

**DRISS**

Course title	Characterization and modeling of light alloys
Scientific Discipline Sector	ING-IND/16
CFU	2
Year	Second
SUMMARY /GOAL	This course will be focused on the main experimental methodologies for the technological characterization of light alloys for automotive/aerospace/biomedical applications.

**Insegnamento n. 47****DRISS**

Course title	Analysis and management of heritage buildings: efficiency and innovative technologies
Scientific Discipline Sector	ICAR/10 – ICAR/12
CFU	1 ICAR/10
Year	Second
SUMMARY /GOAL	<p>This course will explore the concepts of efficiency in historic buildings, highlighting the role of innovative technologies in improving building performance from building decarbonization perspective.</p> <p>Furthermore the module provides a general overview of the methodological workflow supporting the assessment and control of performances, risk vulnerabilities and pathologies in traditional and modern heritage buildings, with specific focus toward onsite non-destructive survey, diagnostics and monitoring techniques, as well as emerging solutions for data processing and management. In detail, theoretical contents, experimental applications and international research experiences and studies will address the following specific topics:</p> <ul style="list-style-type: none"><li>▪ The diagnostic process: conceptual, operational and normative framework;</li><li>▪ Onsite investigation of masonry, reinforced concrete and timber building components: methods, techniques and operation protocols;</li><li>▪ Digital 2D/3D reality-based models for decay mapping and monitoring, multi-spectral imaging and multi-sensory data collection: research trends and relevant application.</li></ul> <p>Collaborative virtual platforms for data collection, analysis and management: WebGIS, BIM, VR/AR.</p>

**DRIG**

Course title	Advanced Additive Manufacturing and Reverse Engineering design and processes for the twin transition
Scientific Discipline Sector	ING-IND/16
CFU	2
Year	First
<b>SUMMARY /GOAL</b>	<p>The course aim to provides PhD students with the knowledge about advanced Additive Manufacturing (AM) and Reverse Engineering (RE) processes mainly for new Repairing/Remanufacturing more sustainable solutions in circular industrial economy. In fact, the new Additive Manufacturing methods offer the best value-added, resource-efficient approach to end-of-life product recovery. The course project will be articulated in different topics: 1. Direct Energy Deposition (DED) solutions for repair and life extension. Among DED processes, Laser Powder Metal Deposition will be analysed in more detail because of its enormous capabilities, flexibility and efficiency.</p>

**DRIEI**

Course title	Rehabilitation Engineering
Scientific Discipline Sector	ING-INF/06
CFU	2
Year	First
SUMMARY /GOAL	<p>The course aims to provide students with basic knowledge on design principles and methodologies, grounded in the scientific studies, on technologies for rehabilitation bioengineering, including wearable sensors, rehabilitation and assistive robotic systems, e-health applications.</p>

**DRIEI**

Course title	Matlab recipes for measurement signal processing
Scientific Discipline Sector	ING-INF/07
CFU	2
Year	Second
SUMMARY /GOAL	<p>The aim of the course is to present, with a “hands on” approach, a number of useful techniques to acquire and process measurement data, with actual implementation in Matlab.</p> <p>The programme of the course is intended to be adjusted on-the-fly, according to the actual background of the students (in order to avoid too simple or too advanced topics), and to meet actual topics of interest for their Ph.D. work.</p>

**DCMCEI**

Course title	Innovative evaluation techniques to support the implementation and management of civil constructions
Scientific Discipline Sector	ICAR/22
CFU	2
Year	Second
SUMMARY /GOAL	<p>The course aims to provide an essential overview of the main evaluation techniques to support decisions in local interventions, also with reference to public-private partnership models.</p> <p>Contents in summary form:</p> <ul style="list-style-type: none"> <li>– Estimate and innovative tools for the construction of civil works;</li> <li>– Financial analysis and economic analysis (ACB) for the evaluation of investments and the estimate of the impact on the community;</li> <li>– Multi-Criteria Decision Analysis (MCDA) to support decisions in complex contexts: the construction of multidimensional indicators for the implementation and management of civil works.</li> </ul>

