



# Faculté des sciences appliquées

**FSA**

MECA2821 **Conception des machines**

[30h+30h exercices] 5 credits

This course is taught in the 1st semester

**Teacher(s):** Bruno de Meester de Betzenbroeck, Benoît Raucent  
**Language:** french  
**Level:** 2nd cycle course

## 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. Wiley and 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**

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|-----------------|--|-------------|-----------|
| <b>ELME21/M</b> | Première année du programme conduisant au grade d'ingénieur (5 credits)<br>civil électro-mécanicien (mécatronique) |             |           |
| <b>ELME22/E</b> | Deuxième année du programme conduisant au grade<br>d'ingénieur civil électro-mécanicien (énergie)                  | (5 credits) | Mandatory |
| <b>ELME22/M</b> | Deuxième année du programme conduisant au grade<br>d'ingénieur civil électro-mécanicien (mécatronique)             | (5 credits) | Mandatory |
| <b>MECA21</b>   | Première année du programme conduisant au grade d'ingénieur (5 credits)<br>civil mécanicien                        |             | Mandatory |