DEGREE CURRICULUM

ELASTICITY AND STRENGTH OF MATERIALS II

Coordination: BRADINERAS ESCO, FRANCISCO JAVIER

Academic year 2016-17

ELASTICITY AND STRENGTH OF MATERIALS II 2016-17

Subject's general information

Subject name	ELASTICITY AND STRENGTH OF MATERIALS II
Code	102306
Semester	1st Q(SEMESTER) CONTINUED EVALUATION
Typology	<table><tr><th>Degree</th><th>Course</th><th>Typology</th><th>Modality</th></tr><tr><td>Bachelor's Degree in Mechanical Engineering</td><td>3</td><td>COMPULSORY</td><td>Attendance-based</td></tr></table>
ECTS credits	6
Groups	1GG,2GM,5GP
Theoretical credits	2
Practical credits	4
Coordination	BRADINERAS ESCO, FRANCISCO JAVIER
Department	ENGINYERIA AGROFORESTAL
Teaching load distribution between lectures and independent student work	60h attendance class + 90h personal work
Important information on data processing	Consult this link for more information.
Language	Spanish

ELASTICITY AND STRENGTH OF MATERIALS II 2016-17

Professor/a (s/es)	Adreça electrònica professor/a (s/es)	Crèdits	Horari de tutoria/lloc
BRADINERAS ESCO, FRANCISCO JAVIER	bradi@eagrof.udl.cat	10,2	Thursday 9:30-10:30

Subject's extra information

We recommend attendance and resolution of proposed problems.

Case studies should be resolved as soon as possible, it is not advisable to leave them to the last minute.

Consulting bibliography is an essential requirement for the subject.

Students must achieve a level of knowledge that allows the calculation of structural and mechanical parts to achieve capacity enough to select the most appropriate design criteria for optimum performance of each piece.

It aims to establish a foundation of calculation knowledge that will be needed in other areas such as in the case of structural design, mechanical, etc.

Learning objectives

- Calculate static values of sections.

- Get stresses and deformations caused by axial forces.

- Calculate stresses and deflections caused by bending moments.

- Calculate stresses and deformations caused by shear forces.

- Learn to solve isostatic and statically indeterminated cases.

ELASTICITY AND STRENGTH OF MATERIALS II 2016-17

Competences

Degree-specific competences

- Knowledge and ability to apply the principles of elasticity and resistance of materials to the behaviour of real solids.

  Goals

  - Students must be able to address real problems and propose simplifications to them, within the field of strength of materials

- Knowledge and ability for calculus, structural design and industrial constructions.

  Goals

  - Students must be able to calculate a structure and decide what kind of links are the best to the design system selected

Degree-transversal competences

- Ability to gather and interpret relevant data in their field of study, and to emit judgements that include a reflection on relevant themes of a social, scientific or ethical nature

  Goals

  - Students must be able to interpret data of problems and results

- Ability to resolve problems and elaborate and defend arguments inside their field of study

  Goals

  - The student must learn to propose and decide the order to follow for solving problems and real cases

- Ability to analyse and synthesize.

  Goals

  - Students must be able to organize the results of the calculations and choose the relevant ones

Subject contents

1. - STATIC VALUES OF AREAS

2. - THE AXIAL FORCE

- STRESS AND STRAIN

- SOLID OF SAME RESISTANCE

- INTERNAL ENERGY

3. - BENDING THEORY. STRESS ANALYSIS

- PURE BENDING

- COMPOSITE BENDING

- SIMPLE BENDING

4. - BENDING THEORY. DEFLECTION ANALYSIS

- SHEAR DEFLECTIONS.

- ANGULAR DEFLECTION

- MOHR THEOREMS. CALCULATION OF SPIN AND DEFLECTION.

- ELASTIC EQUATION FOR DEFLECTIONS

5. - INDETERMINATE BEAMS. CONTINUOUS BEAMS.

6. - TORQUE

- PROFILES OF CIRCULAR SECTION

- OTHER PROFILES

7. - BUCKLING

- DIFFERENTIAL EQUATIONS OF BUCKLING.

- CRITICAL LOAD

Methodology

* Lectures: Before beginning with the problems a theoretical introduction to each chapter of the course will take place.

* Problems: The main focus of the course is to learn to solve problems of strength of materials and structural design. After the theoretical introduction will arise and solve different kind of problems. Problems are conducted in small groups.

* Exercises to deliver: Students also have to solve problems individually or in groups. The problems solved and delivered in class will be used in the calculation of the final mark for the subject. These exercises will be conducted in small groups.

* Case Studies: At the end of each chapter, a case studie will be required. Students will submit a final report with all of them. This case is different for each student as data depends on the student identification number. This report will also have an important weight in the mark of the subject.

Development plan

Week	Chapters	Classroom working hours	Freelance working hours
1-2	Chapter 1	8	12
3-5	Chapter 2	12	18
6-7	Chapter 3	8	12
8 y 10	Chapter 4	8	12
11-12	Chapter 5	8	12
13-14	Chapter 6	8	12

15	Chapter 7	4	6

Evaluation

Exams: 80% (2 partial 40%)

Case Studies: 20% (Report and class exercises)

Bibliography

· ORTIZ BERROCAL. Resistencia de Materiales. Mc Graw Hill.

· ORTIZ BERROCAL. Elasticidad. McGraw Hill.

· RODRIGUEZ-AVIAL. Resistencia de Materiales. ETSII Madrid.

· TIMOSHENKO. Resistencia de Materiales. Thomson

· M.VAZQUEZ. Resistencia de Materiales. Ed. Noela.

· M.ROMERO,P.MUSEROS,M.MARTINEZ Resistencia de Materiales. Ed. Universitat Jaume 1.

· CALCULO DE ESTRUCTURAS. RAMÓN ARGÜELLES ÁLVAREZ. E.T.S.I.M. MADRID.

· ESTRUCTURAS ARQUITECTÓNICAS E INDUSTRIALES, SU CÁLCULO. ENRIQUE NIETO. ED. TEBAR.

· TEORÍA Y CÁLCULO SOBRE ESTRUCTURAS RESISTENTES DE PRISMAS RECTOS. SANTIAGO RICO FERNANDO. BELLISCO