



LIST OF COURSES OFFERED TO INTERNATIONAL STUDENTS
NON-DEGREE PROGRAM
EVEN SEMESTER, ACADEMIC YEAR 2025/2026
Faculty of Engineering - Universitas Indonesia

Course Name: Advanced Mathematics 1

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	2
Course Overview	Advanced Mathematics 1 covers advanced concepts in vector spaces, matrix theory, and optimization techniques. Students learn about eigenvalues, singular value decomposition, and optimization methods such as linear programming and convex optimization. This course equips students with mathematical tools to solve complex optimization problems in engineering and data science.
Course Key Words	
Learning Outcome	Able to apply matrix decomposition methods and optimization mathematics to solve electrical engineering problems.
Course Schedule	Matrix diagonalization; matrix decomposition methods: Jordan; LU; QR; Cholesky; SVD; analytical solutions for unconstrained optimization; analytical solutions for constrained optimization; least squares methods; application of matrix decomposition in optimization and linear regression.
Textbooks, References, and Supplementary Materials (Maximum 3)	1. Charu C. Aggarwal, Linear Algebra and Optimization for Machine Learning, Springer, 2020 2. Steven J Leon , Linear Algebra with Applications, Pearson, 2015 3. Nicholas Loehr, Advanced Linear Algebra, CRC Press, 2014
Grading Component	
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).



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Course Name: Electric Circuit 1

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	3
Course Overview	This course covers fundamental concepts in electrical circuits, including circuit analysis techniques, network theorems, AC/DC circuits, and the use of circuit simulation software. It provides the foundation for understanding and designing complex electrical systems.
Course Key Words	
Learning Outcome	• Able to analyze AC and DC circuits using circuit analysis techniques (C4) • Able to apply network theorems to solve circuit problems (C3) • Able to use circuit simulation software to analyze electrical circuits (P4)
Course Schedule	Basic Concepts of Electricity; Ohm's Law; Kirchhoff's Laws; Series and Parallel Circuits; Mesh and Nodal Analysis; Thevenin's and Norton's Theorems; AC Circuits; Resonance; Power Analysis
Textbooks, References, and Supplementary Materials (Maximum 3)	William H. Hayt, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis," 8th Edition, McGraw-Hill, 2011.
Grading Component	
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).



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Course Name: Advanced Mathematics 2

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	4
Course Overview	The Advanced Mathematics 2 course builds on the foundational concepts from Advanced Mathematics 1, covering advanced topics such as complex analysis, partial differential equations, and Fourier series. Students develop a deeper understanding of mathematical methods used to model and solve problems in engineering and physics. This course emphasizes the practical application of these techniques to tackle complex systems and phenomena in various technical domains.
Course Key Words	
Learning Outcome	Able to apply advanced calculus methods to solve electrical engineering problems.
Course Schedule	Ordinary differential equations (first-order; higher-order; boundary value problems); partial differential equations (linear and nonlinear); integral transforms: Laplace transform; Fourier transform; Z-transform; inverse integral transforms; Fourier series; applications of transforms in continuous/discrete systems.
Textbooks, References, and Supplementary Materials (Maximum 3)	Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005
Grading Component	
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).



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Course Name: Vector Analysis and Complex Variable

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	2
Course Overview	Vector Analysis and Complex Variable covers key concepts in vector calculus and complex function theory. Topics include differential vectors, gradient, Hessian, Jacobian, divergence, curl, and integral vectors, along with applications of line integrals and Green's theorem. The course also explores surface integrals, Gauss Divergence, and Stokes theorems, followed by an introduction to complex variables, including complex differentials and integrals.
Course Key Words	
Learning Outcome	Able to apply vector calculus and complex variable concepts to solve electrical engineering problems.
Course Schedule	Differential vector, gradient, hessian, Jacobian, divergence, curl, integral vector, line integral, Green theorem, surface integral, Gauss and Stokes divergence theorem, complex variable and function, complex differential and integral.
Textbooks, References, and Supplementary Materials (Maximum 3)	1. Elementary Linear Algebra, Howard Anton & Chris Rorres, 11th edition, 2014 2. Tunc Geveci, "Advanced Calculus: Vector Analysis," 1st Edition, Momentum Press, 2015.
Grading Component	
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).



