## Faculty of Applied Sciences

## 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 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

**FSA12BA**           Deuxième année de bachelier en sciences de l'ingénieur,           (5 credits)
                      orientation ingénieur civil