TAIBAH UNIVERSITY

Electrical Engineering Course Descriptions

2025-2026 | 1447

MATH 105 – Calculus I

Introduces differential and integral calculus of single-variable functions. Topics include limits, continuity, derivatives, mean value theorem, and applications of differentiation and integration. Emphasizes conceptual understanding, problem-solving skills, and the link between theory and practical applications in engineering contexts.

MATH 106 – Calculus II

Covers advanced calculus concepts including techniques of integration (by parts, trigonometric, and partial fractions), improper integrals, and their applications in calculating areas, volumes, and arc lengths. Introduces sequences and series, convergence tests, and Taylor and Maclaurin series with emphasis on linking theory to practical engineering applications.

MATH 313 – Calculus III

Extends calculus to multiple variables. Topics include vectors, partial derivatives, multiple integrals, line and surface integrals, Green's and Stokes' theorems, and related applications. Emphasizes using advanced calculus for solving multivariable engineering and physical problems.

MATH 203 – Analytical Methods in Engineering

Covers linear algebra fundamentals: systems of linear equations, matrices, determinants, vector spaces, linear transformations, eigenvalues/eigenvectors, matrix factorizations, and orthogonality. Includes basic complex analysis (limit, continuity, differentiability, integration) with related theorems. Computer explorations using MATLAB are integrated across all topics.

MATH 308 – Differential Equations

Covers first- and higher-order differential equations, linear systems, Laplace transforms, and numerical methods for solving differential equations. Focuses on analytical and computational techniques with engineering applications and modeling of physical systems.

GE 101 – Introduction to Engineering Drawing

Provides the fundamentals of engineering drawing and graphical communication. Includes orthographic projection, dimensioning, sectioning, and 3D representation. Students develop visualization skills and proficiency in interpreting and preparing technical drawings using manual and computer-aided techniques.

GE 102 – Introduction to Engineering Design

Introduces the engineering design process and problem-solving strategies. Topics include design methods, teamwork, communication, and prototyping. Students apply design thinking and creativity to real-world engineering challenges using case studies and hands-on exercises.

GE 405 – Engineering Economy

Covers principles of economic analysis applied to engineering decisions. Topics include cost estimation, interest formulas, present worth, rate of return, depreciation, and project evaluation. Emphasizes financial reasoning and decision-making in engineering project management.

GE 408 – Leadership and Entrepreneurship

Focuses on leadership skills, innovation, and entrepreneurship in engineering. Topics include team management, ethical leadership, business planning, and technology commercialization. Encourages creativity and initiative in developing engineering-based business solutions.

GE 207 – Safety and Professional Ethics

Introduces safety principles, risk management, and occupational health standards relevant to engineering practice. Emphasizes ethical responsibilities, professional conduct, and regulatory compliance. Students learn to identify hazards, apply safety codes, and evaluate ethical dilemmas in engineering decisions through case studies and applied discussions.

GE 407 – Engineering Management

Provides an overview of management functions in engineering organizations, including planning, organizing, staffing, leading, and controlling. Topics cover project management, cost and quality control, decision-making, and leadership. Focuses on integrating technical expertise with managerial skills to achieve effective project execution and organizational efficiency.

EE 201 – Electric Circuits (1)

Covers basic concepts of electric circuits, Ohm’s and Kirchhoff’s laws, mesh and nodal analysis, circuit theorems, and steady-state DC/AC analysis. Includes study of capacitors, inductors, and first-order circuits, focusing on applying fundamental laws to solve electrical networks accurately and efficiently.

EE 202 – Electric Circuits (2)

Extends circuit theory to AC steady-state analysis using phasors, frequency response, and power calculations. Topics include resonance, three-phase systems, magnetically coupled circuits, and two-port networks. Emphasizes practical analysis of sinusoidal and frequency-domain circuits.

EE 212 – Digital Design (1)

Introduces digital systems, Boolean algebra, logic simplification, and combinational and sequential circuit design. Students learn to analyze and implement digital systems using logic gates, flip-flops, counters, and registers, applying theoretical concepts to practical hardware experiments.

EE 301 – Computer Programming for Electrical Engineering

Focuses on structured programming using MATLAB and C/C++ for solving electrical engineering problems. Students develop algorithms, simulate circuits, analyze data, and model systems relevant to control and signal processing applications.

EE 302 – Numerical Methods in Engineering

Covers numerical techniques for solving engineering problems including root finding, interpolation, numerical integration, and differential equations. Emphasis is on applying computational algorithms and MATLAB programming to analyze and model engineering systems.

EE 321 – Electronics (1)

Introduces semiconductor devices, diodes, and transistors. Students study biasing, small-signal models, and amplifier configurations, learning analysis and design principles for analog circuits such as rectifiers, regulators, and amplifiers.

EE 341 – Signals and Systems

Covers continuous and discrete-time signals, linear systems, convolution, Fourier series and transforms, and Laplace and Z-transforms. Students learn system analysis in time and frequency domains with engineering applications in communication and control.

EE 352 – Electromagnetism (1)

Introduces electromagnetic field theory, including vector analysis, Coulomb's law, Gauss's law, and Ampere's law. Students analyze electric and magnetic fields in different media and solve boundary-value problems related to electric circuits and devices.

EE 362 – Electrical Machines (1)

Covers principles of electromechanical energy conversion, transformers, DC machines, and induction motors. Includes analysis of torque, efficiency, and performance characteristics with laboratory experiments on electrical machine operation.

EE 402 – Artificial Intelligence Applications in Electrical Engineering

Explores AI and machine learning methods applied to electrical engineering problems. Topics include neural networks, fuzzy logic, and optimization algorithms, emphasizing intelligent system modeling, prediction, and control applications.

EE 421 – Instrumentation and Measurements

Focuses on electrical measurement principles, sensors, transducers, and data acquisition systems. Students design and analyze instrumentation systems for measuring voltage, current, resistance, and other parameters accurately.

EE 423 – Electronics (2)

A continuation of Electronics (1), covering operational amplifiers, frequency response, feedback amplifiers, oscillators, and power amplifiers. Emphasizes analysis, design, and practical implementation of advanced electronic circuits.

EE 432 – Control Systems

Introduces feedback control theory, modeling of dynamic systems, and stability analysis. Students learn time- and frequency-domain design techniques using root locus and Bode plots, with MATLAB simulation applications.

EE 463 – Power Systems Analysis (1)

Examines the fundamentals of power generation, transmission, and distribution. Topics include per-unit systems, load flow, short-circuit analysis, and power factor correction, emphasizing analytical modeling of electrical power networks.

EE 471 – Communication Systems (1)

Covers principles of analog and digital communication systems. Topics include modulation, demodulation, noise analysis, and signal transmission over various channels, with emphasis on performance evaluation and bandwidth efficiency.

EE 492 – Graduation Project (1)

Students define, plan, and start executing a design project addressing a real engineering problem. Emphasis on problem formulation, literature review, and initial design under faculty supervision.

EE 591 – Graduation Project (2)

Continuation of Graduation Project (1). Students implement, test, and document their engineering design project, preparing a final report and presentation demonstrating professional-level skills and knowledge integration.