

5.00 crédits	30.0 h + 30.0 h	Q2
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Enseignants	Kerckhofs Greet ;
Langue d'enseignement	Anglais
Lieu du cours	Louvain-la-Neuve
Préalables	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.
Thèmes abordés	<p>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'.</p> <p>During this course, the following basic principles of Tissue Engineering will be addressed for regeneration of different tissues (skin, bone, cartilage, etc.) :</p> <ul style="list-style-type: none"> <li>* cell biology: stem cells, cell harvest, culture, extension and differentiation, '</li> <li>* biomaterial science: general overview of the different classes of biomaterials, and their specific needs for tissue engineering purposes</li> <li>* bioprocessing technology: bioreactors and bioprocessing, design of biologically effective, yet scalable, devices.</li> <li>* in silico approaches: analytical and computational modeling for tissue engineering applications</li> <li>* preclinical screening and clinical application: animal models, ethical considerations, upscaling, ....</li> </ul>
Acquis d'apprentissage	<p><b>A la fin de cette unité d'enseignement, l'étudiant est capable de :</b></p> <p>At the end of this course, students will be able to:</p> <p>a. Disciplinary Learning Outcomes</p> <ul style="list-style-type: none"> <li>• Understand the interdisciplinary nature of Tissue Engineering and the need for a close collaboration between engineers, biologists and clinicians.</li> <li>• 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.</li> <li>1 • Evaluate and critically discuss scientific papers specifically related to Tissue Engineering.</li> </ul> <p>b. Transversal Learning Outcomes</p> <ul style="list-style-type: none"> <li>• Search and read a scientific paper with regards to a specific basic principle of tissue engineering, and critically evaluate its main results.</li> <li>• 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.</li> </ul>
Modes d'évaluation des acquis des étudiants	<ul style="list-style-type: none"> <li>- Examen à livre ouvert (50% du note final)</li> <li>- Projects avec rapports écrits et poster (50% du note final)</li> </ul>
Méthodes d'enseignement	<ul style="list-style-type: none"> <li>- Cours théorique sur les différents aspects de l'ingénierie tissulaire (cellules, biomatériaux, bioréacteurs, monitoring et contrôle, aspects régulatoires, modélisation computationnelle, etc.)</li> <li>- Séminaires pas des experts</li> <li>- Travail de projet (en petits groupes)</li> <li>- Séances pratiques d'histologie et d'imagerie + apprentissage du travail avec un cahier de laboratoire électronique</li> </ul>
Ressources en ligne	<a href="https://moodleucl.uclouvain.be/course/view.php?id=12971">https://moodleucl.uclouvain.be/course/view.php?id=12971</a>
Bibliographie	Tissue Engineering (second Edition), by Clemens van Blitterswijk and Jan De Boer.

Faculté ou entité en charge:	GBIO
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<b>Programmes / formations proposant cette unité d'enseignement (UE)</b>				
Intitulé du programme	Sigle	Crédits	Prérequis	Acquis d'apprentissage
Master [120] : ingénieur civil biomédical	GBIO2M	5		