

**Modulbezeichnung:** Technology of Tissue Engineering (TTE) 7.5 ECTS  
(Technology of Tissue Engineering)

Modulverantwortliche/r: Oliver Friedrich, Aldo R. Boccaccini

Lehrende: Aldo R. Boccaccini, Martin Christian Vielreicher, Michael Haug, Oliver Friedrich

Startsemester: SS 2020

Dauer: 1 Semester

Turnus: jährlich (SS)

Präsenzzeit: 75 Std.

Eigenstudium: 150 Std.

Sprache: Englisch

### Lehrveranstaltungen:

Details zu den einzelnen Terminen der Vorlesung sind im StudOn Kurs "Schedule & TOC TTE WPF MA" als Datei abgelegt

Biomaterials for Tissue Engineering (SS 2020, Vorlesung, 2 SWS, Aldo R. Boccaccini et al.)

Technology of Tissue Engineering (SS 2020, Vorlesung, 2 SWS, Oliver Friedrich et al.)

Praktikum zu Technology of Tissue Engineering (SS 2020, Praktikum, 3 SWS, Oliver Friedrich et al.)

### Inhalt:

- High-resolution deep scaffold imaging: 2-photon imaging, Second Harmonic Generation imaging, light sheet imaging, examples from TE using biomaterials
- Top-down TE, decellularization/recellularization - common concepts, challenges, different protocols and chemical processing, optical clearing of bio-scaffolds for 2-photon imaging
- Selected decell-/recell systems: lung, heart, kidney and required bio-reactor technologies
- Challenges in skeletal muscle TE and MyoBio bioreactor technology (related to prac class)

#### Prac class:

- Decellularization of a whole skeletal muscle organ in a custom-engineered bioreactor system with optical and environmental continuous monitoring (MyoBio)

### Lernziele und Kompetenzen:

Students shall

- conceive the relevance of biomaterials in Tissue Engineering and Regenerative Medicine
- be competent to distinguish between the advantages of named biomaterials over others in tissue reconstruction according to the physico-chemical requirements and the cellular seeding prerequisites
- be able to apply the different approaches of bottom-up and top-down TE according to respective research questions and applications in Medicine and Industry
- be able to choose appropriate optical readout and sensor technologies to monitor the maturation and remodelling of scaffolds by seeded/printed cells
- be able to conceptualise bioreactors for tissue maturation according to the target tissue biophysical, physico-chemical and physiological needs
- be able to critically evaluate scientific publications on the lecture topics in the accompanying exercise classes ("Übung") and present study contents and analyses in an oral presentation to the class

### Literatur:

- Boccaccini, et al. (eds.): Tissue engineering using ceramics and polymers; Elsevier Woodhead, Cambridge, 2014
- Polak, Mantalaris, Harding (eds.): Advances in Tissue Engineering; Oxford u.a., 2010
- Hench, Jones (eds.): Biomaterials, artificial organs and tissue engineering; Oxford, 2005
- Reviews on organ decell-/recell, e.g. Scarritt et al. (2015) A review of cellularization strategies for tissue engineering of whole organs. Front Bioeng Biotechnol 3:43

### Studien-/Prüfungsleistungen:

Technology of Tissue Engineering (TechTE) (Prüfungsnummer: 44761)

(englische Bezeichnung: Technology of Tissue Engineering)

Prüfungsleistung, Klausur, Dauer (in Minuten): 120

Anteil an der Berechnung der Modulnote: 66.6666666666667% Prüfungssprache: Deutsch

Erstablingung: SS 2020, 1. Wdh.: WS 2020/2021

1. Prüfer: Boccaccini/Friedrich (T10052)

Praktikum Technology of Tissue Engineering (Prüfungsnummer: 44762)

Prüfungsleistung, Praktikumsleistung

Anteil an der Berechnung der Modulnote: 33.3333333333333%

weitere Erläuterungen:

Unbenotete Studienleistung über Abgabe eines Protokolls.

Prüfungssprache: Deutsch

Erstablingung: SS 2020, 1. Wdh.: WS 2020/2021

1. Prüfer: Oliver Friedrich

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