UCLouvain

lgbio2071

2021

Tissue Engineering

5.00 credits	30.0 h + 30.0 h	Q2

Teacher(s)	Kerckhofs Greet ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Basic knowledge in biology, as treated in the course LGBIO1111 of the bachelor in civil engineering, and basic knowledge in anatomy and physiology of biological systems, as treated in the course LGBIO1113 of the bachelor in civil engineering, are required.
Main themes	The term 'tissue engineering' was officially coined at a National Science Foundation workshop in 1988 to mean 'the application of principles and methods of engineering and life sciences toward the fundamental understanding of structure-function relationships in normal and pathological tissues and the development of biological substitutes to restore, maintain or improve tissue function'. During this course, the following basic principles of Tissue Engineering will be addressed for regeneration of different tissues (skin, bone, cartilage, etc.) : * cell biology: stem cells, cell harvest, culture, extension and differentiation, ' * biomaterial science: general overview of the different classes of biomaterials, and their specific needs for tissue engineering purposes * bioprocessing technology: bioreactors and bioprocessing, design of biologically effective, yet scalable, devices. * in silico approaches: analytical and computational modeling for tissue engineering applications * preclinical screening and clinical application: animal models, ethical considerations, upscaling, ...
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 At the end of this course, students will be able to: a. Disciplinary Learning Outcomes • Understand the interdisciplinary nature of Tissue Engineering and the need for a close collaboration between engineers, biologists and clinicians. • Describe the basic principles of Tissue Engineering, and understand how they interact with each other. This provides the students with the knowledge and vocabulary necessary for communication with biomedical experts and clinicians. • Evaluate and critically discuss scientific papers specifically related to Tissue Engineering. b. Transversal Learning Outcomes • Search and read a scientific paper with regards to a specific basic principle of tissue engineering, and critically evaluate its main results. • Make a poster of this paper, and present this to your peers by clearly stating the context and providing a critical opinion about the topic.
Evaluation methods	• Open book examination (50% of the final grade) • Projects with written reports and poster (50% of the final grade)
Teaching methods	• Theoretical lectures on the different aspects of tissue engineering (cells, biomaterials, bioreactors, monitoring and control, regulatory aspects, computational modelling, etc.) • Seminars by experts in the field • Project work (in small groups) • Practical sessions in histology and imaging + learning how to work with an electronic labbook
Content	.
Inline resources	https://moodleucl.uclouvain.be/course/view.php?id=12971
Bibliography	Tissue Engineering (second Edition), by Clemens van Blitterswijk and Jan De Boer.
Faculty or entity in charge	GBIO

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Biomedical Engineering	GBIO2M	5		