LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Introduction to Engineering Materials
Course Code: ENMT611004
Course Credits: 2

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	This course provides an overview of engineering materials, their structures, properties, and manufacturing processes, with a focus on both metallurgical and materials engineering principles.
Course Key Words	
Academic Goal	Students can apply knowledge in the fields of mathematics, basic science, materials science, information technology and basic engineering to gain a thorough understanding of engineering principles in general and metallurgical and materials engineering in particular.
Course Schedule	1. Types of engineering materials and their applications; 2. Structure of engineering materials; 3. Material properties; 4. Manufacturing and Processing of Metal Materials; 5. Steel and iron: production and properties; 6. Aluminum: production and properties; 7. Other nonferrous alloys: production and properties; 8. Polymers: processing
Textbooks, References, and Supplementary Materials	1. Bondan T. Sofyan, Introduction to Engineering Materials, Salemba Teknika Publisher, 2010 2. W.D. Callister, Materials Science and Engineering: An Introduction, 6th ed., John Wiley & Sons, 2003 3. William F. Smith, Introduction to Materials Science and Engineering
Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40%

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

	- Quizzes: 10%
Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Materials Characterization
Course Code: ENMT613011
Course Credits: 3

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	This course will describe a variety of techniques used to characterize the structure and composition of engineering materials, including metals, ceramics, polymers, composites, and semiconductors.
Course Key Words	
Academic Goal	Students are able to design/design and conduct laboratory experiments on material and/or field characterization, conduct analysis and interpretation of data based on field evidence and in-depth scientific analysis to strengthen technical assessment
Course Schedule	Part I: Introduction to material testing, Review of material mechanical behavior, Data analysis and presentation of test results, Test procedures, Test machines and instruments, Standardization of material testing, Destructive testing (tension, compression, shear, fatigue, stress relaxation and wear), Non-destructive (visual, penetrant, ultrasonic, radiographic, eddy current and magnetic particles). Part 2: Microstructure analysis techniques, Formation phases and general characteristics of material structure, Steel microstructure; stable and metastable phases and their formation and mechanisms, Microstructure of non-ferrous alloys; aluminum, copper, titanium, Macro Structure, Sampling Techniques, Sample Preparation, Observation Techniques with Optical and Electron Microscopes, Special Measurements; microhardness, layer thickness, roughness, quantitative metallography grain size, phase and precipitate volume fractions, electron interaction with the sample, advanced microstructural analysis. Part 3: Principles of advanced material characterization include X-Ray

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

	Diffraction, Scanning Electron Microscopy, Transmission Electron Microscopy, FIB, EBSD, X-ray Fluorescence, Optical Emission Spectrometers methods.
Textbooks, References, and Supplementary Materials	1. Lous Cartz, Non-Destructive Testing; ASM International; 1995 2. Andreas Ohsner and Holm Altenbach; Properties and Characterization of Modern Materials; 2017 3. Callister, William D. 2007. Materials Science and Engineering, John Wiley & Sons. 4. Zhang, Sam; Candle; Kumar, Ashok. 2008. Materials Characterization Techniques, CRC Press. 5. Schwartz, A.J.; Kumar, M.; Adams, B.L.; Field, DP 2009. Electron Backscatter Diffraction in Materials Science, Springer US
Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%
Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Electrochemistry
Course Code: ENMT613008
Course Credits: 3

