

BIOENG-449

**Tissue engineering**

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Cursus	Sem.	Type
Bioengineering	MA2, MA4	Opt.
Life Sciences Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

Tissue engineering is an interdisciplinary field that broadly impacts human health. This course provides students an overview of how engineering approaches can be used to investigate and manipulate cell and tissue functions and enable students to be on the cutting edge of tissue engineering.

**Content***Part A. The biological fundamentals*

Fundamentals in tissue organization and morphogenesis  
Stem cells and adult tissue dynamics  
Model systems in tissue engineering

*Part B. The engineering fundamentals*

Macro-materials for tissue engineering  
Micro-/nano-materials for tissue engineering

*Part C. Specific topics*

Synthetic morphogenesis  
Immune tissue engineering  
Soft tissue engineering  
Tissue engineering bone  
Tissue engineering in urology  
Neural tissue engineering

*Part D*

Presentations of group projects I  
Presentations of group projects II

**Keywords**

tissue engineering, regenerative medicine, stem cell, materials engineering, drug delivery

**Learning Prerequisites****Required courses**

This class requires a basic knowledge in biology, physics, chemistry, and materials science.

**Recommended courses**

BIOEING-399 Immunoengineering  
BIOENG-315 Materials science for bioengineers  
BIOENG-442 Biomaterials

### Teaching methods

Lectures integrated with exercises (group project and presentation)

### Expected student activities

Attending lectures, completing exercises, team project, reading and presenting literature.

### Assessment methods

Group project: 30%  
Final written exam: 70%

### Supervision

Forum                      Yes

### Resources

#### Moodle Link

- <https://moodle.epfl.ch/course/view.php?id=14448>