

# Course Package

## Physiological Signals and Systems – 1A

Name module	Physiological Signals and Systems - 1A
Educational programme	MSc Biomedical Engineering
Period	First block of the first semester (block 1A)
Study load	15 ECTS
Coordinator	J. Huttenhuis

Physiological Signals and Systems			
block 1A	block 1B	block 2A	block 2B
<b>Integrative Design of Biomedical Products</b> <b>191150700 (5 EC)</b>			
<b>Clinical Research Methods</b> <b>201400286 (5 EC)</b>			
<b>Technology for Health</b> <b>201500222 (5 EC)</b>			

Required preliminary knowledge: Design Methodology; Basic knowledge of Sickness/Health; Bachelor BMT or equivalent.

### 191150700 - Integrative Design of Biomedical Products

During this course strategies are presented as an addition to the methodical design process. Subjects that will be discussed are project management, teamwork, communication methods for a good co-operation between medical and technical experts, application of selection processes, specific design aspects of implants, test of prototypes, including FMEA-analysis, METC-protocol and CE-certification. During the course an project assignment will be worked out by a multidisciplinary group of students.

### 201400286 - Clinical Research Methods

Clinical research is the systematic process of examining clinical conditions and outcomes, in order to establish relationships among clinical phenomena and to generate evidence for decision making toward improved clinical practice. As a Biomedical Engineer, you will continuously encounter clinical research, either by performing a clinical study yourself or by using the results of clinical research for development or validation of new technologies or medical devices. Furthermore, you will frequently be working with professionals for whom clinical research is a main source of knowledge toward theory building and clinical innovation - c.f., evidence based medicine. This course will provide the foundations of clinical research by addressing key aspects of theory building, concepts of measurements, study design, interpretation of data. Students will assess and interpret clinical methods and results and use clinical results for developing new concepts or for assessment or validation of new technology. The course consists of lectures disclosing the structure of the subject material, explaining approaches and concepts and providing illustrative examples from the clinical research practice. During the course, students will build a portfolio based on

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assignments for application of the theory on a specific clinical research topic of interest and participate in peer groups for providing mutual feedback and receiving feedback from a tutor. This feedback is processed into the final version of the portfolio, which is graded at the end of the course. The final assignment in the portfolio will be a brief research proposal, to be presented to fellow students.

### **201500222 - Technology for Health**

This course is offered at the beginning of the Master Biomedical Engineering (BME) and is primarily designed for students of the Master Biomedical Engineering. The aim of biomedical engineering is to provide technological solutions for health care problems, for example for the support of human functions which are impaired by trauma or disease. As a biomedical engineer, you will be actively involved in technology research for advancing new ideas, concepts or intermediate results on the translation chain towards innovation of clinical practice and commercial exploitation. The overall goal of this course is to outline the identity of the biomedical engineering discipline and to generate awareness of key aspects of biomedical engineering by focusing on the key roles of the biomedical engineer in:

- **Healthcare Innovation** – Biomedical engineers analyze today's healthcare problems to recognize technological limitations and to envision the potential impact of new technology.
- **Technology Research** – Biomedical engineers develop new concepts, tools and skills for measuring, analysis, modeling or controlling of quantities, or realization of materials.
- **Technology Transfer** – Biomedical engineers synthesize new technological concepts and stake-holders interests into validated and innovative solutions for health care problems.

In this course you will learn through active engagement in online and face-to-face learning activities aiming at your professional development, especially your competences in meeting societal challenges, ensuring impact of your ideas and work, and communication and collaboration with fellow professionals and stakeholders. You will be challenged to connect insights acquired from several course materials to the practice of research presently performed at the TechMed institute and to reflect on your own professional development. Achievement of the learning goals is evaluated by assessment of an individual portfolio in which you document and reflect on your learning outcomes. Your individual mark will be supplemented by a mark which is based on the outcome of group work: your ranking in the grant competition.