Universida_{de}Vigo

Subject Guide 2013 / 2014

| | G DATA | | | |
|-----------------------|---|---|--|---|
| (*)Elasticid | ade e ampliación de resistencia de materiais | | | |
| Subject | ampliación de | | | |
| | resistencia de | | | |
| | materiais | | | |
| Code | V12G380V01502 | | | |
| Study | (*)Grao en | | | |
| programme | Enxeñaría | | | |
| D | Mecànica | | | |
| Descriptors | ECIS Credits | Choose | Year | Quadmester |
| Toochin | y Spanich | Mandatory | 3rd | Ist |
| language | Spallish English | | | |
| Denartment | | | | |
| Coordinator | Badaoui Fernández. Aida | | | |
| Lecturers | Abia Alonso, Juan Ignacio | | | |
| | Baamante Vázquez, Modesto Manuel Antonio | | | |
| | Badaoui Fernández, Aida | | | |
| | Caneiro Couce, Alfonso | | | |
| | Comesaña Piñeiro, Rafael | | | |
| | Garcia Gonzalez, Marcos | | | |
| | Lurenzo maleo, jaime Alberto Pece Montenegro, Santiago | | | |
| F-mail | | | | |
| Web | | | | |
| General | (*)En esta asignatura se estudiarán los fundamentos o | le la elasticidad v | / se profundizar | á en el estudio de la |
| description | resistencia de materiales, con el fin de poder aplicar le sólidos reales (estructuras, máquinas y elementos res Esta asignatura, junto con la de Resistencia de Materia cuyo objeto es el diseño mecánico. | os conocimientos istentes en gener ales, es un soport | adquiridos al c ral). te de asignatura | omportamiento de as más especializadas |
| C | | | | |
| Code | les | | | |
| A3 CG3 Kn | owledge in basic and technological subjects that will on | able students to | learn new moth | ods and theories and |
| | them the versatility to adapt to new situations | SUC SLUUCIILS LO | | ious unu liieunes, anu |
| A4 CG4 Ab | ility to solve problems with initiative. decision making | creativity, critical | thinking and th | e ability to communicate |
| and tra | nsmit knowledge and skills in the field of industrial engi | neering. | | |
| A35 TM4 Kn solids. | owledge and skills to apply the fundamentals of elastic | ity and strength c | of materials to t | he actual behavior of |
| B1 CT1 And | alysis and synthesis | | | |
| B2 CT2 Pro | blems resolution. | | | |
| B3 CT3 Ora | al and written proficiency in the own language. | | | |
| B5 CT5 Info | ormation Management. | | | |
| ву CS1 Ap | ply knowledge. | | | |
| BIG CD2 C | i learning and work. | | | |
| B17 CP2 Cri | ucai umining. rking as a team | | | |
| DI/ CP3 W0 | יואווא מס מ נכמווו. | | | |
| Learning ai | ms | | | |
| Expected res | ults from this subject | | | Training and Learning |
| | - | | | Results |
| Knowledge o | f the foundations of elasticity theory | | | 43 |
| | | | A | 135 |

| Further deepening on mechanics of materials and stress analysis | | | B2 B10 |
|---|---|---------------------------|--|
| Knowledge of deformations in beams and sha | fts | A3 A4 A35 | B2 B9 |
| Ability to apply the knowledge of elasticity an mechanical performance of machines, structu | d mechanics of materials, and to analyze the ires, and general structural elements | A4 A35 | B1 B2 B5 B9 |
| Ability to take decisions about suitable mater subjected to a specific load | ial, shape and dimensions for a structural element | A4 A35 | B1 B2 B3 B5 B9 B16 B17 |
| Knowledge of different solving methods for st suitable method for each specific problem | ructural problems and ability to choose the most | A4 A35 | B1 B2 B5 B9 B16 |
| Contents | | | |
| Торіс | | | |
| Fundamentals of elasticity | Introduction to the theory of elasticity Stress analysis of elastic solids Strain Stress-strain relationships Two-dimensional elasticity | | |
| Bending. Stress | Non uniform bending: Shear stresses. Zhuravski expression Principal stresses. Stress trajectories Bending and axial load: Normal stresses. Neutral axis Eccentric axial loads Kern of the cross-section | | |
| Bending, Deflections | Composite beams | | |
| Bending. Statically indeterminate beams | General method Settlements in fixed supports Continuous beams | | |
| Torsion | Definition Coulomb]s fundamental theory Static torque diagrams Stress and angle of twist Statically indeterminate problems | | |
| Combined loads | Definition Bending and torsion loaded circular shafts Shear center | | |
| Buckling | Introduction Buckling and stability Euler[]s buckling. Critical load Buckling effective length Application limits of Euler[]s formula. Real buck Eccentric compression of slim columns Shearing force and critical load | ling | |
| Strain energy and energy methods | Strain energy: Axial load/shearing loads/bendin expression. Maxwell[]Betti Reciprocal Theorem. Applications Castigliano[]s theorem. Mohr's integral. Applica | g/torsion/g s tions | eneral |
| Criteria of failure based in tensions | Saint-Venant[]s failure criterion Tresca[]s failure criterion Von-Mises[] failure criterion | | |
| | | | |

| | Class hours | Hours outside the | Total hours |
|--|-------------|-------------------|-------------|
| | | classroom | |
| Introductory activities | 1 | 0 | 1 |
| Previous studies / activities | 0 | 6 | 6 |
| Master Session | 20 | 40 | 60 |
| Troubleshooting and / or exercises | 28 | 41 | 69 |
| Laboratory practises | 24 | 6 | 30 |
| Autonomous troubleshooting and / or exercises | 0 | 20 | 20 |
| Troubleshooting and / or exercises | 2 | 20 | 22 |
| Self-assessment tests | 0 | 8 | 8 |
| Practical tests, real task execution and / or simulated. | 3 | 6 | 9 |

