MODULE HANDBOOK

Course	:	**Medical Image Modality**
Module Level	:	Undergraduate
Code	:	FIK402
Sub-heading, if applicable:	:	-
Courses included in the module, if applicable:	:	-
Semester/Term	:	5th/Third Year
Module Coordinator(s):		Dr. Khusnul Ain, S.T., M.Si
Lecturer(s):	:	Dr. Nurul Ukhrowiyah, S.Si., M.Si.
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, 14 weeks per semester, and total of 84 hours per semester 2.8 ECTS*
Credit Points	:	2
Requirement(s)	:	Electronics II, Computational Physics I
Learning Outcome	:	LO 3 : They have solved the problem with applied the concept and principal of physics for theoretical analysis, modeling and simulation LO 6 : They are familiar with information technology and able to apply on a relevant physics problem LO 7 : They are able to applied a knowledge and physics principle in industry and medical as well as other interdisciplinary
Learning Goals/Competences:	:	**General Competence (Skill):** The Medical Image Modality is an image-based diagnostic device. This modality is very important to be in the hospital. These modalities include radiography, ultrasound, CT-scan, diagnostic nuclear medicine, MRI and non-ionizing Tomography. Each of these modalities utilizes different physical principles. Understanding the principle of medical image devices is important to be mastered so as to improve the optimization and life time of the image modality device.. **Specific Competence:** The students are able to: 1. describing the principle of the radiographic device 2. describing the principle of the ultrasound device 3. describing the principle of the CT-Scan device 4. describing the working principle of a diagnostic nuclear medicine device 5. outlining the principle of the MRI device

		6. outlining the principle of the EIT or DOT device
Contents	:	**1. Radiography** X-ray production, photography, digital radiography, fluoroscopy **2. Ultrasonography** Ultrasound, ultrasound transducers, ultrasound image **3. CT-Scan** Traditional tomography, pixel, voxel, CT-Number, evolution of CT-Scan, radon transform, sinogram, teori irisan fourier slice theorem, image reconstruction **4. Medical Nuclear Diagnostic** Emission Tomography (SPECT dan PET), reconstruction, image analysis **5. MRI** NMR, relacsation time T1 and T2, pulse squencing, MRI scanner **6. Non-Ionic Tomography** EIT and DOT, forward problem, inverse problem
Soft Skill Attribute	:	Dicipline, can access and process the information.
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 1 + 20%assignment 2 + 30% midterm + 30% 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. The physics of diagnostic imaging, 2006, David J. Dowsett, Patrick A. Kenny and R. Eugene Johnston, Hodder Arnold, an imprint of Hodder Education, an Hachette UK Company. b. Fundamentals of computerized tomography, 2009, Gabor T. Herman, Springer, New York. c. Medical Imaging (Principle, Detector and Electronics), 2009, Krzysztof Iniewski, John Wiley and Sons, New Jersey. d. Emision Tomography (The Fundamentals of PET and SPECT), 2004, Miles N. Wernick and John N. Aarsvold, Elsevier Academic Press.

		e. Basic of Magnetic Resonance Imaging, 1999, William Oldendorf, M.D And William Oldendorf, JR., Martinus Nijhoff Publishing. f. Tomography, 2002, Pierre Grangeat, Wiley g. Electrical Impedance Tomography (Methods, History and Applications), 2005, David S Holder, Department of Medical Physics and Bioengineering-University College London h. Diagnostic Ultrasound Imaging, 2004, Thomas, L. Szabo, Academic Press Series in Biomedical Engineering.
Notes:		*Total ECTS={(total hoursworkloadx50min)/60min}/25hours Each ECTS isequalswith25hours