UCLouvain

lmeca2355

2019

Mechanical design in biomedical engineering

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)	Kerckhofs Greet ;Vankrunkelsven Ann (compensates Raucent Benoît) ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	The purpose of the course is to initiate students to the design metholodogies involved in biomedical engineering, taking into account the specificities and constraints related to the area of medicine and surgery. The main topics are: • design methods and specificities related to the area of medicine and surgery (identification of medical requirements, risk analysis, etc.) • the constraints intrinsic to the area of medicine and surgery (biocompatibility, sterilization, accuracy and precision, ergonomics and safety, etc.) • the industrial constraints (certification, cost, etc.).
Aims	In consideration of the reference table AA of the program " Master's degree civil engineer mechanics ", this course contributes to the development, the acquisition and the evaluation of the following learning outcomes: • AA1.1, AA1.2, AA1.3 • AA2.1, AA2.3, AA2.4 • AA3.1, AA3.2 • AA4.1, AA4.2, AA4.3, AA4.4 • AA5.1, AA5.3, AA5.4, AA5.5, AA5.6 • AA6.2, AA6.3 1 At the end of the course, students will be able to: • address practical, relevant problems encountered in medicine and surgery, • understand specificities related to the medical/surgical area (e.g. orthopaedics orcardiac surgery) • clarify the medical needs and formulate the technical specifications, • develop a state-of-the-art of existing devices, • design a technical solution that complies with medical constraints, • test the solution with a 3D functional prototype (3D printed, etc.), • communicate findings in an oral presentation and a summary report. - - - - *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.** Evaluation will be based on the project, especially the written report (50%), the oral presentation (30%) and the quality of work done during the semester (20%). An evaluation grid will be given to students.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Teaching includes several sessions and seminars on main topics in the area of medicine and surgery, and a project to design of a new medical/surgical device in collaboration with clinicians.
Content	Design requires both solid methodological knowledge and many experiments in practice. With this in mind, the students will first work on new subjects such as certification, biocompatibility, risk analysis ... Then the students will realizein small groups a project to design a new device including an original thinking on a specific medical issue in collaboration with clinicians. The results of the project will be presented to the audience at the end of semester. The entire project will be realised in collaboration with and using the software tool from Matrix Requirements: https://matrixreq.com/en/

Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=10234
Bibliography	Ouvrage de référence **conseillé (non obligatoire)** et disponible en prêt à la BSE : RC. Juvinall and KM Marshek, Fundamentals of Machine Component Design, Wiley and Sons.
Other infos	There is no prerequisite. This course is open to all who have followed training or not in mechanical or biomedical engineering. It is not necessary to have followed Machine Design LMECA2801 nor Introduction to life science FSAB1221, although these courses are interesting foundations.
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Mechanical Engineering	MECA2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		