In Partnership With Diversity Learning Institute-DLI & Twikatane e.V Vermany

Bachelor of Science in Electrical & Electronic Engineering (B.Sc. EEE)

Semester 1:

Module Name	Module Code	Teaching Hours	Credits
Introduction to Electrical Engineering	EEE101	45	3
Circuit Analysis I	EEE102	60	4
Mathematics for Engineers I	EEE103	45	3
Physics for Engineers	EEE104	45	3
Programming Fundamentals	EEE105	30	2
Engineering Drawing	EEE106	45 (Lab)	2

Semester 2:

Module Name	Module Code	Teaching Hours	Credits
Electronics I	EEE201	45	3
Circuit Analysis II	EEE202	60	4
Mathematics for Engineers II	EEE203	45	3
Electromagnetic Fields and Waves	EEE204	45	3
Digital Logic Design	EEE205	45	3
Electronics I Lab	EEE206	45 (Lab)	2

Semester 3:

Module Name	Module Code	Teaching Hours	Credits
Signals and Systems	EEE301	45	3
Control Systems	EEE302	60	4
Electrical Machines	EEE303	45	3
Analog Electronics	EEE304	45	3
Digital Signal Processing	EEE305	45	3
Control Systems Lab	EEE306	45 (Lab)	2

Semester 4:

Module Name	Module Code	Teaching Hours	Credits
Power Systems Analysis	EEE401	45	3
Communication Systems	EEE402	60	4
Microprocessors and Microcontrollers	EEE403	45	3
Power Electronics	EEE404	45	3
Embedded Systems	EEE405	45	3
Power Systems Lab	EEE406	45 (Lab)	2

Semester 5:

Module Name	Module Code	Teaching Hours	Credits
Digital Communication Systems	EEE501	45	3
Renewable Energy Systems	EEE502	60	4
VLSI Design	EEE503	45	3
High Voltage Engineering	EEE504	45	3
Wireless Communication	EEE505	45	3
VLSI Design Lab	EEE506	45 (Lab)	2

Semester 6:

Module Name	Module Code	Teaching Hours	Credits
Power System Protection and Switchgear	EEE601	45	3
RF and Microwave Engineering	EEE602	60	4
Optical Communication Systems	EEE603	45	3
Robotics and Automation	EEE604	45	3
Final Year Project	EEE605	90	6
Industrial Training (Internship)	EEE606	-	6

Note: The Industrial Training (Internship) is typically conducted during the semester break, providing students with practical exposure to the industry.

Modules Outline

Semester 1:

Module 1: Introduction to Electrical Engineering (EEE101)

1. Overview of Electrical Engineering
2. History and Milestones in Electrical Engineering
3. Basics of Electrical Circuits
4. Electrical Components and Devices
5. Engineering Ethics and Professionalism
6. Introduction to Software Tools for Electrical Engineers

Module 2: Circuit Analysis I (EEE102)

1. Basic Circuit Laws and Theorems
2. Circuit Analysis Techniques
3. AC and DC Circuits
4. Network Theorems
5. Transient Analysis
6. Circuit Simulation and Analysis Tools

Module 3: Mathematics for Engineers I (EEE103)

1. Mathematical Functions and Calculus
2. Linear Algebra
3. Differential Equations
4. Complex Numbers and Phasors
5. Fourier Series and Transforms
6. Applications in Electrical Engineering

Module 4: Physics for Engineers (EEE104)

1. Mechanics and Newtonian Physics
2. Electricity and Magnetism
3. Optics and Wave Phenomena
4. Thermodynamics
5. Introduction to Quantum Physics
6. Applications in Electrical Engineering

Module 5: Programming Fundamentals (EEE105)

1. Introduction to Programming
2. Programming Logic and Control Structures
3. Data Types and Variables
4. Functions and Procedures
5. Debugging and Error Handling
6. Introduction to a Programming Language (e.g., Python or C)

Module 6: Engineering Drawing (EEE106)

1. Basics of Engineering Drawing
2. Geometric Dimensioning and Tolerancing (GD&T)
3. Electrical and Electronic Symbols
4. CAD Software and Drawing Tools
5. Circuit Diagrams and Schematics
6. Drawing Interpretation and Documentation

The pattern continues for subsequent semesters and modules.