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Course Name: Statistics and Probability

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	4
Course Overview	The Statistics and Probability course introduces students to the foundational concepts of probability theory and statistical analysis. Students learn how to model uncertainty, analyze data, and make informed decisions using techniques such as hypothesis testing, probability distributions, and regression analysis. This course equips students with essential tools for solving real-world problems in various fields, including engineering, science, and business.
Course Key Words	
Learning Outcome	• Able to apply probability and basic statistics methods in solving electrical engineering problems. • Able to evaluate data obtained from statistical and probabilistic studies.
Course Schedule	General concepts of probability and statistics; population; sample; data organization and presentation (frequency distribution; data presentation in tables/graphs; mean; standard deviation; variance; median); random variables (discrete; continuous); types of probability; various probability distributions; sampling methods; sampling distributions; Bayes' Theorem; inference of mean values (point estimation; interval estimation; maximum likelihood estimation); variance inference (variance estimation; hypothesis); proportion inference (proportion estimation; hypothesis; goodness of fit); linear regression (single; multiple); correlation.
Textbooks, References, and Supplementary Materials (Maximum 3)	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying E. Ye, "Probability and Statistics for Engineering and the Sciences, 9th Edition," Prentice Hall, USA, 2012
Grading Component	
Other	Students are expected to:



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Course Name: Electric Materials

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	2
Course Overview	The Electric Materials course explores the properties and applications of materials used in electrical engineering, including conductors, semiconductors, insulators, and magnetic materials. Students learn about the atomic structure, electrical behavior, and thermal characteristics of these materials, and how they influence the design and performance of electrical systems. This course provides a foundation for understanding the role of materials in modern electronic devices and power systems.
Course Key Words	
Learning Outcome	Able to classify the properties of materials in electrical engineering.
Course Schedule	Atoms in solids; Dielectric polarization; Dielectric losses; Classification of electric materials: solids; ceramics; polymers; Insulation materials: gases and liquids; properties/characteristics of materials: conductivity; thermal; electrical; optical; Insulation failures; optical materials.
Textbooks, References, and Supplementary Materials (Maximum 3)	1. Rudy Setiabudy, "Material Teknik Listrik", UI Press, 2007 2. R. E. Hummel, "Electronic Properties of Materials", Third Edition, Springer, 2000
Grading Component	
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).



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Course Name: Electrical Power Engineering

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	4
Course Overview	The Electrical Power Engineering course covers the generation, transmission, distribution, and utilization of electrical power. Students learn about power system components, electrical machines, and power grid operations, with an emphasis on the analysis and design of efficient, reliable power systems. This course prepares students to address challenges in modern power systems, including renewable energy integration and smart grid technologies.
Course Key Words	
Learning Outcome	• Able to identify problems in electrical machines. • Able to use and understand the operation of suitable tools or software for the analysis and testing of electrical machines.
Course Schedule	Electrical power systems; power generation; transmission; and distribution; transformers; motors; generators.
Textbooks, References, and Supplementary Materials (Maximum 3)	1. S. J. Chapman, "Electric Machinery and Power System Fundamentals," McGraw-Hill Science/Engineering/Math, 2001 2. B.M. Weedy, B.J. Cory, "Electric Power Systems," 4th Edition, John Wiley and Sons, 2001
Grading Component	
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.



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Course Name: Electromagnetics

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	3
Course Overview	Electromagnetics covers the fundamental principles of electric and magnetic fields, focusing on electrostatics, magnetostatics, and electromagnetic dynamics. Students will explore plane waves, Maxwell's laws, and the behavior of electromagnetic fields in various media. The course also addresses interference phenomena and the analysis of electromagnetic fields in transmission lines.
Course Key Words	
Learning Outcome	Able to apply semiconductor physics concepts in engineering.
Course Schedule	Electrostatic, Magneto-static, Electromagnetic dynamic, Plane Waves, Maxwell's Laws, Electromagnetic Interference, transmission line
Textbooks, References, and Supplementary Materials (Maximum 3)	1. Stuart M. Wentworth, "Fundamentals of Electromagnetics / Elektromagnetika with Engineering Applications," John Wiley, 2005. 2. William H. Hayt and John A. Buck, "Engineering Electromagnetics / Elektromagnetika," McGraw-Hill Companies: 6th Ed. 2001.
Grading Component	
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).



