Universitat de Lleida

DEGREE CURRICULUM

AGRICULTURAL BUILDING DESIGN

Coordination: PUIGDOMENECH FRANQUESA, LUIS

Academic year 2020-21

AGRICULTURAL BUILDING DESIGN 2020-21

Subject's general information

<table>
<tr><td>Subject name</td><td>AGRICULTURAL BUILDING DESIGN</td></tr>
<tr><td>Code</td><td>102521</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's Degree in Agricultural and Food Engineering</td><td>2</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><td>PRAULA</td><td>TEORIA</td></tr>
<tr><th>Number of credits</th><td>1.8</td><td>4.2</td></tr>
<tr><th>Number of groups</th><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>PUIGDOMENECH FRANQUESA, LUIS</td></tr>
<tr><td>Department</td><td>AGRICULTURAL AND FOREST ENGINEERING</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalán: 100%
Castellano: occasionally just for clarification
English: occasionally just for clarification</td></tr>
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AGRICULTURAL BUILDING DESIGN 2020-21

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
PUIGDOMENECH FRANQUESA, LUIS	lluis.puigdomenech@udl.cat	6	

Subject's extra information

The subject, common per the four specialties within the degree in Agricultural and Food Engineering, deals with the basic concepts of Statics and Resistance of Materials applied to construction elements and which will then be applied to the respective construction subjects of each specialty.

Requirements: Physics I

Recommendations: check the Virtual Campus regularly

Learning objectives

R1 Assess the suitability of a structural model applicable to a real construction element

R2 Estimate the extreme values of reactions, internal efforts and stresses for sizing and first checks on isostatic beams

R3 Estimate possible deformations in isostatic beams

R4 Evaluate reactions, stresses, internal efforts and deformations in hyperstatic beams

Competences

General competences

The subject will support the achievement of the following general competences:

CG1. Capacity for the prior preparation, conception, drafting and signing of projects that have as their object the construction, reform, repair, conservation, demolition, manufacture, installation, assembly or exploitation of movable or immovable property that by their nature and characteristics are included in the own technique of agricultural and livestock production (facilities or buildings, farms, infrastructure and rural roads), the agri-food industry (extractive, fermentative, dairy, canning, horticultural, meat, fisheries, salting and in general, any other dedicated to the elaboration and / or transformation, conservation, manipulation and distribution of food products) and gardening and landscaping (urban and / or rural green spaces -parks, gardens, nurseries, urban trees, etc.-, public or private sports facilities and environments undergoing landscape recovery).

CG2. Ability to direct the execution of the works subject to projects related to agri-food industries, farms and green spaces and their buildings, infrastructure and facilities, the prevention of risks associated with this execution and the management of multidisciplinary teams and human resources management, in accordance with deontological criteria.

Specific competences

It will also support knowledge, understanding and use of some principles in:

CEMC7. Rural environment engineering: calculation of structures and construction, hydraulics, engines and machines, electrical engineering, technical projects.

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Subject contents

Block 1

Unit 1. From Static to Construction 1.1.- Identification of “almost” rigid solids in Construction. 1.2.- Constructive functionality: Structural and Non-Structural. 1.3.- Why does the engineer use Statics in the field of Construction ?. 1.4.- Structural Risk. **Unit 2**. Actions in design 2.1.- Identification in constructive elements of possible punctual, distributed, superficial, uniform loads, linearly distributed, bending moments, action resulting from constraints. 2.2.- Distribution of loads under construction 2.3.- Estimation of actions, characteristic values and calculation. **Unit 3**. Structural model 3.1.- Structural model: directrix, load and joints. Constructive examples. 3.2.-Isostaticity and hyperstaticity. 3.3- Identification of basic structural models in Construction. 3.4.- Constructive importance of the plane structural system. **Unit 4**. Isostatic beams. Reactions and internal efforts 4.1.- Flowchart in the structural analysis of isostatic beams. 4.2.- Agreements and premises. 4.3.-Estimation of reactions in beam supports. 4.4.- Principle of Saint-Venant. Estimation of internal efforts in isostatic beams: bending moment, axial stress, shear stress. Diagrams of efforts. Some constructive solutions according to distribution of internal efforts. **Unit 5**. Stresses in sections 5.1.- Local effect (zones D, discontinuities) and general (zones B) of the actions in beams. Principles applicable in areas B (Navier-Bernouilli). Slice analysis in zones B and extension of the analysis to the structure. 5.2.-Theoretical mechanical model of the material. Real mechanical responses of structural materials. 5.3.- Stress distribution for the different internal efforts in sections with symmetry axes. Mechanical characteristics of section. Asymmetric sections. Analysis of commercial prospects. 5.4.- Combined effects. Principal stresses

Block 2

Unit 6. Deformations in beams 6.1.- Slice deformation: shortening / lengthening, curvature and shear. 6.2.- Effects on the whole beam. Statement of the elastic deformation and resolution curve. 6.3.- Theorems derived from the geometric analysis of deformation (Mohr, Bresse). 6.4.- Introduction to energy theorems. 6.5.- Analysis of the deformation in beams. **Unit 7**. Introduction to hyperstatic beams 7.1.- Examples and constructive advantages of hyperstatic systems. 7.2.- Uncertainty of hyperstatic systems in the face of certain assumptions and execution gaps. 7.3.- Flow diagram in the estimation of efforts of some hyperstatic systems. 7.4.- Analysis by releasing constraints, by sections, approach to the linear equation system. Reference to some procedures for the resolution (Cross, Kani, matrix resolution ...). **Unit 8**. Cables 8.1.- Trace, arrow, reactions and efforts of cables with punctual loads 8.2.- Trace, arrow, reactions and efforts of cables with uniformly distributed load.

Development plan

1st exam: from lesson 1 to 5

2nd exam: from lesson 6 to 8

The on site exam will be conditioned by health regulations.

Evaluation

Formal correction, good writing, clarity, order and spelling are required in exams. The presence of some fundamental misconception, order of magnitude or contradiction may be sufficient cause for an exam to be classified as suspense. The mathematical expressions will have to be written correctly and the numerical results will be accompanied by units of measurement. There will be two exams with a value of 50% of the global mark each, being able to compensate one exam with the other provided that a minimum result of 4.0 of the exam to be compensated is reached.

Bibliography

Considering the great amount of bibliography, the interesting keywords to be able to carry out the bibliographic search both in the resources of the Library and in the network would be: Statics, Strength of Materials, Theory of Structures, Structural Analysis, Construction. It may be interesting to consult structural regulations, which will be provided in the Virtual Campus, and which is also available in internet. All AENOR regulations are also available in the Dades Base / AENOR resource in the Library.