Course Description – B.Tech Electrical and Electronics Engineering

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Program: **Bachelor of Technology in Electrical and Electronics Engineering**
Institution: National Institute of Technology Calicut (NITC)
Period: July 2019 – June 2023

1. Executive Summary

This report intends to provide a detailed, content-specific analysis of the curriculum completed for the Bachelor of Technology (B.Tech) degree in Electrical and Electronics Engineering, based on my chosen study workload, at the National Institute of Technology Calicut (NITC). The National Institute of Technology Calicut is an "Institution of National Importance" under the NIT Act 2007. The program is accredited by the National Board of Accreditation (NBA).

The curriculum follows a credit-based semester system. The academic framework at NITC follows a rigorous credit-based semester system, structured to align with international academic norms such as the European Credit Transfer and Accumulation System (ECTS) and the United States credit system, facilitating seamless evaluations for graduate admissions. The medium of instruction and examination for all courses was English. For source verification and curriculum details, please refer to the end of the document where you can find references for the information gathered.

Grading System

Performance is evaluated on a 10-point scale :

- **S (10):** Outstanding
- **A (9):** Excellent
- **B (8):** Very Good
- **C (7):** Good
- **D (6):** Average
- **E (5):** Satisfactory/Pass
- **F (0):** Failure
- **R (0):** Insufficient Attendance

2. Course Summary Table

Course Code	Course Title	Credits	Total Hours	Area
ZZ1004D	Computer Programming	2	26	CS / Data Science
EE3038D	Data Structures and Algorithms	3	39	CS / Data Science
EE3026D	ANN and Fuzzy Logic	3	39	CS / Data Science
EE3043D	Embedded Systems	3	39	CS / Data Science
EE4021D	Heuristic Methods for Optimization	3	39	CS / Data Science
CS4067D	Foundations of Programming	4	65	CS / Data Science
EC4070D	Internet of Things (IoT)	3	39	CS / Data Science
MA1001D	Mathematics-I	3	39	Mathematics
MA1002D	Mathematics-II	3	39	Mathematics
MA2001D	Mathematics-III	3	39	Mathematics
MA2002D	Mathematics-IV	3	39	Mathematics
PH1001D	Physics	3	39	Physics / Eng.
ZZ1003D	Basic Electrical Sciences	3	39	Core Engineering
EE2001D	Circuits and Networks	3	39	Core Engineering
EE2003D	Logic Design	3	39	Core Engineering
EE2005D	Electrical Measurements	3	39	Core Engineering

EE2007D	Basic Electronic Circuits	3	39	Core Engineering
EE2008D	Analog Electronic Circuits and Systems	3	39	Core Engineering
EE2002D	Signals and Systems	3	39	Core Engineering
EE3002D	Digital Signal Processing	3	39	Core Engineering
EE3001D	Control Systems-I	3	39	Core Engineering
EE3004D	Control Systems-II	3	39	Core Engineering
EE2004D	Microprocessors and Microcontrollers	3	39	Core Engineering
EE3007D	Power Electronics	3	39	Core Engineering
EE2009D	Applied Electromagnetics	3	39	Core Engineering
EE4001D	Instrumentation Systems	3	39	Core Engineering
EE2006D	Electrical Machines-I	3	39	Power Systems
EE3003D	Electrical Machines-II	3	39	Power Systems
EE3005D	Power Systems-I	3	39	Power Systems
EE3006D	Power Systems-II	3	39	Power Systems
EE4091D	Project-Part 1	3	39	Project
EE4092D	Project-Part 2	6	117	Project
MS1001D	Professional Communication	3	39	Humanities
ME3104D	Principles of Management	3	39	Management
MS3001D	Engineering Economics	3	39	Economics

3. Computer Science and Data Science Coursework

ZZ1004D: Computer Programming

- **Credits:** 2
- **Total Hours:** 26
- **Module 1: Data Types, Operators, and Control Flow (10 Hours):** Variables and constants; declarations; arithmetic and logical operators; assignment operator; Input/Output. Control flow statements: if-else, switch, while, for, do-while, break, continue, goto, and labels.
- **Module 2: Modular Programming (8 Hours):** Basics of functions; parameter passing mechanisms; scope rules; recursion.
- **Module 3: Aggregate Data Types and Pointers (8 Hours):** Single and multidimensional arrays; structures and unions. Pointers to arrays and structures; passing arrays and pointers as arguments to functions.

EE3038D: Data Structures and Algorithms

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Complexity Analysis and Database Foundations (13 Hours):** Field applications of structured data; Embedded systems and DBMS; Data abstraction; Relational and Distributed systems; Entity-Relationship modeling; Normal forms. Complexity analysis: Time and space complexity; asymptotic notations; Polynomial complexity; NP and NP-Hard problems.
- **Module 2: Linear and Non-Linear Data Structures (13 Hours):** Stacks, Queues, Lists, Dictionaries. Linked lists; Trees; Graphs (array and linked list implementation). Binary Trees (in-order, pre-order, post-order traversals); Expression Trees; AVL Trees; Red-Black Trees; B-Trees; Hashing and Hash tables. Implementation in C and Python.
- **Module 3: Algorithm Design Paradigms (13 Hours):** Divide & Conquer; Greedy Methods. Searching: Sequential, Binary. Sorting: n^2 sorts (Bubble, Insertion, Selection) and *nlogn* sorts (Quick, Heap, Merge). Recursion; Travelling Salesman Problem; Dynamic Programming; Randomized Algorithms; Thread-safe computations.

