lmeca2801

2019

UCLouvain

Machine design

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Raucent Benoît ;Servais Thomas (compensates Raucent Benoît) ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Functional analysis of machines and their components Properties of component Elements of calculus of machine components.
Aims	**Specific learning outcomes of the course** · Write functional specifications for a machine · Identify the functionalities of a machine (actuation, bearing systems, transmission, sealing, ') · Estimate the installed and maximum power, the energetic consumption and the efficiency of a machine · Design a simple machine following an adapted methodology · Identify the basic hypotheses of elements dimensioning · Dimensioning following various criteria (yield strength, elastic compliance, fatigue) of usual elements (e.g. shafts) · Dimensioning while taking into account the effect of dynamic loading, stress concentration and residual stresses · Choose machine components (bearing, gasket, transmission) Read and interpret the drawing of an existing machine · Hand drawing of machine components and overall drawings · Placing tolerances for a mechanical system · Machine component design : threaded fastener and power screws, rivet and welding rolling bearing, sliding bearings, clutches and brakes, power transmssion components (gears, belt, chains, etc..), shaft and assocated part (key, pin, coupling, ') In consideration of the reference table AA of the program " Master's degree civil engineer mechanics ", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: AA1.1, AA1.2 AA2.1, AA2.2, AA2.3, AA2.4, AA2.5, AA2.6, AA2.7, AA2.8 AA4.3, AA4.4 AA5.1 - - - - *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	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The students will be evaluated based on the report of the project on tolerances and an exam where theywill have to solve problems and draw part of a machine.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The course are taught by PBL by groups of 6 students. A project on identification of tolerances is also part of the course.
Content	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 various failure criteria : elastic buckling, plastic yielding, fatigue, while accounting for dynamic loads, stress concentration, residual stresses, safety factors
	· Investigated components : threaded fastener and power screws, rivet and welding rolling bearing, sliding bearings, spur gears, helical, bevel and worn gears, clutches and brakes, Power transmssion components (belt, chains,, etc..), shaft and assocated part (key, pin, coupling, ')
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Electro-mechanical Engineering	ELME2M	5		🔍
Master [120] in Mechanical Engineering	MECA2M	5		🔍