Universidad Zaragoza

Academic Year/course: 2023/24

28918 - Strength of materials and structural analysis

Syllabus Information

Academic year: 2023/24
Subject: 28918 - Strength of materials and structural analysis
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
ECTS: 6.0
Year: 2
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

This subject provides the basis for the behavior of solids in their elastic field, as well as the interactions between various elements and their external bonds.

These approaches and objectives are aligned with the following Sustainable Development Goal (SDG) in such a way that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement:

Goal 4: Quality education,

Target 4.4 By 2030, significantly increase the number of youth and adults who have the necessary skills, particularly technical and vocational, to access employment, decent work and entrepreneurship.

The concepts and methods of calculation provided in this course are an essential basis to approach other courses of later courses that study Agricultural Constructions.

2. Learning results

Solve specific problems of calculation of working stresses and strains in tension, compression, and bending in beams and in flat bar systems (isostatic and hyperstatic structures).

Perform the calculation of deformations in resistant elements working in tension, compression and bending.

Calculate buckling slender elements, working in compression.

Apply the knowledge of statics and strength of materials to the field of construction and structural analysis.

Defend and contribute their knowledge in strength of materials and structural analysis before a work team.

3. Syllabus

1. Presentation, methodology and assessment system.
2. Statics basics
3. Simple tension and compression below yield strength
4. Coplanar stresses. Principal stresses
5. Bending: shear forces (V) and bending moments (M)
6. Bending: normal stresses due to bending moment
7. Bending: shear stresses due to shear stress V
8. Bending: deformations due to bending moment
9. Flexion: hyperstaticity in flexion. Continuous beams
10. Deflected bending and compound bending
11. Flexocompression or buckling
12. Torsion and combined stresses
13. Calculation methods for flat articulated systems. Trusses and lattices
14. Methods for the design of hyperstatic member structures

4. Academic activities

Theory classes are held in the classroom. Students will be provided with the support material for the follow-up of the subject in the ADD. It is also advisable that they take notes during the development of the sessions. (30 hours)

In the problem classes the teacher will pose several problems to be solved, and after a deliberation with the students, they will solve and discuss their results. The students will have the results of the problems in the ADD. (20 hours) For the sessions of computer case studies and laboratory practices, the group will be divided into subgroups, for which the professor will present the case to be solved and the students will approach this resolution, as well as the evaluation of the results obtained. (10 hours)

Group work will consist of solving several problems in groups of 3 or 4 students.

Study, Teaching assignments and Other activities (86 hours)

Assessment (4 hours).

5. Assessment system

The assessment of this subject will NOT be done on a continuous basis.

The following assessment tests will be carried out in each of the two sessions:

1. Presential written test of theory contents and problems.
2. Written test to solve a Stress Diagram problem
3. Report/Memorandum on the laboratory and computer practices carried out during the term.
4. Resolution of group problems carried out during the term.

Test 1 will be structured in multiple-choice questions of theoretical content (50%) and problem solving (50%).

Test 2 may be passed during the term on a date that will be communicated sufficiently in advance to the students. In the highest grade obtained in this test, during the call or in the final test, will be taken at each session. To pass the course, it is required to obtain at least a 5 out of 10 in the resolution of the Stress Diagrams problem.

Test 3 will be evaluated by means of the attendance to the laboratory and computer practices, and the delivery of the corresponding reports on the date of the final exam in each exam session.

Test 4 will be evaluated through the delivery of the corresponding reports on the date of the final exam in each call.

The four assessment activities will be evaluated from 0 to 10 points.

Final grade:

To obtain the final grade (CF) in the subject, the weight of the 4 tests will be:

Test 1: 72%

Test 2: 18%

Test 3: 4%

Test 4: 6%

I f the minimum requirements are not met in the assessment activity (5 out of 10 in test 2) the subject will not be considered passed, even if the final grade averaged CF, is equal to or higher than 5. In this case, the final grade that will reflect in the minutes of the subject will be:

If final grade averaged, CF > 4, Fail, 4. If final grade averaged, CF < 4, Fail, CF.

Success rates in recent years: 2019/20: 83,78%; 2020/21: 58,33%; 2021/22: 69,05%