MODULE HANDBOOK

Course:	**Medical Electronics**
Module Level:	Undergraduate
Code:	FIE306
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	7^{th} / Fourth Year
Module Coordinator(s):	Dr. Riries Rulaningtyas, S.T, M.T.
Lecturer(s):	Dr. Riries Rulaningtyas, S.T, M.T. and Drs. Tri Anggono
Language:	Bahasa Indonesia
Classification within the curriculum:	~~Compulsory Course~~ / Elective Course
Teaching format / class hours per week during semester:	2 hours of lectures (50 min / hour)
Workload:	2 hours of lectures, 2 hours of structural activities, 2 hours of individual study, 13 weeks per semester, and total of 78 hours per semester ~ 2.6 ECTS*
Credit Points:	2
Requirement(s):	(FIE201) Analog Electronic and (FIE204) Digital electronics
Learning Goals/Competencies:	**General Competence (Knowledge):** Able to explain the principles of medical electronics and design the circuit of medical electronics. **Specific Competence:** 1. Able to explain measurement system 2. Able to explain controlling system and principle design of controlling system 3. Able to derivate the matematical models in physical systems 4. Able to classify the system and block diagram system 5. Able to explain basic controlling and the aplication of it 6. Able to explain aplication of controlling system 7. Able to explain the types of automatic controlling in industry 8. Able to analyze responses of transient controlling system 9. Able to explain the stability criteria 10. Able to explain erorr analysis 11. Able to explain root locus method 12. Able to set controlling design system

Contents:	**Source and The Characteristic of Biomedical** Nerve potential action, muscle potential action, heart potential action and further biopotential,ECG **Differential Amplifier** Series of Op-Amp for differential amplifier and op-Amp amplifier in medical applications **Op-Amp Amplifier** Inverting, non inverting, Op-Amp comparators, differentiator analog of integrator and the aplication in biomedical (charge amplifier dan ECG amplifier). **Analog Active Filter** Sallen and key filter **,** active filter second orde, aplication filter in medical **Insulation Systems in Medical and Instrumentation Amplifier Circuit:** Insulation amplifier for medical aplication, security standart circuit of amplifier for medical, power supply for medical electronics **.** **Noise and Design Low-Noise Method for Biomedical** Random noise in medical measurement, noise propagation through the filter, factors that cause noise, noise in amplifier,the feedbacks effect of noise **Digital Filter :** Finite impulse response, infinite impulse response, application filter system analog and digital filter in biomedical equipment.
Soft Skill Attributes:	Effort and ethic
Study/Exam Achievements:	Student are considered competent and eligible to pass the course upon obtaining at least 40 of maximum mark of the exams (midterm exam and final exam) and structured activity. Final score is calculated as follow: ▪ 20% assignment : ▪ essay ▪ make papers ▪ 10% soft skill : ▪ from presentation : communication, leadership, team work ▪ discipline ▪ 35% (midterm test) ▪ essay ▪ 35% (final exam) ▪ essay 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:	Powepoint Slides, LCD projectors and whiteboards

Learning Methods:	Concept based learning with lecture , assessments , and group discussion
Literature(s):	1. Northrop, R. B., 2004, *Analysis and Application of Analog Electronic circuits to Biomedical Instrumentation,* Edisi pertama, by CRC Press LLC, USA, New york. 2. David Prutchi, Michael Norris, 2004, *Design and Development of Medical Electronic Instrumentation: A Practical Perspective of the Design, Construction, and Test of Medical Devices* , Wiley-Interscience.
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.