ACADEMIC YEAR: 2019-2020			
COURSE: Machine Design II			
TYPE OF EDUCATIONAL ACTIVITY: Characterizing			
TEACHER: Katia Genovese			
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phone: +39-0971-205019 (office)/5013 (lab)		mobile (optional);	
Language: Italian			
ECTS: 9	n. of hours: 81 50 theoretical lessons 31 tutorials	Campus: Dept./School: School of Engineering Master Program: Mechanical Engineering	Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course of Machine Design II provides the fundamentals for the mechanical design of components and machines with an introduction to the finite element method and its applications to engineering problems.
The student will learn about:

- Engineering criteria and design methods for material and component selection.
- Fundamental approaches to stress and fatigue analysis and failure prevention for machine components.
- The Finite Element Method.

The course aims to provide the student with the following skills:

- Ability to identify, formulate and solve a mechanical structural problem.
- Ability to design a component as a part of a complex mechanical system.
- Perform a basic stress analysis with a FE commercial software.

The student should enlarge his/her knowledge on the course topics by obtaining further insights through autonomous documentation and he/she should demonstrate correctness of technical speech.

PRE-REQUIREMENTS

Some topics covered by the courses of Machine Design I and Strength of Materials are considered as course prerequisites as following:

- Strength of materials: main concepts and test standards.
- Methodologies for static and fatigue strength evaluation.

SYLLABUS

Design and selection of machine elements.
Nomenclature of the main mechanical components. Kinematic schemes. Design of shafts. Selection of rolling-element bearings. Design of gears. Threaded fasteners and design of bolted joints. Desing of a flange coupling. Design of soldered joints. Keyed joints. Spline joints. Springs. Clutches.

Fundamentals of Finite Element Analysis.
The Finite Element Method. Main steps in a FE analysis of a structural problem: creating geometry, defining material, creating mesh, applying loads and constraints, solving and data postprocessing.

TEACHING METHODS

Lectures and tutorials. Some lab hours will be devoted to the use of software for FE-based analyses.

EVALUATON METHODS

Student learning assessment is done through a written and an oral examination. The exam is representative of the course content and objectives. The written test consists in the design of a mechanical system. It is possible to use a single formulary. The use of PC and smart-phones is not allowed during the test. Written test duration is three hours. The student can postpone the oral examination to the next exam session.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

Lecture notes and supplemental material is made available in a shared folder.

Reference books:

R. Giovannozzi. *Costruzione di Macchine*, Voll.1-2, Patron editore, Bologna.
R.G. Budynas, J.K. Nisbett. *Shigley, Progetto e Costruzione di Macchine*, McGraw Hill Education, Milano.
R.C. Juvinall, K. M. Marshek. *Fondamenti della progettazione dei componenti delle macchine,* Edizioni ETS, Pisa, 2001.
SKF, *I cuscinetti volventi*, Catalogo tecnico.

INTERACTION WITH STUDENTS

During the first lecture, the main aims and the program of the course will be illustrated. The student will be informed about teacher's email address and telephone number as well as about the office hours. Lecture notes and supplemental material will be made available in a shared folder. The teacher will be available for questions and discussion at the end of each lesson. Office hours is Tuesday 12:30-13:30 (office - 5th floor or laboratory - 1st floor).

EXAMINATION SESSIONS (FORECAST)[1]

A final examination comprehending a written and an oral session will be scheduled bimonthly starting form January. The dates will be published on the ESSE3 system as soon as available.

SEMINARS BY EXTERNAL EXPERTS YES □ NO □

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.