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	Mastering the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems
Course Key Words	
Academic Goal	Students are able to design/design electrochemical and metallurgical processes and materials to meet expected needs within realistic boundaries, e.g. law, economy, environment, social, political, health and security, sustainability and to recognize and/or exploit the potential of local and national resources with global insights;
Course Schedule	Basic concepts and applications of electrochemistry, and solutions of conductivity, Faraday's law, and its applications. Electrochemical cell electrodes (understanding, potential, Nerst equation, electric double layer, polarization, potential measurement, free energy and electrode potential, equilibrium potential), reference electrodes, Pourbaix diagram construction, and their applications. Electrochemical kinetics, electrode reaction rates, mixed potential theory, Evans diagram, mixed potential diagram
Textbooks, References, and Supplementary Materials	1. JOM Bockris and AKN Reddy; Modern Electrochemistry vol 1 & 2; Penum Rosetta Edition; 1997 2. Bard Faulkner and Larry R; Electrochemical Methods Fundamentals and Application; Willey; 1980 3. Pyron; The Electrochemistry of Corrosion; NACE; 1991
Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Extractive Metallurgy
Course Code: ENMT615023
Course Credits: 3

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	In this course you will learn to develop, optimise and manage the operation of metallurgical processing plants in an economical and environmentally responsible
Course Key Words	
Academic Goal	Students are able to design/draft extraction metallurgy and metallurgical processes and materials to meet expected needs within realistic constraints, e.g. legal, economic, environmental, social, political, health and safety, sustainability and to recognize and/or utilize the potential of local and national resources with a global outlook;
Course Schedule	Basic principles of extractive metallurgy (pyrometallurgy, hydrometallurgy and electrometallurgy). The process/ process of processing the ore to be extracted. Methods for leaching oxide and sulfide ores, Bayer process, leaching Al, Au by cyanidation (Leach; precipitation technique; ion exchange; solvent extraction; reverse osmosis). Electrometallurgy (Electro refining and electro refining). Molten salt electro winner. Hall process. Electro winner Mg, Ti. Secondary metal. Obtaining metal from scrap metal and secondary sources using pyro-, hydro-, and electrometallurgy. Pyrometallurgy, mineral separation, slag, blast furnace, raw materials, reactions, material balance, iron ore, roasting, smelting, refining Sn, Ni, Cu, Zn, Pb.
Textbooks, References, and Supplementary Materials	1. Pehlke, Robert D., Unit Processes in Extractive Metallurgy, Elsevier Pub., New York, 1973 2. JJ Moore., Chemical Metallurgy, Butterworth-Heinemann, London, 1981 3. JD Gilchrist., Extractive Metallurgy, Pergamon., 2nd ed., Oxford, Pergamon Press, 1980

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%
Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Surface Engineering and Heat Treatment
Course Code: ENMT615024
Course Credits: 3

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	This course on Heat Treatment deals with understanding of principles and procedures for metals and alloys.
Course Key Words	
Academic Goal	Students are able to design/draft surface engineering and heat treatment and metallurgical processes and materials to meet expected needs within realistic constraints, e.g. legal, economic, environmental, social, political, health and safety, sustainability and to recognize and/or utilize the potential of local and national resources with a global outlook;
Course Schedule	Definition of heat treatment, phase transformation and microstructure, TTT and CCT diagrams, influence of heating and cooling rates, stable and metastable microstructure, hardening, influence of alloying elements, hardening, softening, temper brittleness, distortion and its prevention, carburization, nitro-carburization, nitriding, boronization, non-ferrous heat treatment, surface hardening, surface deposition, various heat treatment furnaces and their atmospheres, heat treatment process deviations, special heat treatments, heat treatment case studies and surface engineering.
Textbooks, References, and Supplementary Materials	1. Bill Bryson; Heat Treatment Selection and Application of Tool Steel; Hanser Gardner Publications; 1997 2. ASM Practical Heat treating; ASM International; 2006 3. ASM Handbook Vol. 4; ASM International; 1991
Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Metal Manufacturing Process
Course Code: ENMT615026
Course Credits: 4

