# Syllabus

## *Syllabus*

| | |
|---|---|
| **Titul dl curs** | Fondamenti di Costruzione di Macchine |
| **Codesc dl curs** | 42178 |
| **Titul suplementar** | |
| **SSD** | IIND-03/A |
| **Lingaz** | Tedesco |
| **Curs de laurea** | Corso di laurea in Ingegneria Industriale Meccanica |
| **D'autri cursc de laurea (cursc deberieda)** | |
| **Dozenc** | prof. Franco Concli,<br>Franco.Concli@unibz.it<br>https://www.unibz.it/en/faculties/engineering/academic-staff/person/34279 |
| **Assistent didatich** | |
| **Semester** | Primo semestre |
| **Ann/Agn de stude** | 3 |
| **Credic universitars** | 6 |
| **Ores de ensegnament** | 36 |
| **Ores de laboratore** | 24 |
| **Ores de stude individual** | 90 |
| **Ores de receviment prevedudes** | 18 |
| **Ressumé di contegnus** | The course aims to provide the tools and methods used in structural safe design of components present in any mechanical system.<br>- Equilibrium of complex structures<br>- Stresses and strains, stress intensification (Kt)<br>- Material characterization - Constitutive law - Traction test<br>- Von Mises equivalent stress<br>- Fatigue - Wöhler diagram, Multiaxial fatigue criteria. |
| **Argomenc dl curs** | - Fundamentals of machine component design: general concepts |

| | |
|---|---|
| | about machine element damaging and failure.<br>- 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.<br>- Static mechanical behavior of materials and their assessment through the tensile test.<br>- 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.<br>- 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.<br>- Cumulative damage: Palmgreen-Miner, Coffin-Manson damage rules.<br><br>- Exercises on actual design case studies. |
| **Paroles clef** | Machine Elements |
| **Prerecuisic aconsiés** | |
| **Cursc propedeutics** | |
| **Modalité de ensegnament** | Frontal lectures, exercises (Exercises, case studies and computer lab), excursions. |
| **Oblianza de frecuenza** | Required. |
| **Obietifs formatifs y competenzes da arjonje** | 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.<br>Intended Learning Outcomes (ILO):<br>By the end of the course, students should be able to:<br>Knowledge and understanding<br>1. Handle the analysis methods used in structural design of mechanical systems.<br>Applying knowledge and understanding<br>2. Know how to face a new project of a mechanical system |

| | |
|---|---|
| | starting from its functional design.<br>Making judgements<br>3. Identify the critical zones and the corresponding stress states of all components of a mechanical system, under service loading conditions.<br>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.<br>Communication skills<br>5. Oral communication skills (technical language)<br>Ability to learn<br>6. Ability to autonomously extend the knowledge acquired during the study course by reading and understanding. |
| **Obietifs formatifs y competenzes da arjonje (informazions suplementares)** | |
| **Sort de ejam** | - Summative assessment:<br>50% written exam, exercises: 3/4 exercises (2.5 hours); ILOS assessed: 2, 3, 4;<br>50% oral exam, theory: open-ended questions<br>- Theoretical knowledge (40%)<br>- Ability to provide examples/applications of the theoretical concepts (30%)<br>- Ability to establish relationships between topics (20%)<br>- Mastery of language (also with respect to teaching language) (10%)<br>ILOs assessed: 1, 5, 6. |
| **Criters de valutazion** | The final mark will be obtained combining the evaluations of the final written test and of the oral examination. |
| **Bibliografia obligatora** | Lecture notes and documents for exercise will be available on the OLE. |
| **Bibliografia aconsieda** | ISSLER L., RUOß H: HÄFELE P., Festigkeitslehre – Grundlagen, Springer (GER)<br><br>BERNASCONI A., FILIPPINI M., GIGLIO M., LO CONTE A., PETRONE G., SANGIRARDI M., Fondamenti di costruzione di |

| | |
|---|---|
| | macchine, McGraw-Hill (ITA)<br><br>+<br><br>DAVOLI P., VERGANI L., BERETTA S., GUAGLIANO M., BARAGETTI S., Costruzione di macchine 1, McGraw-Hill (ITA)<br><br>Shigley's Mechanical Engineering Design, McGraw-Hill (ENG) |
| **Deplù informazions** | |
| **OSS** | Innovazione e infrastrutture, Istruzione di qualità |