Semester 2:

Module 7: Electronics I (EEE201)

1. Semiconductor Physics and Devices
2. Diodes and Rectifiers
3. Bipolar Junction Transistors (BJTs)
4. Field-Effect Transistors (FETs)
5. Amplifiers and Oscillators
6. Electronic Circuits Simulation

Module 8: Circuit Analysis II (EEE202)

1. Laplace Transforms
2. Frequency Response Analysis
3. Two-Port Networks
4. Filters and Resonance
5. Power Analysis in AC Circuits
6. Applications in Signal Processing

Module 9: Mathematics for Engineers II (EEE203)

1. Multivariable Calculus
2. Vector Calculus
3. Partial Differential Equations
4. Numerical Methods
5. Probability and Statistics
6. Applications in Electrical Engineering

Module 10: Electromagnetic Fields and Waves (EEE204)

1. Electrostatics and Magnetostatics
2. Maxwell's Equations
3. Electromagnetic Waves
4. Transmission Lines
5. Antennas and Propagation
6. Applications in RF and Microwave Engineering

Module 11: Digital Logic Design (EEE205)

1. Boolean Algebra and Logic Gates
2. Combinational Logic Circuits
3. Sequential Logic Circuits
4. Memory Devices
5. Programmable Logic Devices (PLDs)
6. Digital Circuit Simulation and Design Tools

Module 12: Electronics I Lab (EEE206) Hands-on laboratory sessions related to Electronics I topics, reinforcing theoretical concepts through practical applications.

The pattern continues for subsequent semesters and modules.

Semester 3:

Module 13: Signals and Systems (EEE301)

1. Continuous-Time and Discrete-Time Signals
2. Linear Time-Invariant Systems
3. Fourier Analysis
4. Laplace and Z-Transforms
5. System Response and Stability
6. Applications in Communication Systems

Module 14: Control Systems (EEE302)

1. Introduction to Control Systems
2. Modeling of Dynamic Systems
3. Time and Frequency Domain Analysis
4. Control System Design
5. Stability and Compensation Techniques
6. Applications in Robotics and Automation

Module 15: Electrical Machines (EEE303)

1. Principles of Electromechanical Energy Conversion
2. DC Machines
3. Induction Machines
4. Synchronous Machines
5. Transformers
6. Applications in Power Systems

Module 16: Analog Electronics (EEE304)

1. Operational Amplifiers
2. Feedback and Stability
3. Analog Filters
4. Oscillators and Waveform Generators
5. Analog Integrated Circuits
6. Applications in Audio and RF Systems

Module 17: Digital Signal Processing (EEE305)

1. Discrete-Time Signals and Systems
2. Fourier Transform and Spectral Analysis
3. Digital Filters
4. Signal Processing Algorithms
5. DSP Hardware and Software
6. Applications in Image and Speech Processing

Module 18: Control Systems Lab (EEE306) Hands-on laboratory sessions related to Control Systems topics, reinforcing theoretical concepts through practical applications.

The pattern continues for subsequent semesters and modules.

Semester 4:

Module 19: Power Systems Analysis (EEE401)

1. Power Generation and Transmission
2. Power Flow Analysis
3. Fault Analysis and Protection
4. Power System Stability
5. Renewable Energy Integration
6. Applications in Smart Grids

Module 20: Communication Systems (EEE402)

1. Analog and Digital Modulation Techniques
2. Signal Transmission and Reception
3. Noise and Error Control
4. Multiple Access Techniques
5. Wireless Communication Systems
6. Applications in Networking and Telecommunications

Module 21: Microprocessors and Microcontrollers (EEE403)

1. Architecture and Organization of Microprocessors
2. Instruction Set and Programming
3. Interfacing and Peripheral Devices
4. Embedded Systems Design
5. Real-Time Operating Systems
6. Applications in IoT and Embedded Systems

