

FACULTY OF **ENGINEERING**

DEGREE COURSE: **INDUSTRIAL ENGINEERING**

MASTER DEGREE: **INDUSTRIAL ENGINEERING / DESIGN**

**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
- Provide autonomous design capabilities of components with high performance and under hard conditions of use

## **CONTENTS**

- Basic 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)

## **LEARNING OUTCOMES**

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

## **ASSESSMENT**

Written exam: multiple choice and open questions

## **RECOMMENDED TEXTBOOKS**

- is recommended a knowledge of Structural Analysis and Machine Component Design

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