

FACULTY OF **ENGINEERING**

DEGREE COURSE: **INDUSTRIAL ENGINEERING**

MASTER DEGREE: **INDUSTRIAL ENGINEERING / ENERGY**

SUBJECT: MECHANICAL DESIGN

LECTURER: EDOARDO MANCINI

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OBJECTIVES

- Acquire the principles and basic methodologies that are used in the modern engineering for structural and functional design and verification of the machines
 - Acquire autonomous design capabilities of high performance components, especially under hard conditions of use
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CONTENTS

- Basics of Structural Analysis and Machine Component Design
 - Stress Theory of Failure (Rankine's, Tresca-Guest's and Huber-Von Mises-Henkey's theories)
 - Relation Between Stress and Strain (elastic and plastic stress-strain relationships)
 - Load Spectra and stress histories
 - Creep
 - Low-Cycle Fatigue
 - Linear Elastic Fracture Mechanics
 - Crack Growth Analysis
 - Axisymmetric Structures (Disks, Tank and Tubes)
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LEARNING OUTCOMES

- At the end of the course the students will have acquired the knowledge necessary for testing and designing in the field of mechanical design
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ASSESSMENT

Written exam: multiple choice tests and open-ended questions

RECOMMENDED TEXTBOOKS

Preliminary Knowledge of Structural Analysis and Machine Component Design is recommended

J.A. Collins, "*Failure of Materials in Mechanical Design*", Ed. John Wiley & Sons

J.F. Shigley, "*Mechanical Engineering Design*", 9^{ed}: R.G. Budynas and J. K. Nisbett, McGraw-Hill

David Broek, "*The Practical use of Fracture Mechanics*", Ed. Kluwer Academic Publishers

