Course: Medical Instrumentation — credits: 5

Course code	ELVH18GMI
Name	Medical Instrumentation
Study year	2024-2025
ECTS credits	5
Language	English
Coordinator	J. Zijlstra
Modes of delivery	Lecture Practical / Training
Assessments	Medical Instrumentation - Written, organised by STAD examinations

Learning outcomes

The student:

- understands Bioelectric signals (origin of biopotentials, biopotential electrode designs, biopotential amplifier circuits,signal characteristics: electrocardiogram, electroencephalogram, electromyogram, electrooculogram,lead systems, artifacts);
- understands blood pressure, flow and volume, Cardiac output (direct and indirect blood pressure measurement, Fick principle, dilution, plethysmography, Ultrasonography);
- understands physics of MRI, X-ray and CT imaging modalities;
- understands Respiration (model of the respiratory system, gas concentration, lung volume, spirometry);
- understands physics of Implantable devices (pacemaker, defibrillator);
- knows Biochemical sensors (for blood-gas and acid-based physiology);
- has knowledge of safety aspects and regulatory affairs of medical devices IEC 601;
- is able to translate medical demands in technical solutions;
- understands the basic principles of Switched Mode Power Supplies (Buck/Boost);
- understand and applies principles of Digital Signal Processing (DSP); like laplace transform, Z-transform, IIR filters, low/hi-pass, bandpass notch filters and the Fourier series and DFT.

Content

To develop an understanding of the measurement principles of medical instrumentation, including biochemical sensors, bio-potential amplifiers, bioelectrical signals (ECG, EEG), measurement of respiratory function, cardiac variables, blood pressure, blood flow as well as medical devices and signal analysis.

Included in programme(s)

Exchange Biomedical Engineering (autumn)
Minor Biomedical Engineering

School(s)

Institute of Engineering

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