ROMANIAN ACADEMY
School of Advanced Studies of the Romanian Academy
(SCOSAAR)

SUMMARY OF THE COURSE: "INTRODUCTION TO STUDY OF COMPOSITE MATERIALS"

1. Program data

1.1 Department	Department Engineering, Mechanical and Computer Sciences
1.2 Institution	Romanian Academy
1.3 Field of study	Mechanical Engineering
1.4 Study Cycles	PHD Doctoral study

2. Discipline data

2.1 Name of discipline			Introduction to study of composite materials				
2.2 Titular of course activities			CSI dr. hab Ligia Munteanu				
2.3 Titular of seminar activities			CSI dr. hab Ligia Munteanu				
2.4 Titular of lab activities			-				
2.5 Year of study	1	**2.6 Semester**	2	**2.7 Type of assessment**	E	**2.8 Discipline regime**	DS

3. Estimated total workload (hours per semester of didactic activities)

3.1 Number of hours per week	15	**From which:**			
3.2 cours	9	**3.3 seminar**	3	**3.4 laboratory**	3
3.5 Total hours from the curriculum	210	**From which:**			
3.6 cours	126	**3.7 seminar**	42	**3.8 laboratory**	42
3.9 Number of hours per semester	210				
3.10 Number of credits	15				

4. Course content

1. Properties of composite materials. Reinforcement materials.
2. Continuous fibers. Staple fibers. Particles.
3. Matrices. Metal matrix composites.
4. Elasticity of composite materials. Anisotropic elasticity.
5. Continuous fiber reinforced composite materials.
6. Mechanical models. Built-in fiber model.
7. Micromechanical models for particle-reinforced composites.
8. Micromechanical models for discontinuous fiber composites.
9. Stresses and deformations in multilayer composite structures reinforced with fibers. Directions to request.
10. Constitutive laws for composite materials. Homogenization procedures. Techniques of experimental investigation of the state of tension and deformation.
11. Optimization of structures made of layered composite materials. Damage modeling.
12. Types of discontinuities, methodology for the study of structures with discontinuities made of composites.
13. Fiber-reinforced multilayer composite tubes, non-prestressed tubes subjected to internal pressure.

*E = Examen. C = Colocvium.
**DF = Fundamental Discipline. DS = Specialized Discipline

5. Objectives of the discipline and the specific acquired skills

- 1. The general objective of the discipline: Knowing and understanding the concept of "composite material", acquiring the necessary skills to use the theories, methods, mathematical models and tools specific to the study of composite materials.
- 2. Specific objectives:
- Acquisition of knowledge specific to the study of composite materials: types, definitions, properties.
- The study of mechanical models and constitutive laws, optimization, discontinuities.
- Examples of composite materials

6. References

1. D. Gay, Materiaux composites, Editions Hermes, 1991.
2. S. Vlase, Elastodinamica elementelor finite. Editura Lux Libris, 1996; Mecanică computaţională, Editura Infomarket, 2006; Materiale composite. Metode de calcul. Editura Universităţii Transilvania, 2007.
3. N.D. Stănescu, L.Munteanu, V. Chiroiu, N.Pandrea, Sisteme dinamice. Teorie şi aplicaţii, vol. 1, 2, Editura Academiei, Bucureşti, 2007, 2011.
4. L. Munteanu, St. Donescu, Introduction to Soliton Theory: Applications to Mechanics, Book Series Fundamental Theories of Physics, 143, Kluwer Academic Publish., 2004.
5. M.Mihailescu, V.Chiroiu, Advanced mechanics on shells and intelligent structures, Editura Academiei, Bucureşti, 2004.
6. V.Chiroiu, P.Stiucă, L.Munteanu, St.Donescu, Introducere în nanomecanică, Editura Academiei, Bucureşti, 2005.
7. L.Munteanu, Nanocomposites, Editura Academiei, Bucureşti, 2012

7. Assessment

Activity type	5.1 Evaluation Criterias	5.2 Evaluation methods	5.3 Weight of the final grade
5.4 Cours	Acquired Knowledge	Oral Exam	50%
5.5 Seminar+laborator	Activity	Study cases	50%

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5.6 Minimum performance standard: Knowledge of 80% of the information contained in the course

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Course structure

June 2023 – September 2023 – Didactic activity - Laboratory of Mechanics of Deformable Media, IMSAR

Exam

October 2023

Course owner: Dr. Veturia Chiroiu

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