



**TECHNICAL UNIVERSITY**  
OF CLUJ-NAPOCA, ROMANIA

**SYLLABUS**

**1. Data about the program of study**

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Faculty of Civil Engineering
1.3	Department	Civil Constructions and Management
1.4	Field of study	Civil Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	CCIA English/Engineer
1.7	Form of education	Full time
1.8	Subject code	59.20

**2. Data about the subject**

2.1	Subject name	Agricultural Structures									
2.2	Subject area	Civil Engineering									
2.3	Course responsible/lecturer	Ruxandra DÂRMON									
2.4	Teachers in charge of seminars	Ruxandra DÂRMON									
2.5	Year of study	IV	2.6	Semester	2	2.7	Assessment	Exam	2.8	Subject category	DID/DOP

**3. Estimated total time**

3.1	Number of hours per week	3	3.2	of which, course:	2	3.3	applications:	1
3.4	Total hours in the curriculum	42	3.5	of which, course:	28	3.6	applications:	14
Individual study								hours
Manual, lecture material and notes, bibliography								14
Supplementary study in the library, online and in the field								14
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								28
Tutoring								2
Exams and tests								4
Other activities								-
3.7	Total hours of individual study	62						
3.8	Total hours per semester	104						
3.9	Number of credit points	4						

**4. Pre-requisites (where appropriate)**

4.1	Curriculum	Reinforced and Prestressed Concrete, Steel Constructions
4.2	Competence	-

**5. Requirements (where appropriate)**

5.1	For the course	Not applicable
5.2	For the applications	Not applicable



## 6. Specific competences

Professional competences	<p>Theoretical knowledge:</p> <ul style="list-style-type: none"> <li>To know the normal performance for designing general plans of farm buildings;</li> <li>To know the performance criteria for the design of agricultural buildings;</li> <li>To meet performance requirements standardized construction of livestock;</li> <li>To meet the performance requirements of standardized production plant construction;</li> <li>To know the types of structural systems of livestock buildings;</li> <li>To know the types of structural building systems for vegetable production;</li> <li>To know the specific performance requirements of the enclosure of livestock buildings;</li> </ul> <p>After completing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>- produce floor plans and cross sections correlated with technologies of livestock buildings and maintenance of bio factors;</li> <li>- determine the type of structure functions properly with the livestock building functionality and technology;</li> <li>- design closure elements correlated with the protection structure and the microclimate;</li> <li>- be calculated in terms of heat engineering closure elements of the building livestock;</li> <li>- able to calculate the energy balance of the building livestock;</li> <li>- prepare a greenhouse design;</li> <li>- decide on measures of corrosion protection of construction elements.</li> </ul>
Cross competences	<p>Presentation of a technical report incorporating the specifically bio-tech elements for agricultural buildings, structural elements and description of the resistance structure. Supporting an oral presentation of the designed construction.</p>

## 7. Discipline objectives (as results from the *key competences gained*)

7.1	General objective	Developing abilities to identify, formulate and solve structural engineering problems
7.2	Specific objectives	Developing abilities to design or check structural and specifically members to fulfil strength, stiffness and stability requirements

## 8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1.	Elements of design theory of agricultural construction: classification, performance criteria, performance targets and specific environmental factors	Lecture with discussions	
2.	The design of general plan of livestock farms correlated with environmental requirements		
3.	Constructions for zootechnical field: performance criteria, indoor and outdoor environmental factors, technologically and specifically functional elements		
4.	Technological and functional elements for housing cattle and swine species		



