



MECA1821 Machine design.

[30h+30h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s): Bruno de Meester de Betzenbroeck, Benoît Raucent
Language: French
Level: First cycle

Aims

Introduce students to basic conceptual notions of machines: functional analysis of machines and their components, properties of use of components, selection of materials, basic dimensioning.

Main themes

- Functional analysis of machines and their components
- Properties of component use
- Elements of calculus of machine components.

Content and teaching methods

First part : functional analysis of machines and their components

- Functional requirements (Specification conditions)
- Principal functions of components (actuation, bearing systems , transmission, #)
- Origin of loads

Second part : properties of component use

- Geometric characteristics
- Tolerances and adjustments, shape tolerances, surface conditions, roughness and scale effects
- Residual stresses

Third part : elements of calculus of machine components

- Dimensioning in relation to elastic limits: calculus criteria, stress concentration, effects of residual stress, safety factors
- Fatigue: dimensioning, calculus methods, residual stress effects
- Current elements calculus

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisite :

Basics of material resistance and technical drawing

Teaching method :

Parts 1 and 3 are taught via PBL (Problem-Based Learning), followed by synthesizing lectures. Part 2 is taught via lecture courses followed by labs and PBL.

References :

- For Part 1 : N.Cross, Engineering Design Methods, J. Wiley Sons, 1991.
- For Parts 2 and 3 : B; de Meester. Machine design : course notes
- For Part 3 : RC. Juvinall and KM Marshek, Fundamentals of Machine Component Design, Wiley and Sons.

Books can be borrowed from the Science Library.

Grading criteria :

The evaluation is based on work throughout the year (labs and PBL) and on an oral exam session. It includes:

- solving a problem (open book)
- answering a theoretical question

Other credits in programs

ELME22/E	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(5 credits)	
ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)	Mandatory
FSA12BA	Deuxième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)	
FSA13BA	Troisième année de bachelier en sciences de l'ingénieur, orientation ingénieur civil	(5 credits)	
MAP22	Deuxième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(5 credits)	
MATR23	Troisième année du programme conduisant au grade d'ingénieur civil en science des matériaux	(5 credits)	