EE3026D: Artificial Neural Networks and Fuzzy Logic Systems

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Artificial Neural Networks (ANN) (9 Hours):** Biological vs. Artificial Neuron Models; Activation functions; Learning strategies (supervised, unsupervised, reinforcement); Perceptron Models; Training algorithms; Limitations of single-layer models; Computer-based simulation.
- **Module 2: Multilayer Networks and Backpropagation (10 Hours):** Backpropagation Algorithm; Convergence limitations; Radial Basis Function (RBF) networks; Covers theorem; Separability of patterns; RBF learning strategies; Applications in forecasting and pattern recognition.
- **Module 3: Fuzzy Logic Systems (11 Hours):** Classical vs. Fuzzy sets; Membership functions; Operations and properties; Fuzzy relations; Cardinalities; Fuzzification; Rule base development; Defuzzification methods.
- **Module 4: Fuzzy Inference and Hybrid Systems (9 Hours):** Mamdani and Sugeno Fuzzy Models; Adaptive Neuro-Fuzzy Inference Systems (ANFIS); Applications in function approximation, control, fault diagnosis, and load forecasting.

EE3043D: Embedded Systems

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: System Architecture (12 Hours):** Embedded system categories and figures of merit; Hardware and software architecture; MCU internals (Timers, Interrupts, DMA, Serial Communication); Memory types (Flash, SRAM, DRAM); Debugging tools (Simulators, Emulators); Sensors and actuators.
- **Module 2: ARM Processor Architecture (12 Hours):** ARM Architecture versions; Thumb-2 Instruction Set; Assembly and C programming for ARM; ARM 7 Bus structure; Peripherals (GPIO, Timers, Interrupts); Introduction to Cortex Series.
- **Module 3: Design Lifecycle and Networking (3 Hours):** Embedded Product Development Life Cycle (EDLC); Hardware testing (Boundary Scan); Networks: I2C, SPI, AMBA, CAN.
- **Module 4: Operating Systems (12 Hours):** Firmware concepts; Linux Kernel; File systems; Bootloaders (U-boot); Real-Time Operating Systems (RTOS); Scheduling; Multiprocessing; Multithreading; Inter-process communication; Device Drivers.

EE4021D: Heuristic Methods for Optimization

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Genetic Algorithms (10 Hours):** Optimization problem classification; Evolutionary computation history; Genetic algorithm process: parent selection, crossover, mutation; Application to engineering problems.
- **Module 2: Particle Swarm Optimization (PSO) (10 Hours):** Discrete PSO; PSO for MINLPS; Hybrid PSO; Adaptive PSO; Evolutionary PSO.
- **Module 3: Simulated Annealing and Tabu Search (11 Hours):** Simulated Annealing algorithm and applications. Tabu Search: Problem formulation and basic algorithm.
- **Module 4: Ant Colony Optimization (ACO) (8 Hours):** Ant colony algorithms; Distributed computations; Pheromone feedback mechanisms; Greedy search; Applications.

CS4067D: Foundations of Programming

- **Credits:** 4
- **Total Hours:** 39 Theory + 26 Practical
- **Module 1 (10T+7P Hours):** Programming methodology: Specification, Design, Coding. Separation of concerns (correctness, efficiency, maintainability). Fundamental concepts in programming languages.
- **Module 2 (10T+7P Hours):** Procedural Abstraction: Environment models; Combinators; Evaluation strategies; Substitution model; Linear vs. Tree recursion. Higher-order procedures.
- **Module 3 (10T+6P Hours):** Data Abstraction: Hierarchical data; Closure property; Data Directed Programming; Generic Operators.
- **Module 4 (9T+6P Hours):** Modular Design: Object-oriented concepts; Local state; Environment model of evaluation; Encapsulation; Inheritance; Polymorphism.

EC4070D: Internet of Things (IoT)

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: M2M and Architecture (16 Hours):** M2M Value Chains; IoT Architecture; Devices and Gateways; Local and Wide Area Networking; Data Management; Everything as a Service (XaaS); M2M and IoT Analytics.
- **Module 2: Protocols (10 Hours):** IoT processing platforms; Cloud computing models; Protocols: Zigbee, BLE, 6LoWPAN. Fog Computing; Industrial IoT; Health care applications.
- **Module 3: Processor Architectures (13 Hours):** Intel architecture (80286 to Pentium); Pipelining; Superscalar execution; Out-of-order execution; Branch prediction; Register renaming; Multicore processors; ARM Cortex-M architecture.