**CTI**

<b>Course title</b>	Theories and methods in structural design: modeling and experimental issues
<b>Scientific Discipline Sector</b>	SSD: ICAR/08
<b>CFU</b>	2
<b>Year</b>	First
<b>SUMMARY /GOAL</b>	<p>The shape of masonry constructions and the influence of the curvature in the load bearing capacity of arches, domes and vaults. Seismic actions and masonry constructions. Mechanical behavior of masonry: heterogeneity, different behavior in tension / compression, non-linear mechanical response, anisotropy, failure modes, damage. Modeling strategies: micromechanical models, FEM and DEM implementation of micromechanical models, macro-mechanical models, multiscale models, NT (No-Tension) and RNT (Rigid No Tension) models, macro-elements. Limit Analysis: static and kinematic approaches. From the static approach of Limit Analysis to the relation between shape and structures in masonry arches and vaults (and back to graphic statics).</p>

**DRISA**

<b>Course title</b>	Identification and propagation of optical photons in different media
<b>Scientific Discipline Sector</b>	FIS/01
<b>CFU</b>	2
<b>Year</b>	Second
<b>SUMMARY /GOAL</b>	<p>The course aims to provide the student with advanced knowledge of radiation measurements and detection techniques, from classic scintillation detectors to Silicon Photomultiplier devices. Scintillator materials are widely used in particle physics for ion identification and energy measurements. Next-generation space missions will employ plastic scintillator detectors (PSDs) equipped with the new Silicon Photomultipliers (SiPMs) technology to read out the scintillator light emission. Scintillator based detectors are also widely used for radiation monitoring for environmental or industrial purposes. The course requires an elementary background in radiation measurements, radiation-matter interactions and basic electronics.</p>



**DRISA**

<b>Course title</b>	Introduction to space flights
<b>Scientific Discipline Sector</b>	ING-IND/05 – ING-IND/35
<b>CFU</b>	2
<b>Year</b>	Second
<b>SUMMARY /GOAL</b>	<p>The purpose of this class is to provide students with a wide range of topics relevant to specific aspects of spaceflight. The class will be integrated with on spot lectures by astronauts, industry/agency representatives who will provide an overview of their experience, functional to the class objectives.</p>

**DRISA**

Course title	Space Logistics
Scientific Discipline Sector	ING- IND/35
CFU	2
Year	Second
SUMMARY /GOAL	<p>The aim of the course is to provide comprehensive introductory knowledge about the theory, practice, and advanced ideas of implementing space system design to guarantee operability and supportability, and on the management of the flow of materials, technologies, services, and information needed throughout a space system lifecycle.</p>

DRIME

Course title	CONSERVATION LAWS IN CONTINUUM MECHANICS AND TRAFFIC MODELING
Scientific Discipline Sector	MAT/05
CFU	2
Year	First
SUMMARY /GOAL	<p>Euler and Burgers equations. The Method of Characteristics. Shock waves. Rankine-Hugoniot conditions. Entropy weak solutions. Oleinik Estimate. Riemann Problem. Vanishing Viscosity. Viscous shock waves. Convergence and error estimate. Legendre Trasform. Lax-Oleinik Formula. Fluidodynamic models for vehicular traffic. LWR model: shock and rarefaction waves. Moving bottleneck. Nonlocal models. Aw-Rascle model. Two phase models. Multi-population models. Traffic on networks: shocks generated by the junctions. Nonlinear elasticity. Gas dynamics. The <math>\rho p</math>-system. Shock waves. Riemann invariants.</p>

**Insegnamento n. 165**

Course title	Gender studies
Scientific Discipline Sector	ING-IND/35
CFU	2
Year	First
SUMMARY /GOAL	<p>The course aims to provide students with the theoretical and operational tools to understand the concept of gender in its historical evolution and in its social, political and economic implications. At the end of the course the students and teachers will have acquired knowledge regarding feminist theories, women's studies, men's and masculinity studies relating to the social construction of male and female identities, and will be able to identify and critically analyse the different factors that contribute to generate any inequality and discrimination based on gender.</p>