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	This course contributes primarily to the students' knowledge and understanding of manufacturing processes.
Course Key Words	
Academic Goal	Students are able to design/draft metal manufacturing processes and metallurgical processes and materials to meet expected needs within realistic constraints, e.g. legal, economic, environmental, social, political, health and safety, sustainability and to recognize and/or utilize the potential of local and national resources with a global outlook;
Course Schedule	Metal forming as part of the design and manufacturing process; basics of metal casting (moulds, liquid metal, solidification), molds (sand, ceramics, metal), pouring systems (patterns, risers, pressure and non-pressure, chill) and their simulations, solidification of cast iron and aluminum, liquid processing for iron metals (inoculation, Mg treatment) and nonferrous (modifiers, grain refiners), various casting methods, casting defects; general principles of solid metal forming, metal forming techniques through pressing, forging, rolling, extrusion, wire drawing, sheet metal forming; thermo-mechanical processing (TMP). General principles of powder metallurgy, powder fabrication and powder formation mechanisms, characteristics and characterization of powders, mechanical alloying, pre-solidification processes, compaction, precursor characteristics, powder sintering and consolidation, full density processing, sintering equipment and related aspects, application of powder metallurgy products . Laboratory: (1) Distribution of sand particle size, calculation of water content, additive content (bentonite) in the mold, flowability of sand, relationship between water and additive content in sand with permeability, shear strength and compressive

	strength of sand, (2) utilization of sand. Simulation software in casting calculations and design, (3) Inlet and riser design, making molds from patterns, making mold cores, melting and pouring molten metal into molds, casting defect analysis, casting product analysis related to alloy elements and casting processes.
Textbooks, References, and Supplementary Materials	1. Heine, RW et.al., Principles of Metal Casting, McGrawHill Pub., New Delhi, 1986 2. Surdia, T. Metal Casting Technology, P. Paramita, 1985 3. John Campbell, Castings, Second Edition, Elsevier Butterworth-Heinemann, 2004
Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%
Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Course Name: Polymer Technology
Course Code: ENMT615027
Course Credits: 3

Degree	Bachelor
Department/Study Program	Metallurgical and Materials Engineering
Type of Class	International
Language of Instruction	English
Lecturer Name	
Course Structure	Lecture
Course Overview	This course equips students with the knowledge and skills to design, develop, process, and analyze various polymeric materials.
Course Key Words	
Academic Goal	Students are able to design/draft polymer technology and metallurgical processes and materials to meet expected needs within realistic constraints, e.g. legal, economic, environmental, social, political, health and safety, sustainability and to recognize and/or utilize the potential of local and national resources with a global outlook;
Course Schedule	Basic principles and characteristics of polymer materials, as well as methods of fabricating polymer raw materials into ready-to-use products, the relationship between the structure and behavior of polymer molecules; thermal, chemical, optical, and electrical properties of polymer materials; polymer rheology; fabrication processes (formulation, continuous and discontinuous forming, and product finalization) of thermoplastics, thermosets, and rubber; and case studies of polymer product technology in packaging (rigid and flexible), automotive, electronics, and construction applications.
Textbooks, References, and Supplementary Materials	1. G. Challa, Polymer Chemistry – An Introduction, 1993, Ellis Horwood Limited series in Polymer Science, UK 2. Young RJ and Lovell PA, Introduction to Polymers, 2nd edition, 1997, Chapman & Hall, Cambridge, UK 3. Cheremisinoff NP, Polymer Characterization –Laboratory Techniques and Analysis, 1996, Noyes Publication, New Jersey, USA 4. Morton-Jones DH, Polymer Processing, 1994, Chapman & Hall, UK

LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
ODD SEMESTER, ACADEMIC YEAR 2026/2027
Faculty of Engineering - Universitas Indonesia

Grading Component	Please describe the grading component. For example: - Midterm Exam: 25% - Final Exam: 25% - Assignments: 40% - Quizzes: 10%
Other (i.e. Expectations on Classroom Conduct and Decorum etc.)	Students are expected to: - Attend all classes regularly and on time. - Participate actively in discussions and learning activities. - Maintain respectful behavior toward instructors and peers. - Avoid any form of academic dishonesty (e.g., plagiarism, cheating).