Syllabus

Descrizione corso

Titolo insegnamento	Fondamenti di Costruzione di Macchine
Codice insegnamento	42178
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	IIND-03/A
Lingua	Tedesco
Corso di Studio	Corso di laurea in Ingegneria Industriale Meccanica
Altri Corsi di Studio (mutuati)	
Docenti	prof. Franco Concli, Franco.Concli@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/34279
Assistente	
Semestre	Primo semestre
Anno/i di corso	3
CFU	6
Ore didattica frontale	36
Ore di laboratorio	24
Ore di studio individuale	90
Ore di ricevimento previste	18
Sintesi contenuti	The course aims to provide the tools and methods used in structural safe design of components present in any mechanical system. - Equilibrium of complex structures - Stresses and strains, stress intensification (Kt) - Material characterization - Constitutive law - Traction test - Von Mises equivalent stress - Fatigue - Wöhler diagram, Multiaxial fatigue criteria.
Argomenti	- Fundamentals of machine component design: general concepts

dell'insegnamento	about machine element damaging and failure. - Stress and strain field definitions: tensors and Mohr's circle description. Elastic constitutive relations: Hooke's Laws. Elasto-plastic behavior of ductile materials under simple loading conditions. - Static mechanical behavior of materials and their assessment through the tensile test. - Static design criteria: definition of equivalent, limit and admissible stresses. Meaning and use of the safety factor. Failure criteria for ductile and brittle materials. Comparison among the principal failure criteria. - High-Cycle fatigue criteria: General description of cyclic loading and fatigue damage. Laboratory tests for materials fatigue assessment. Factors that affect fatigue behavior of materials and machine elements. Fatigue curves. Fatigue failure theories and design criteria. - Cumulative damage: Palmgreen-Miner, Coffin-Manson damage rules. - Exercises on actual design case studies.
Parole chiave	Machine Elements
Prerequisiti	
Insegnamenti propedeutici	
Modalità di insegnamento	Frontal lectures, exercises (Exercises, case studies and computer lab), excursions.
Obbligo di frequenza	Required.
Obiettivi formativi specifici e risultati di apprendimento attesi	Criteria for strength assessment are addressed, under static and time-varying loading conditions. The most common and widely used mechanical components are then analyzed. Modern software for structural design and analysis is introduced and used, to address some actual case studies. Intended Learning Outcomes (ILO): By the end of the course, students should be able to: Knowledge and understanding 1. Handle the analysis methods used in structural design of mechanical systems. Applying knowledge and understanding 2. Know how to face a new project of a mechanical system

	starting from its functional design. Making judgements 3. Identify the critical zones and the corresponding stress states of all components of a mechanical system, under service loading conditions. 4. Choose the geometry and materials able to satisfy the requirements of each component in terms of strength, deformation, fatigue life, and so on and realizing the technical drawing of the system. Communication skills 5. Oral communication skills (technical language) Ability to learn 6. Ability to autonomously extend the knowledge acquired during the study course by reading and understanding.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	- Summative assessment: 50% written exam, exercises: 3/4 exercises (2.5 hours); ILOS assessed: 2, 3, 4; 50% oral exam, theory: open-ended questions - Theoretical knowledge (40%) - Ability to provide examples/applications of the theoretical concepts (30%) - Ability to establish relationships between topics (20%) - Mastery of language (also with respect to teaching language) (10%) ILOs assessed: 1, 5, 6.
Criteri di valutazione	The final mark will be obtained combining the evaluations of the final written test and of the oral examination.
Bibliografia obbligatoria	Lecture notes and documents for exercise will be available on the OLE.
Bibliografia facoltativa	ISSLER L., RUOß H: HÄFELE P., Festigkeitslehre – Grundlagen, Springer (GER) BERNASCONI A., FILIPPINI M., GIGLIO M., LO CONTE A., PETRONE G., SANGIRARDI M., Fondamenti di costruzione di macchine, McGraw-Hill (ITA)

	+ DAVOLI P., VERGANI L., BERETTA S., GUAGLIANO M., BARAGETTI S., Costruzione di macchine 1, McGraw-Hill (ITA) Shigley's Mechanical Engineering Design, McGraw-Hill (ENG)
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Innovazione e infrastrutture, Istruzione di qualità