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4. Foundational Mathematics and Statistics

MA1001D: Mathematics-I

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Calculus of One and Several Variables (13 Hours):** Limits, continuity, differentiability; Mean Value Theorems; Taylor's theorem. Partial derivatives; Saddle points; Hessian matrix; Method of Lagrange Multipliers.
- **Module 2: Sequence, Series, and Integration (13 Hours):** Convergence tests for sequences and series; Power series; Uniform convergence. Multiple integrals (Double/Triple); Change of variables; Jacobians; Polar coordinates.
- **Module 3: Vector Calculus (13 Hours):** Parameterized curves; Gradient, Curl, Divergence; Scalar potential. Integral theorems: Green’s, Stokes’, and Gauss’ Divergence Theorem.

MA1002D: Mathematics-II

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Linear Algebra (16 Hours):** Systems of linear equations; Gauss elimination; LU decomposition; Rank; Linear independence. Vector spaces; Subspaces; Basis and dimension; Linear transformations. Eigenvalues; Eigenvectors; Cayley-Hamilton theorem; Diagonalization; Quadratic forms.
- **Module 2: Ordinary Differential Equations (ODE) (13 Hours):** First order ODEs (existence and uniqueness); Linear ODEs; Wronskian; Method of variation of parameters; Euler-Cauchy equations; System of linear ODEs.
- **Module 3: Laplace Transforms (10 Hours):** Gamma/Beta functions; Laplace transforms; Inverse transforms; Convolution; Solution of differential and integral equations using Laplace transforms.

MA2001D: Mathematics-III

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Probability Distributions (15 Hours):** Random variables; Expectation; Variance; Moment generating functions. Discrete distributions (Binomial, Poisson); Continuous distributions (Normal, Gamma, Weibull). Joint distributions; Marginal and conditional distributions.
- **Module 2: Statistical Inference (14 Hours):** Sampling distributions; Point estimation (Maximum Likelihood, Method of Moments); Interval estimation. Hypothesis testing: Tests concerning means, variances, and proportions; Chi-square test for goodness of fit.
- **Module 3: Regression and ANOVA (10 Hours):** Analysis of Variance (ANOVA); Randomized block design. Curve fitting; Method of Least Squares; Linear regression; Correlation coefficient.

MA2002D: Mathematics-IV

- **Credits:** 3
- **Total Hours:** 39
- **Module 1: Series Solutions (11 Hours):** Power series solutions; Legendre Equation and Polynomials; Frobenius Method; Bessel's Equation and functions; Sturm-Liouville Problems; Orthogonal eigenfunction expansions.
- **Module 2: Partial Differential Equations (PDE) (10 Hours):** First order linear and nonlinear PDEs; Charpit's Method. Classification of second order PDEs. Solution of Wave, Heat, and Laplace equations using separation of variables and Fourier series.
- **Module 3 & 4: Complex Analysis (18 Hours):** Analytic functions; Cauchy-Riemann equations; Conformal Mapping; Bilinear transformations. Complex Integration: Cauchy's Integral Theorem/Formula; Taylor/Laurent series; Residue Theorem; Evaluation of real integrals.

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5. Core Engineering and Physics

PH1001D: Physics & PH1091D: Lab

- **Total Credits:** 4 (3 Theory + 1 Lab)
- **Theory Content:** Quantum Physics (Schrödinger equation, barrier tunneling); Solid State Physics (Band theory, Fermi-Dirac distribution).
- **Lab Content:** Magnetic Hysteresis; Hall Effect; Solar Cell characteristics; Band Gap determination; Planck's constant determination.

ZZ1003D: Basic Electrical Sciences

- **Credits:** 3
- **Total Hours:** 39
- **Module 1 & 2:** Circuit analysis (Mesh/Node); Network theorems (Thevenin, Norton, Superposition); AC circuit analysis (RL, RC, RLC); Magnetic circuits.
- **Module 3 & 4:** Sensors (Piezoelectric, Thermoelectric); Operational Amplifiers (Inverting, Non-inverting, Integrator); Digital Electronics (Logic gates, K-maps, Flip-flops, ADC/DAC basics).

EE2001D: Circuits and Networks

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Circuits with dependent sources; Two-Port Networks (Z, Y, H, ABCD parameters); Interconnection of two-ports.
- **Module 2:** Three-phase balanced and unbalanced circuits; Symmetrical components.
- **Module 3:** Time-domain analysis; Laplace transform applications in circuit analysis; Transfer functions; Pole-zero plots.
- **Module 4:** Frequency response; Fourier series representation of non-sinusoidal waveforms; Passive filters (Low-pass, High-pass).

EE2003D: Logic Design

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Combinational Logic: Boolean algebra; K-Maps; Adders; Decoders; Multiplexers.
- **Module 2:** Sequential Logic: Latches; Flip-flops (SR, JK, D, T); Shift Registers; Counters (Ripple, Synchronous, Ring).
- **Module 3:** Finite State Machines: State diagrams; State reduction; Analysis of asynchronous sequential logic; Race conditions.
- **Module 4:** Programmable Logic: RAM; ROM; PLA; PAL.

EE2007D: Basic Electronic Circuits

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Semiconductor physics: Diodes; BJTs; JFETs; MOSFETs; Biasing and thermal stability.
- **Module 2:** Amplifier Analysis: Small signal models; CE, CB, CC configurations; CS and CD amplifiers.
- **Module 3:** