Faculty of Applied Sciences

MECA2821   Design of machinery.

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

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

Aims

Introduce students to basic conceptional 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. Wilyord 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)	Mandatory
ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)	Mandatory
ELME23/E	Troisième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(5 credits)	
MECA21	Première année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	Mandatory
MECA22	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	