



Universitat de Lleida

DEGREE CURRICULUM **STRUCTURES 1**

Academic year 2014-15

Subject's general information

| | |
|---|---|
| Subject name | Structures 1 |
| Code | 101416 |
| Semester | First semester |
| Typology | compulsory subject |
| ECTS credits | 6 |
| Groups | One large and two medium-sized |
| Theoretical credits | 2 |
| Practical credits | 4 |
| Office and hour of attention | 1.03 building CREA Schedule previously agreed by email |
| Department | Enginyeria Agroforestal |
| Teaching load distribution between lectures and independent student work | 60 Master class 90 Homework |
| Modality | Presencial |
| Important information on data processing | Consult this link for more information. |
| Language | Spanish |
| Degree | Degree in Architectural Technology |
| Distribution of credits | 20 hours of theory 40 hours exercises |
| Office and hour of attention | 1.03 building CREA Schedule previously agreed by email |
| E-mail addresses | jmiglesias@eagrof.udl.cat |

Jose M. Iglesias Rodriguez

Subject's extra information

Theoretical and practical course. Work using the recommended bibliography is very important.

The subject is studied in the 1st semester of the 2nd year of the degree.

This is included to the "Specific training module", specifically to the "Structures and facilities of the building" matter

Learning objectives

Knowledge of the efforts in a section of a linear structural element. Axil. Shear and bending.

Statically determinate beams. Reactions. Determination of stress in a linear structural element.

Learning from Stress & Strain: Axial tension, compressive forces, shear and bending

Deflections of beams

Statically indeterminate beams

Plastic Analysis of structures

Competences

University of Lleida strategic competences

- Master Information and Communication Technologies.
- Capacity of analysis and synthesis.
- To have the skills required to undertake new studies or improve the training with self-direction.
- Capacity of abstraction and of critical, logical and mathematical thinking.

Degree-specific competences

- Ability to apply the technical rules to the building process and generate documents of technical specifications of the construction procedures and methods of the buildings.
- Aptitude for the predimensioning, design, calculation and checking of structures and for the direction of their material execution.
- Ability to constructively develop the installations of a building, control and plan their execution and verify the service and reception trials as well as those regarding maintainance.
- Aptitude to apply the specific rules about installations to the building process.

Degree-transversal competences

- Ability to plan and organise the personal work.
- Ability to work in situations where information is lacking or you are under pressure.

Subject contents

- T1.- Mechanics of Materials. Introduction
- T2.- Equilibrium and support reactions. Statically determinate beams
- T3.- Internal forces. Axial force, shear and bending moment. Shear and bending moment diagrams
- T4.- Stress & Strain: Axial tension, compressive forces. Shear
- T5.- Axial loading. Normal Stress.
- T6.- Pure bending. Unsymmetric Bending
- T7.- General case of eccentric axial loading
- T8.- Normal and shearing stresses in transverse sections of beams
- T9.- Deflections of beams
- T10.- Statically indeterminate beams
- T11.- Influence lines
- T12.- Plastic Analysis

Methodology

It is a theoretical and practical subject. The homework using the recommended bibliography is very important.

The course develops theoretical concepts of each theme and then exercises that complement and facilitate the understanding of matter are done.

Throughout the explanations of the work that is being done, in each session, student must make questions required for complete understanding of the theoretical and practical developed content.

Professor will deliver, at the beginning of each theme, a summary. In any case this material replaces the books recommended for the study of the subject. The student needs a much more comprehensive understanding which can develop in class during an academic course.

This subject must be done when the student have the Physics basic required concepts.

When the student have the necessary knowledge, the Professor proposes some exercises to do at home or in classroom. Randomly, some are collected and scored (in total 0.50). This note is added at the end of the course. This allows the student self-assessment, and the constant personal work is awarded.

During the sessions in the classroom, teacher raises questions to which every student can answer. The result of this activity is a clear indicator of the level of study and understanding of the matter. It is a valuation of the subject that is very useful, both for the teacher and for the student.

All the issues are interlinked together. This makes impossible that the study of the subject can be done at the end, not serving, in this case, all the class attendance during the course.

Development plan

| Dates | Description: | Classroom activity | HTP (2) (hours) | Personal activity | HTNP (3) (hours) |
|---------------------|---|----------------------------|-----------------|---------------------|------------------|
| | T1.- Mechanics of materials. Introduction | Theory | 1 | Theory | 1.5 |
| | T2.- Equilibrium and support reactions. Statically determinate beams | Theory (1) Problems (3) | 4 | Theory and problems | 6 |
| | T3.-Internal forces. Axil force, shear and bending moment. Shear and Bending Moment Diagrams | Theory (1) Problems (6) | 7 | Theory and problems | 10,5 |
| | T4.- Stress & Strain: Axial tension, compressive forces. Shear | Theory (2) Problems (3) | 5 | Theory and problems | 7.5 |
| | T5.-Axial loading. Normal Stress. | Theory (2) Problems (3) | 5 | Theory and problems | 7,5 |
| First partial exam | Theory T1-T5 | Theory | 0.5 | Theory | |
| First partial exam | Problems T1-T5 | Problems | 1.5 | Problems | |
| | T6.- Pure bending. Unsymmetric Bending | Theory (3) Problems (4) | 7 | Theory and problems | 10.5 |
| | T7.-General case of eccentric axial loading | Theory (1) Problems (4) | 5 | Theory and problems | 7.5 |
| | T8.-Normal and shearing stresses in transverse sections of beams | Theory (1) Problems (2) | 3 | Theory and problems | 4.5 |
| | T9.-Deflections of beams | Theory (1) Problems (5) | 6 | Theory and problems | 9 |
| | T10.- Statically indeterminate beams | Theory (2) Problems (4) | 6 | Theory and problems | 9 |
| | T11.-Influence lines | Theory (2) Problems (4) | 6 | Theory and problems | 9 |
| | T12.- Plastic Analysis | Theory (3) Problems(2) | 5 | Theory and problems | 7.5 |
| Second partial exam | Theory T6-T12 | Theory | 0.5 | Teoría | |
| Second partial exam | Problems T6-T12 | Problems | 1.5 | Problems | |
| Recovery | Recovery T1-T12 | Theory and problems | 2 | Theory and problems | |

Evaluation

| Objectives | Evaluation activities | % | Dates | O/V (1) | I/G (2) | Observations |
|------------|-----------------------|----|--------------------|---------|---------|---------------|
| T1-T5 | Theory T1-T5 | 15 | first partial exam | O | I | |
| T1-T5 | Problems T1-T5 | 35 | first partial exam | O | I | Without books |

| Objectives | Evaluation activities | % | Dates | O/V (1) | I/G (2) | Observations |
|------------|---|-----|---------------------|---------|---------|---------------|
| T6-T12 | Theory T6-T12 | 15 | 2º Parcial | O | I | |
| T6-T12 | Problems T6-T12 | 35 | second partial exam | O | I | Without books |
| Recovery | Theory and Problems T1-T12 | 100 | Recovery | | | Without books |
| Recovery | For students who have been to all the midterms. Note maximum 5. The note of the examination of recovery, for all the students who submitted, shall be final | | | | | |

Bibliography

Recommended bibliography

Resistencia de Materiales

M.Cervera, E. Blanco

EdicionesUPC

Timoshenko Resistencia de Materiales

J. M. Gere

Editorial Thomson

Mecánica de Materiales

F.P.Beer, E. Russell Johnston Jr, J.T. Dewolf

Editorial Mc Graw Hill

Análisis Estructural

A.Kassimali

Editorial Thomson

Software Barras

J. M^aIglesias, J. Bradineras

Cuadernos UdL