

Course title: MECHANICS OF COMPOSITE AND ADVANCED MATERIALS	
Course module: Theoretical lectures and practical training	
CFU: 9	SSD: ICAR/08
Lectures (hrs): 50	Tutorials (hrs): 30
TWO-YEAR MASTER DEGREE IN STRUCTURAL AND GEOTECHNICAL ENGINEERING – Year: I or II LAUREA MAGISTRALE IN INGEGNERIA STRUTTURALE E GEOTECNICA – Anno di corso: I or II	
<p>Course objectives: Composite and advanced materials are widely adopted in different field of Engineering and in the last decades there is great interest for these materials in Civil Engineering. Composites are obtained by assembling at least two different materials characterized by specific mechanical properties. The combination of different materials allows to get new materials with specific and interesting features. Advanced materials are characterized by extraordinary performances; Shape Memory Alloys are able to recover their initial configuration after a thermo-mechanical cycle, while Piezoelectric materials are able to convert the mechanical energy in electric energy and vice-versa, useful in many applications such as in the energy harvesting and structural monitoring. The aim of the course is to provide the capacity to model the mechanical response of the composite and advanced materials, allowing the possibility of predicting the behavior of new composites and, eventually, to tailor and design new materials, considering also their nonlinear behavior, including plasticity, visco-plasticity, damage, fracture.</p>	
<p>Course contents: Thermo-mechanics of materials: anisotropy, elastic and plastic deformation, creep and stress relaxation, thermo-elasticity, elements of damage, fracture and fatigue. Theory of Homogenization: concepts and definitions, analytical and numerical homogenization and localization techniques, derivation of overall properties and failure mechanisms in composites.</p>	
Lecturer: ELIO SACCO	
Code: ...	Semester: 1st
Required/expected prior knowledge: Statics, Elasticity, Strength of materials.	
Education method: Lectures with both slides and blackboard; Tutorials and examples of calculations; Seminars.	
<p>Textbooks and learning aids : Nemat-Nasser and Hori, Micromechanics of heterogeneous media, North-Holland, 1999 R. Jones, Mechanics of Composite Materials, Taylor & Francis, 1999 J. Aboudi, Mechanics of Composite Materials, Elsevier Science, 1991 Lecture notes distributed by the teacher</p>	
Assessment: Oral examination.	