Course	:	**Medical Instrumentation**
Module Level	:	Undergraduate
Code	:	FIA403
Semester/Term	:	7th / Fourth Year
Module Coordinator(s):	:	Dr. Riries Rulaningtyas, S.T, M.T
Lecturer(s):		Dr. Riries Rulaningtyas, S.T, M.T, Winarno, S.Si, M.T
Classification within the Curriculum	:	~~Compulsory Course~~ / Elective Course
Workload	:	2 hours of lectures, 2 hours of structural activities, 2 hours of individual study,14 weeks per semester, and total 84 hours per semester ~2.8 ECTS*
Credit Points	:	2
Requirement(s)	:	Electronics II (FIE212)
Learning Outcome	:	LO3 : They have ability to apply concepts and principles of physics for theoretical analysis, modeling and simulation LO4 : They have ability to conduct scientific methods and apply them in physics problems and develop them in interdisciplinary problems LO6 : They are familiar with information technology and able to apply them on relevant physics problems LO7 : They are able to apply knowledge and principles of physics in industry and medical field as well as other interdisciplinary fields
Learning Goals/Competences	:	**General Competence (Skill):** Students are able to: Understand and explain the mechanism of medical instrumentation and medical signal processing. **Specific Competence:** Students are able to: a. Identify the kind of medical signal resulted from medical electronics devices b. Identify the kind of the medical signal noises c. Design the analog filter of medical signal d. Design the digital filter of medical signal e. Design the amplifier circuit of medical signal f. Design the acquisition system of medical signal
Contents	:	Introduction of medical electronics devices: ECG, EMG, EEG; **Analog Filter for medical signal**: **Passive Filter** including low pass filter, high pass filter, bandpass filter, bandstop filter, RLC resonance; **Active Filter** including integrator, differensiator, low pass filter, high pass filter, bandpass filter, bandstop filter (*notch filter*); **Digital Filter for medical signal**: FIR (Finite Impulse Response): FIR lowpass

		filter, FIR filter design spesifications, Optimal FIR filter design, Maximally-flat FIR filter; IIR (Infinite Impulse Response): Classical IIR design: Butterworth filter, Chebyshev filter, Elliptic filter; Nyquist Filter; Implementing FIR Filters; Implementing IIR Filters; Wavelet Filter: Konsep Dasar, Downsampling, Upsampling, Aliasing filter.
Soft Skill Attribute	:	Honesty and Dicipline.
Study/Exam Achievements	:	Students are considered competent and eligible to pass the course upon obtaining at least 40 of maximum score for the exams (midterm test and final exam), structured activity (group discussion). Final score is calculated as follow: 20% assignment + 10% soft skill + 35% midterm + 35% final exam Final grade is defined as follow: A : 75 – 100 AB : 70 - 74.99 B : 65 - 69.99 BC : 60 - 64.99 C : 55 - 59.99 D : 40 - 54.99 E : 0 - 39.99
Forms of Media	:	Powerpoint slides, LCD projectors and whiteboards
Learning Methods	:	Lecture, assessments and group discussion
Referensi	:	a. Najarian, K., Splinter, R., 2012, Biomedical Signal and Image Processing, Second Edition, CRC Press, New York b. Schilling, R., J., Harris, S., L., 2012, Fundamental of Digital Signal Processing, Second Edition, Clarkson University, Postdam, NY c. Blinowska, K. J., Zygierewicz, J., 2012, Practical Biomedical Signal Analysis Using Matlab, CRC Press, Taylor & Francise d. Costaridou, L., 2005, Medical Image Analysis Method, Taylor & Francis.
Notes	:	*Total ECTS={(total hours workloadx50 min)/60 min}/25 hours Each ECTS is equals with 25 hours