperstatic bending. |
| 5. Other forces | 5.1. Shear in joints. Definition. Shear force. Shear stress. Bolted and riveted joints. Shear joints. 5.2. Introduction to the concept of compressive buckling. 5.3. Introduction to the concept of torsion in straight prisms. |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Lecturing | 30.5 | 40 | 70.5 |
| Laboratory practical | 9 | 23 | 32 |
| Problem solving | 9 | 9 | 18 |
| Essay questions exam | 3 | 0 | 3 |
| Problem and/or exercise solving | 0 | 24.5 | 24.5 |
| Objective questions exam | 2 | 0 | 2 |

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

| | Description |
|----------------------|---|
| Lecturing | Lecture where theoretical principles are presented using digital media, videos and blackboard |
| Laboratory practical | Activities of application of the knowledge to concrete situations and of acquisition of basic skills and procedural skills related with the subject of study. |
| Problem solving | Resolution of problems related to real case studies |

Personalized assistance

| Methodologies | Description |
|---------------|-------------|
| | |

Laboratory practical The students can ask the lecturers for the clarification of those concepts presented in the lecturers and practicals, as well as to clarify / discuss any doubts that may appear after the end of the sessions. The tutoring sessions may be carried out by telematic means (Remote Campus, Faitic, etc.) under the modality of prior agreement.

| Assessment | | Qualification | Training and Learning Results |
|---------------------------------|---|---------------|---|
| Description | | | |
| Laboratory practical | Attendance and active participation in all the practical classes of the semester will be valued, as well as the timely delivery of all the documentation requested in them (reports, internship reports, etc.). The face-to-face part corresponding to each practice takes place on a specific date, so it is not possible to make up for absences. Those practices in which the student presents an official certificate (doctor, court,...) due to unavoidable reasons will be excused. It will be scored with the indicated value, provided that at least 45% of the possible qualification is reached in the final exam. | 10 | B3 C14 D1 B4 D2 D9 D10 D16 D17 |
| Essay questions exam | Written exam on the official data established by the School. | 40 | B3 C14 D1 B4 D2 D9 D10 D16 |
| Problem and/or exercise solving | Throughout the course, 4 problem/exercise bulletins will be established for students to solve independently. These reports must be handed in solved on dates established by the teaching staff of the subject at the beginning of the course. The delivery must be made only through the teleteaching platform. | 10 | |
| Objective questions exam | Written tests to assess the individual work done by the student throughout the course. 4 tests will be carried out throughout the course on the dates that will be communicated to the students at the beginning of the course, or at least 2 weeks before the test. Each test will be valued at 10% of the overall grade for the subject, with the total of tests valued at 40% of the final grade. To pass the subject, it will be a necessary condition to achieve at least 40% of the mark of this test. The indicated value will be scored, provided that at least 45% of the possible grade is reached in the final exam. | 40 | B3 C14 D1 B4 D2 D9 D10 D16 |

Other comments on the Evaluation

Ethical Commitment: The student is expected to demonstrate appropriate ethical behavior. If unethical behavior is detected (copying, plagiarism, use of unauthorized electronic devices and others), they consider that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade of this course will be suspended (0.0).

The use of any electronic device will not be allowed during the assessment tests unless expressly authorized. The fact of introducing an unauthorized electronic device into the exam room will be considered a reason for not passing the subject in this academic year and the overall grade (0.0) will be suspended.

Sources of information

Basic Bibliography

Manuel Vázquez, **Resistencia de materiales**,

Complementary Bibliography

Hibbeler, R., **Mecánica de materiales**,

Ortiz Berrocal, L., **Resistencia de materiales**, Ed. McGraw-Hill,

González Taboada, J.A., **Tensiones y deformaciones en materiales elásticos**, Ed. Autor,

González Taboada, J.A., **Fundamentos y problemas de tensiones y deformaciones en materiales elásticos**, Ed. Autor,

Recommendations

Other comments

Requirements: To enroll in the subject, it is necessary to have passed or be enrolled in all the subjects of the courses below the course in which this subject is scheduled.