T-828-TISS **TISSUE ENGINEERING AND BIOMATERIALS** **8 ECTS**

Year of study: 4th year (1st year MSc).
Semester: Spring.
Level of course: 6. Second cycle, advanced.
Type of course: Elective. *Recommended elective for MSc Biomedical Engineering.*
Prerequisites: Molecular and Cell Biology (T-106-LIFV); Chemistry (T-204-EFNA); Physiology (T-406-LIFE).
Suggested additional prerequisites: Materials Science (T-407-EFNI); Advanced Biomechanics (T-828-BIOM).
Schedule: Runs for 12 weeks – 6 teaching hours a week.
Supervisor: Ólafur Eysteinn Sigurjónsson.
Lecturer: Ólafur Eysteinn Sigurjónsson.

Learning outcomes: At the end of the course, the student will have a basic understanding of tissue engineering, regenerative medicine, cell therapy and stem cell biology. The students should also have basic knowledge of bioreactor systems and the processes it takes to take a tissue engineering product from bench to the clinic

***Knowledge*:** At the end of the course, the student will have knowledge on
- Tissue engineering
- Stem cell biology
- 3D printing of organs
- Use of bioreactor systems in tissue engineering
- Biomaterials
- 3D printing and organoids
-Cell mechanics
-Basic immunology of tissue transplantation
-Cell therapy
-Regulations that are important in tissue engineering and cell therapy for clinical use

***Skills*:** At the end of the course, the student will have skills in:
- Regenerative medicine
-Tissue engineering
-Cell therapy
-Biomaterials
-3D printing of organs
-What forces can affect cell growth and differentiation

***Competence*:** At the end of the course, the student will gain competence on: Basic concepts of tissue engineering, cell therapy and regenerative medicine.

Content: In this course we will look into how tissue engineering and cell therapy will revolutionize how we treat diseases and trauma in the future. We will look into the role of stem cells and stem cell differentiation, how biomaterials can create a 3D environment for tissue building. We will also look into bioreactor systems and the role they play in tissue engineering and how we can use novel approaches such as organs on a chip to understand disease progress and treatment. We will look into 3D printing of organs and whether that could become a key method for organ replacement in the future.

Reading material: To be announced.
Teaching and learning activities: Lectures, discussion groups and practical experiments.
Assessment methods: To be announced.
Language of instruction: English.

All course descriptions may be subject to change. Revised information on the course schedule, reading material, teaching and learning activities, and assessment methods will be introduced in the learning management system Canvas at the beginning of the semester.