Course: Medical Instrumentation — credits: 5

Course code	ELVH18GMI
Name	Medical Instrumentation
Study year	2022-2023
ECTS credits	5
Language	English
Coordinator	J. Zijlstra
Modes of delivery	Lecture Practical / Training
Assessments	Medical Instrumentation - Written, organised by STAD examinations

Learning outcomes

1. Understands: Bioelectric signals (origin of biopotentials, biopotential electrode designs, biopotential amplifier circuits,signal characteristics: electrocardiogram, electroencephalogram, electromyogram, electrooculogram,lead systems, artifacts)
2. Understands: Blood pressure, flow and volume, Cardiac output (direct and indirect blood pressure measurement, Fick principle, dilution, plethysmography, Ultrasonography)
3. Understands: physics of MRI, X-ray and CT imaging modalities
4. Understands: Respiration (model of the respiratory system, gas concentration, lung volume, spirometry)
5. Physics of Implantable devices (pacemaker, defibrillator)
6. Knows Biochemical sensors (for blood-gas and acid-based physiology)
7. have knowledge of safety aspects and regulatory affairs of medical devices IEC 601
8. are able to translate medical demands in technical solutions
9. understand the basic principles of Switched Mode Power Supplies (Buck/Boost)
10. Understand and apply 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 Technology to Innovate (autumn)
Exchange Biomedical Engineering (autumn)
Minor Technology to Innovate
Minor Biomedical Engineering

School(s)

Institute of Engineering

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