UCL Université catholique de Louvain

LMECA2330

2014-2015

Machine components

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Delannay Laurent ; Raucent Benoît ; Ronsse Renaud ; Servais Thomas (compensates Raucent Benoît) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA2330
Main themes :	-- Basics of dimensioning. -- Dimensioning criteria (static and dynamic strength, deformation, wear, corrosion, ...) -- Description and modelling of machine components.
Aims :	Eu égard au référentiel AA du programme « Master ingénieur civil mécaniciens », ce cours contribue au développement, à l'acquisition et à l'évaluation des acquis d'apprentissage suivants : -- AA1.1, AA1.2, AA1.3 -- AA2.4, AA2.5 -- AA3.1, AA3.2, AA3.3 -- AA4.1, AA4.2, AA4.3, AA4.4 -- AA5.2, AA5.3, AA5.5, AA5.6 -- AA6.1, AA6.3 More precisely, at the end of this course the students will be able to: a. Disciplinary learning outcomes ' Explain the kinematics of the assembly when the machine is in use: o Identify the components of a machine on a technical drawing and explain how they are assembled; o Explain the main characteristics and the role of each component o Make a schematic representation, ' Estimate the required power for a given duty ' Estimate the distribution of mechanical loads throughout the assembly; ' Design of classical machine members such as springs, power screws, threatened fastener, bearings, gears, shaft, belts, brakes, clutches etc..: o Estimate the deformation and the stresses inside each component, o Identify potential failure modes, o Determine the minimum dimensions of the component based on the material properties and the expected loads; ' Rigorously motivate the selected design procedure and the expected accuracy; ' Make general drawing of the machine b. Transverse learning outcomes ' Formulate simplifying assumptions allowing a fair representation of and a rapid approximate answer to an engineering problem; ' Justify the choices made in the process of the solution; ' Draw the link between theory and application; ' Acquire ingenuity and imagination to solve engineering problems *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*

Evaluation methods :	The final mark is obtained as following : A first problem-based learning project has to be completed by groups of 4-5 students, to apply the theoretical concepts to a concrete example. The mark obtained in this project will count for 20% of the final mark. A second problem-based learning project has to be completed by groups of 4-5 students, to apply the theoretical concepts to a concrete example. The mark obtained in this project will count for 20% of the final mark. An intermediate evaluation is organized in March. This evaluation aims at evaluating the individual student's capacities to manage fundamental concepts like the free body diagram, the understanding of technical drawings, and power equilibrium. If passed, this evaluation counts for 15% of the final mark. If failed, this evaluation does not count but the corresponding topics will be re-evaluated during the final exam. Finally, the students will be individually graded based on the objectives indicated above during the final oral exam. More precisely, the final exam consists of two or three questions being shaped either like (i) a practical case study starting from the technical drawing of a machine and aiming to determine a technologically relevant solution for one or two of its components; or (ii) a theoretical question related to the design of a machine component which was addressed during the semester. The final exam counts for 45% of the final mark, except if the intermediate evaluation was failed. In that case, it counts for 60% of the final mark.
Teaching methods :	Ex-cathedra lectures are given with the aim to explain the fundamentals of machine components design. During these lectures, the students' understanding of theoretical issues is assessed based on simple practical engineering problems Exercises are proposed on a weekly basis allowing the students to practice their skills in machine component design. One or two PBL modules are organized in order to integrate the different aspect of the component design. A visit is organized to a Walloon company in order to illustrate the daily practice of engineers active in this field.
Bibliography :	The main reference book is the book: 'Fundamentals of Machine Component Design' by RC Juvinall and KM Marshek. Lecture slides are provided via iCampus.
Cycle and year of study :	> Master [120] in Mechanical Engineering > Master [120] in Electro-mechanical Engineering
Faculty or entity in charge:	MECA