

# Course Package

## Tissue Engineering

Name module	BNT - Tissue Engineering
Educational programme	MSc Biomedical Engineering
Period	Second quartile of the second semester (Quarter 2B)
Study load	15 ECTS

BNT - Tissue Engineering			
Quarter 1A	Quarter 1B	Quarter 2A	Quarter 2B
			<b>Tissue Engineering</b> (5 EC)
			<b>Clinical Chemistry</b> (5 EC)
			<b>Topics in Human Anatomy &amp; Sports Physiology</b> (5 EC)

Required preliminary knowledge: Fundamental knowledge and concepts from cell biology, biochemistry, chemistry (both inorganic and organic chemistry, standard techniques), biomaterials and cell material interactions. Basic anatomy and physiology. Cell culture and molecular biological laboratory experience is of eminent importance!

### [201600327](#) **Tissue Engineering**

The course 'Tissue Engineering' provides students with both basic knowledge as well as state-of-the-art examples of the field of regenerative medicine and tissue engineering in particular. The course will rely on the text book: Tissue Engineering 2nd edition (ISBN13: 9780124201453), which will be available as a downloadable e-book.

Lectures will detail on cells source (stem cell vs mature cell), extracellular matrix (natural and engineered), Growth factors (tissue formation and controlled release), construct vascularization (methods and approaches), types of tissue engineering (Top-down vs Bottom-up), and advanced enabling technologies (microtechnology and 3D bioprinting). Internationally leading scientist will perform guest lectures on specific topics. For each lecture a set of questions will be provided via which the students can test their grasp of the topic's content. Lectures will take place over a period of 4 weeks. Every other week there is a dedicated opportunity for discussion on the content and questions of the past lectures.

*The modules are tentative and subject to change. Please check [the website](#) regularly.*

Students will subsequently gain practical experience via lab work that will be performed in a subgroup format. Students will be able to choose between two practical assignments, which are either mostly biological or mostly engineering. Assignment one focusses on the decellularization of a tissue, which will be recellularized to form an engineering tissue. Assignment two focusses on the 3D printing of a designer construct that will be seeded with cells to generate an engineered tissue. For both assignments students will have the choice to engineer liver, skeletal, or heart tissue. The students will be allowed to design their own experiments within the boundaries of the practically feasible. Experts researchers will act as mentors for the experimental design. Students will present their design, which will provide the basis for a go or no-go (revision) decision to proceed with the experimental lab work.

### **193640050 Clinical Chemistry**

The course clinical chemistry includes the basics of laboratory medicine in chemistry and pathology. Various concepts of clinical chemistry and laboratory medicine will be discussed such as; different measuring principles, sensitivity and specificity. What qualities are required of a laboratory test when it is used for screening purposes, like the current national screen for colorectal cancer. The aim is to explore the principles, techniques and instrumentation involved in quantitative analysis, with special emphasis on their clinical applications.

The start of this course will involve the basic concepts followed by a lab tour. During the remainder of the course you will address a current problem within the field of clinical chemistry. Together with one or more fellow students you will be challenged to make this problem 'your own', by writing a project description and a more extensive paper on your vision and ideas on the problem.

During this time you will be supervised by a clinical chemist. Furthermore you will teach your fellow students about a subject regarding the project, like lab on a chip, diabetes etc.

### **200900040 Topics in Human Anatomy & Sports Physiology**

This course will focus at different topics in the field of human anatomy and physiology with a focus on sport injuries and physiology. Lectures and practical courses will be used alternatively. In addition, guest speakers who are experts in the field of sport injuries and rehabilitation will provide one or more lectures. The course will be examined by a written exam and three assignments throughout the course. Some lectures/practicals will be held at Roessingh Research and Development.