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

| Methodologies | |
|---|---|
| | Description |
| Introductory activities | Introduction to the subject: Course aims, expected learning outcomes, course syllabus, teaching methods, assessments and grading policy. |
| Previous studies / activities | Student previous activities to lectures (compulsory submission): |
| | The students will receive detailed instructions to complete and send certain exercises before lectures/laboratory sessions. |
| | The purpose of this assessment is to optimize the session outcome. |
| | The submission of these exercises is indispensable for the students to be examined on the subject. |
| Master Session | The contents of the subject will be presented in a organized way. Special emphasis will be put on the fundamentals of the subject and on the most troublesome points. |
| | To improve the comprehension, the contents of the next lectures will be announced on Tema platform on a weekly basis. |
| Troubleshooting and / or exercises | ⁻ Each week will devote a time to the resolution by part of the student of exercises or problems proposed, related with the content that was seeing in the moment. |
| Laboratory practises | Application of theory concepts to laboratory collaborative works. |
| Autonomous troubleshooting and / or exercises | The students will be supplied with exercises and problems to solve, the solutions will be provided for level self-evaluation. |

| Personalized attention | |
|---|--|
| Methodologies | Description |
| Autonomous troubleshooting and / or exercises | The lecturers are at disposal of the students during office hours to solve any question related to the subject contents The students will be able to verify if the completed assignments are correct and to identify the mistakes of miscalculations The detailed schedule will be provided to the students at the beginning of the course through the TEMA platform. Any modification will be previously announced. |

| Assessment | | |
|--|--|---------------|
| | Description | Qualification |
| Laboratory practises | Attendance and active participation in the complete laboratory lessons will be graded from 0 to 10, provided that the student gets a minimum mark in the written examination (minimum mark: 4.5/10). | 5 |
| Troubleshooting and / or exercises | Exam for the assessment of the module learning outcomes. The exam comprises of brief problems and/or theoretical questions. The duration and precise grading will be communicated at the beginning of the exam. | 80 |
| Practical tests, real task execution and / or simulated. | Short exercises and conceptual tests will be taken during the course (within lecture or laboratory hours; grading from 0 to 10). The mark will be added to the exam mark, provided that the student gets a minimum mark in the written examination (minimum mark: 4.0/10). | 15 |

Other comments on the Evaluation

In this module the minimum required mark to pass is 5 out of 10.

The written examination of students not able to attend laboratory sessions will be graded 100% of the module mark, provided the student resigns from continuous assessment (and gets the required school approval) within the period

established for that purpose. This examination will assess the subject overall competencies.

The qualification obtained in the laboratory practices in the course 2012/2013 (5% of the qualification) will be preserved, provided the student requests that within an established period in the beginning of the course.

Group responsible lecturer:

Group M1: Aida Badaoui Fernández

Group with teaching in English: Rafael Comesaña Piñeiro (racomesana@uvigo.es)

Sources of information

José Antonio González Taboada, **Tensiones y deformaciones en materiales elásticos**, 2a Edición, José Antonio González Taboada, **Fundamentos y problemas de tensiones y deformaciones en materiales elásticos**, 1a Edición,

Manuel Vázquez, Resistencia de Materiales,

Luis Ortiz-Berrocal, **Elasticidad**, 3a Edición,

Recommended: Hibbeler R.C., Mechanics of Materials, SI Edition, 8th Edition in SI units,

Complementary: Timoshenko, Goodier., Theory of elasticity, 3rd ed., International student ed.,

Reading list for the group in English:

Recommended:

- Hibbeler R.C., Mechanics of Materials, SI Edition, Prentice Hall.

- José Antonio González Taboada , Tensiones y deformaciones en materiales elásticos, 2a Edición, Tórculo.

- José Antonio González Taboada , Fundamentos y problemas de tensiones y deformaciones en materiales elásticos, 1a Edición, Tórculo.

Complementary:

- Timoshenko, Goodier, Theory of elasticity, 3rd ed., (International student ed.), McGraw-Hill

- Manuel Vázquez, Resistencia de Materiales.

Recommendations

Subjects that continue the syllabus

(*)Deseño de máquinas I/V12G380V01304 (*)Teoría de estruturas e construcións industriais/V12G380V01603

Subjects that it is recommended to have taken before

(*)Física: Física I/V12G380V01102 (*)Física: Física II/V12G380V01202 (*)Resistencia de materiais/V12G380V01402