MODULE HANDBOOK

Course:	**Analysis of Materials**
Module Level:	Undergraduate
Code:	FIM309
Sub-heading, if	-
Courses included in the	-
Semester/Term:	6th / Third Year
Module Coordinator	Dr. Ir. Aminatun, M.Si.
Lecturer(s):	Jan Ady, S.Si., M.Si
Language:	Bahasa Indonesia
Classification within the	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:	3
Requirement(s):	Modern Physics
Learning Goals/Competencies:	**General Competence (Knowledge)** After following this course, students will able to analyze the properties of biomaterials from the perspective of physical knowledge and use them in the study of material engineering research in the industrial and medical fields. **Specific Competence:** 1. Explain the method of material characterization including the characterization of microscopic properties namely FTIR, UV-Vis, XRD, SEM-EDX, TEM and XRF as well as the characterization of macroscopic properties including mechanical, thermal, chemical and biological properties. 2. Analysis the microscopic properties of material, namely functional groups, UV-Vis absorption and liquid material composition, crystal structure, surface morphology and composition of solid material. 3. Analysis the macroscopic properties of material, namely mechanical, thermal, chemical and biological properties 4. Apply the results of the analysis of material properties to design an industrial and medical material

Contents:	**The structure of matter**: atoms, molecules, crystals, electrical properties, optical properties. **Fundamentals of Spectroscopy**: energy levels of atoms, molecules, transitions between energy levels, rules of selection, absorption intensities, Lambert-Beer law. **Microscopic analysis of material**: Infrared Spectroscopy (FTIR), Ultraviolet-Visible (UV-Vis) and XRD. Morphological analysis and material composition: SEM-EDX, TEM and XRF. **Characterization and analysis of mechanical properties include**: tensile strength, elongation, compressive strength, impact strength and hardness. **Characterization and analysis of thermal properties include: t**hermal capacity, thermal expansion, thermal expansion coefficient and thermal conductivity, DSC and TGA. **Characterization and analysis of chemical properties,** namely corrosion and biological properties, namely cytotoxicity.
Soft Skill Attribute:	Effort and ethic
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 + 20% Quis + 30% midterm test + 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 presentation
Literature(s):	1. Joon Park and R.S. Lakes, 2007, *Biomaterials* An Introduction, Third Edition Springer, New York. 2. Graybeal, Jack D., 1988, *Molecular Spectroscopy*, McGrawHill, New York. 3. Hollas, J.M., 1992, *Modern Spectroscopy*, 2 nd ed, JohnWiley & Sons. 4. Svanberg S., 1985, *Atomic and Molecular Spectroscopy*, JohnWiley & Sons, New York. 5. Blake, Alexander J., 2009, *Crystal Structure Analysis*, Oxford University Press, USA 6. Hammond, C., 2001, *The Basics of Crystallography and Diffraction*, Oxford University Press, USA
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.