Course Code: MScTI_BIOSIG		**Course Title:** Biosignal Processing and Machine Learning		
Course Coordinator: Dr. Mostafa Haghi and Dr. Amin Aminifar		**Type:** Lecture with exercise		
Credit Points: 6	**Workload:** 180 h	**Teaching Hours:** 4 / week	**Term:** ST	**Module usage:** WPBR

Module Parts and Teaching Methods:
- Lecture (2 h / week) with seminar/exercises (2 h / week)

Objectives: Students...
- understand and describe the most contributing biosignals in biomedical applications
- perform the preprocessing and processing of biosignals such as electrocardiogram
- describe and implement the biosignal processing techniques such as discrete wavelet transform to adjust with the frequency boundary of cardiorespiratory parameters
- apply the biosignal processing techniques in cardiac abnormality detection
- identify and distinguish the well-known biosignal data formats
- explain the fundamental concepts in machine learning
- implement and use deep learning for medical applications
- describe at least one machine learning solution for addressing noise concern in biosignal processing
- apply machine learning in the context of biosignal processing

Content:
- Introduction to biosignals and signal processing (general briefing)
- Signal generation and improvement
- Signal visualization
- Basic of R wave and R wave detection in electrocardiogram
- Computer Aided Detection (CAD) – biosignal, Atrial Fibrilation detection
- Data formats for biosignals
- Introduction to the application of machine learning in the biomedical/health domain
- Classical machine learning in the biomedical domain
- Deep learning in the biomedical domain
- Reinforcement learning in the biomedical domain
- How to treat noisy data using machine learning?
- Current and future challenges for machine learning in biomedical applications

Prerequisites:	**Recommended Knowledge:** Basic Calculus and Algebra Algorithm and Python Programming

Literature:
- Will be suggested in lecture

Testing: Defined by lecturer before beginning of course