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5.	Technological and functional elements for housing poultry and equine species				
6.	Structural design of housing constructions: construction systems, schemes and static load calculation features, dimensioning the elements of resistance structure				
7.	Structural systems with load-bearing walls				
8.	Structural framing systems with openings 9-15m				
9.	Structural framing systems span 15- 24m				
10.	Hygrothermal design of agricultural buildings: indoor comfort parameters, specific design problems				
11.	The energetically design of the farms buildings. Constructive details of envelope elements.				
12.	Aggressive environments. Corrosion protection. Basics elements to refurbish the agricultural building envelope.				
13.	Functional elements, environmental factors and resistance structures for greenhouses.				
14.	Functional elements, environmental factors and resistance structures for grains storage and fruit warehouse.				
Bibliography					
<p>Pantel, E., Ioani, A., Popa, A., Nedelcu, M., <i>Strength of Materials. Theory and Problems, Part II</i>, Edit. Napoca Star, 2009.</p> <p>Pantel, E., Ioani, A., Turda., D., Popa A., <i>Lessons of Strength of Materials. Theory and Problems, Part II</i>, Cluj-Napoca, 2004.</p> <p>Gere, J.M, Goodno, B.J., <i>Mechanics of Materials</i>, Eighth edition, Edit. CENGAGE Learning, 2012.</p> <p>Hibbeler, R.C., <i>Mechanics of materials</i>, Eighth edition, Pearson Prentice Hall, 2011.</p> <p>Beer, F. P., Johnston Jr., E.R., DeWolf, J.T., Mazurek, D.F., <i>Mechanics of materials</i>, Sixth edition, McGraw-Hill, 2012.</p> <p>Megson, T.G.H., <i>Structural and stress analysis</i>, Second Edition, Elsevier Butterworth-Heinemann, 2005.</p> <p>da Silva, V. D., <i>Mechanics and strength of materials</i>, Springer-Verlag, 2006.</p> <p>Boresi, A.P., Schmidt, R.J., Sidebottom, O.M., <i>Advanced mechanics of materials</i>, Fifth Edition, John Wiley &amp; Sons, Inc., 1993.</p>					
8.2. Applications/Seminars				Teaching methods	Notes
1.	Study location of farming - livestock and vegetables			Problems solving with discussions	
2.	Designing the floor plan and cross-section for a building within a Farm				
3.	The study of structural resistance system for a livestock building - structural computation and dimensioning of resistance elements				
4.	The energetically design of the building and envelope elements.				
5.	Study location of farming - livestock and vegetables				
6.	Designing the floor plan and cross-section for a building within a farming - livestock or vegetables				



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7.	The energetically design of the building and envelope elements.		
<p><b>Bibliography</b></p> <p>Gere, J.M, Goodno, B.J., <i>Mechanics of Materials</i>, Eighth edition, Edit. CENGAGE Learning, 2012.</p> <p>Pantel, E., Ioani, A., Popa, A., Nedelcu, M., <i>Strength of Materials. Theory and Problems, Part II</i>, Edit. Napoca Star, 2009.</p> <p>Pantel, E., Ioani, A., Turda., D., Popa A., <i>Lessons of Strength of Materials. Theory and Problems, Part II</i>, Cluj-Napoca, 2004.</p> <p>Hibbeler, R.C., <i>Mechanics of materials</i>, Eighth edition, Pearson Prentice Hall, 2011.</p> <p>Beer, F. P., Johnston Jr., E.R., DeWolf, J.T., Mazurek, D.F., <i>Mechanics of materials</i>, Sixth edition, McGraw-Hill, 2012.</p> <p>Ye, J., <i>Structural and stress analysis. Theories, tutorials and examples</i>, Taylor &amp; Francis, 2008.</p> <p>Hartsuijker, C., Welleman, J.W., <i>Engineering mechanics. Volume 2: Stresses, Strains, Displacements</i>, Springer, 2007.</p>			

**9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field**

Acquired skills will be needed for civil engineers who work in design and buildings firms, and are fundamental for those who will follow master and doctoral programmes in the field of Civil Engineering.

**10. Evaluation**

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
Course	5 theory subjects	Written examination	75%
Applications	Project defence	Oral presentation	25%
<b>10.4 Minimum standard of performance</b>			
The minimum grade required to pass the written examination is 5 (five).			
The minimum grade for the project defence is 5 (five).			
The attendance of the application classes is mandatory under the provisions of ECTS Regulation.			

Date:

Course Tenure

Course Instructor

september 2017

Lecturer ,  
*Dr Eng\_MSc Ruxandra DĂRMON*

Lecturer,  
*Dr Eng\_MSc Ruxandra DĂRMON*

Date of approval within department

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Department Manager  
Senior Lecturer,  
Assoc. Prof. *Dr Eng\_Claudiu ACIU*