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Course Name: Numerical Computation

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	2
Course Overview	The Numerical Computation course focuses on the use of computational methods to solve mathematical problems that arise in engineering and science. Students learn techniques such as numerical integration, differentiation, and the solution of linear and nonlinear equations. This course emphasizes practical problem-solving through the development and implementation of algorithms using programming languages and software tools.
Course Key Words	
Learning Outcome	• Able to choose algorithms to solve mathematical problems. • Able to use software to solve mathematical problems in electrical engineering.
Course Schedule	Types of numerical errors; numerical methods for root finding; numerical methods for single and multidimensional optimization solutions; least squares methods for static and dynamic model estimation; nonlinear regression; interpolation; numerical integration and differentiation; numerical methods for solving ordinary differential equations.
Textbooks, References, and Supplementary Materials (Maximum 3)	Steven Chapra, Raymond Canale. "Numerical Methods for Engineer 7th Edition", McGraw Hill. 2014
Grading Component	
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Course Name: Telecommunication System

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	4
Course Overview	The Telecommunication System course provides an overview of the principles and technologies behind modern communication networks, including wireless, satellite, and optical communication systems. Students explore topics such as signal transmission, modulation techniques, and network architecture, with an emphasis on the design and performance of telecommunication systems. This course prepares students to understand and analyze the challenges of building efficient, reliable communication networks in today's digital world.
Course Key Words	
Learning Outcome	Able to identify telecommunication systems in accordance with relevant professional ethical codes in telecommunication engineering.
Course Schedule	Introduction to Telecommunications; Analog and Digital Communication Systems and Devices; Telecommunication Networks; Distortion; Decibel (dB) Principles; Switching; Signaling; Queuing Theory and Routing; Numbering Techniques; Transmission Lines: Cable and Wireless; Analog Modulation Principles: Amplitude and Frequency Modulation.
Textbooks, References, and Supplementary Materials (Maximum 3)	1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons Inc. 2. Behrouz A. Forouzan, "Data Communications and Networking" 5th Edition, McGraw-Hill, 2012
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Course Name: Electronic Circuits 2

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	2
Course Overview	Electronic Circuit 2 builds on the foundations from Electronic Circuits 1, focusing on advanced circuit analysis and design. Students will explore power amplifier circuits, digital circuits using bipolar transistors, highorder active filters, oscillator circuits, Schmidt triggers, and voltage regulators. The course emphasizes practical skills in analyzing and optimizing electronic circuit designs for specific applications.
Course Key Words	
Learning Outcome	• Able to apply methods of analysis and design of electronic circuits • Able to analyze the performance of electronic circuit designs • Able to provide recommendations for electronic circuit designs for certain purposes
Course Schedule	Power amplifier circuit, digital circuit with digital bipolar circuit, high-order active filter, oscillator circuit, Schmidt Trigger, and voltage regulators
Textbooks, References, and Supplementary Materials (Maximum 3)	Boylestad R, Nashhelsky L, “Electronic Devices and Circuit Theory 9th Edition”, Prentice Hall, 2006.
Grading Component	
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Course Name: Control Engineering

Degree	Bachelor
Department/Study Program	Electrical Engineering
Type of Class	International
Lecturer Name	
Course Structure	Lecture
Course Credits	4
Course Overview	The Control Engineering course focuses on the principles and techniques used to design and analyze control systems for dynamic processes. Students explore topics such as feedback systems, stability analysis, and control strategies like PID control and state-space methods. This course equips students with the skills to model, simulate, and implement control systems in various engineering applications, ensuring precise and efficient system performance.
Course Key Words	
Learning Outcome	• Able to identify controllers for single-input single-output systems based on dynamic models to improve transient and steady-state response performance in frequency and time domains. • Able to identify control system design methods.
Course Schedule	Feedback control systems (continuous/discrete); dynamic system modeling: transfer function and state space models; transient response; steady-state error; stability analysis using Routh-Hurwitz and Nyquist methods; root locus; Bode plots; continuous/discrete linear controller design; continuous/discrete PID controller design; continuous/discrete state-space controller design.
Textbooks, References, and Supplementary Materials (Maximum 3)	S. Skogestad, "Simple Analytic Rules for Model Reduction and PID Controller Design," Journal of Process Control, vol. 13, pp. 291-309, 2003
Grading Component	
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*** Note: Please add additional sheets for the next courses.**