Module 22: Power Electronics (EEE404)

1. Power Semiconductor Devices
2. AC-DC and DC-DC Converters
3. Inverters and PWM Techniques
4. Power Quality and Harmonics
5. Motor Drives and Control
6. Applications in Electric Vehicles and Renewable Energy

Module 23: Embedded Systems (EEE405)

1. Embedded System Architecture
2. Real-Time Operating Systems
3. Embedded Software Development
4. System-on-Chip (SoC) Design
5. IoT Protocols and Communication
6. Applications in Robotics and Automation

Module 24: Power Systems Lab (EEE406) Hands-on laboratory sessions related to Power Systems Analysis topics, reinforcing theoretical concepts through practical applications.

The pattern continues for subsequent semesters and modules.

Semester 5:

Module 25: Digital Communication Systems (EEE501)

1. Digital Modulation and Demodulation
2. Channel Coding and Error Correction
3. Spread Spectrum and CDMA
4. OFDM and MIMO Techniques
5. Software-Defined Radio
6. Applications in Digital Broadcasting and Cellular Networks

Module 26: Renewable Energy Systems (EEE502)

1. Solar Photovoltaic Systems
2. Wind Energy Conversion
3. Biomass and Bioenergy
4. Hydropower Systems
5. Energy Storage Technologies
6. Applications in Sustainable Energy

Module 27: VLSI Design (EEE503)

1. VLSI Design Process and Methodologies
2. CMOS Technology and Circuit Design
3. VLSI Testing and Verification
4. FPGA-based Design
5. Low Power VLSI Design Techniques
6. Applications in Digital Systems and ASICs

Module 28: High Voltage Engineering (EEE504)

1. High Voltage Generation and Insulation
2. Breakdown Phenomena and Dielectric Materials
3. Overvoltage Protection
4. HVDC Transmission
5. Lightning Protection
6. Applications in Power Systems and T&D

Module 29: Wireless Communication (EEE505)

1. Wireless Propagation and Channel Models
2. Multiple Access and Cellular Networks
3. Satellite Communication
4. 5G and Beyond
5. Security in Wireless Networks
6. Applications in IoT and Mobile Communication

Module 30: VLSI Design Lab (EEE506) Hands-on laboratory sessions related to VLSI Design topics, reinforcing theoretical concepts through practical applications.

The pattern continues for subsequent semesters and modules.

Semester 6:

Module 31: Power System Protection and Switchgear (EEE601)

1. Principles of Power System Protection
2. Protective Relaying Techniques
3. Circuit Breakers and Switchgear
4. Fault Analysis and Disturbance Recording
5. Digital Protection and SCADA Systems
6. Applications in Power Distribution

Module 32: RF and Microwave Engineering (EEE602)

1. RF Circuit Design and Analysis
2. Microwave Components and Devices
3. Transmission Lines and Waveguides
4. Microwave Antennas
5. Radar Systems
6. Applications in Wireless Communication and Radar

Module 33: Optical Communication Systems (EEE603)

1. Optical Fiber Basics and Components
2. Optical Modulation and Demodulation
3. Fiber Optic Communication Systems
4. Wavelength Division Multiplexing (WDM)
5. Optical Networks
6. Applications in Telecommunication

Module 34: Robotics and Automation (EEE604)

1. Introduction to Robotics
2. Kinematics and Dynamics of Robots
3. Robot Control Systems
4. Industrial Automation
5. AI and Machine Learning in Robotics
6. Applications in Manufacturing and Industry 4.0

Module 35: Final Year Project (EEE605)

1. Project Proposal and Planning
2. Literature Review
3. Design and Implementation
4. Testing and Evaluation
5. Project Documentation
6. Presentation and Demonstration

Module 36: Industrial Training (Internship) (EEE606) Practical training in an industrial setting, allowing students to apply their knowledge and skills in real-world engineering projects.

Note: The content and structure of the later semesters are designed to provide students with advanced knowledge, practical skills, and exposure to emerging technologies in electrical and electronic engineering.