Aalto University
School of Chemical
Technology

CHEM-E3225, Cell- and Tissue Engineering, 5 cr (2019)

Introduction to Tissue Engineering

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Course requirements – what is expected of you

Workload Total 135 h = 5cr

1. Lectures 16.4., 17.4., 18.4. (TOPICS 1-6)
2. Work on projects in groups of 5 together during 23.4., 24.4. and present your work on 25.4. (Also short lectures on TOPICS 7-9)
3. Seminar – start on 25.4. in groups of 5 to prepare for seminar
4. Seminar day is 7.5. only and presentation, no written work
5. Home exam – questions are available in MyCourses as of 16.4., deadline for returns is 31.5.

Instructions and grading

- Lecture attendance 6 x 1 = 6 points (each lecture on 16.4., 17.4. and 18.4. accounts for 2 points) + 2 extra points for attending all
- Group work 6 x 2 = 12 points
- Seminar = 10 points (see seminar instructions for grading criteria)
- Home Exam: 30 (see home exam instructions for grading criteria)
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- Grading scale (preliminary)
- 55 - 60 = 5
- 49 - 54 = 4
- 40 – 48 = 3
- 31 – 39 = 2
- 22 – 30 = 1
- 21 or below = fail

Instructions and grading

What	Points	Total max
Lecture attendance	6 x 1 point (each session)	6 + 2 for attending all
Group work	6 x 2 = 12 points (each session)	12
Seminar	3-10	10
Exam **Note that points will be deducted for missing the return deadline of 31.5. , 0.5. points per day of delay is deducted,**	6 x 5	30

Learning outcomes:
After the course you can:

1. Describe major classes of human stem cells with potential for use for cell-based and tissue – engineering products
2. Present theory for culturing techniques, growth requirements in vitro and differentiation and generation of pluripotent stem
3. Discuss the interactions of cells and implantable biomaterials
5. Present the culturing of cells in a bioreactor and on different scaffolds
6. Present the challenges in prevention of contamination and aseptic techniques when working with cells in reactors
7. Discuss the product development process and comment on the challenges of bringing products to the market

Lecture topics 16.4. – 18.4.

12-16 KE 4 (so we will cover several topics each day)

16.4. 2019

TOPIC 1: Introduction to Tissue Engineering

TOPIC 2: (Stem) Cells for Tissue engineering (also covers issues related to ECM)

17.4. 2019

TOPIC 3: Selected Cell – ECM (Extra-Cellular Matrix) Interactions with implications for growing cells and tissues

18.4. 2019

TOPIC 4: Culturing (stem) cells for Tissue Engineering

TOPIC 5: Biomaterials (and scaffolds) for Tissue Engineering

18.4. / 23.4. continued if needed

TOPIC 6: Bioreactors for Tissue Engineering

Group work (STUDIO, Design Factory)

23.4 (12.15 – 16.00)
12.15 –12.45 Group work (see instructions for more details)
13.45 – 14.30 TOPIC 7: Bioethics: Questions and issues (Katrina); and TOPIC 8: Health Care products, regulatory and legal
14.30 – 15.30 Continue with Group Work
15.30 – 16.00 Each group presents their progress for the day (5 min each)

24.4. (12.14 – 16:00)
12.15 – 13:30 Continue with Group Work and plan your presentation (summary) for today
13.30. – 13.45 Break
13.45 – 14.30 TOPIC 9: Hypes and Hopes of Tissue Engineering (Katrina)
14.30 – 15.00 Presentations
15.00 – 16.00 Starting to work on mini-seminar for 25.4.

25.4. (9.00 – 12.00) Mini-Seminar day. The preparation for the seminar will start on 24.4.The plan is to have 5 groups with 4 students, but this depends on the final number of participants.

Thursday: 24.4. You will read the paper assigned to you and make a preliminary plan for presenting this on 25.4 You should make 3 power points.

9:00 – 10.45 working on the mini-seminar in groups
10.45– 12.00 10 minute presentations

Cell and Tissue Engineering E-3225: What does this give you ?

1. Lectures

16.4. 12-16
17.4. 12-16
18.4. 12-16

What does this give you (the student) ?

Basics of cells and tissues that you need in order to understand what kinds of cells can be used and how they are used to generate new tissues or organs. Also – background on scaffolds, materials, bioreactors

2. Group work

23.4. 12-16
24.4. 12-16
25.4. 9-12

24.4. Start to prepare for seminar

What does this give you ?

Group work will help you understand the real challenges of applying the theory (from lectures) to real life products and treatments
We will use different ways of practically illustrating the products

Mini-Seminar 25.4.

What does this give to you ?

Critical view of the key issues that regulate the use of Cell and Tissue engineering and products thereof, gives a perspective on the supply chain, the reimbursement, the regulations and risk

5.What do you learn from the course ?

1) A focused view into Cell and Tissue Engineering covering aspects of biology, methods, materials, supports, other technologies needed.
2) An understanding of case examples highlighting challenges of making products
3)Reflecting on questions that arise from the course; allows you to present your learning - not through trying to guess exam questions

4. Home Exam questions availble on 16.4. deadline for return is 31.5. Questions cover 1) Lectures, 2) Reading materials (book see MyCourses), which covers also the lecture topics and the group work and the 5 articles

What are the main goalsof this course ?

- To Learn - what you learn from this course depends on what you give to this course
- To develop skills on working with people from different disciplines
- To give you an in-debth understanding of the key issues in cell and tissue engineering, it will not cover everything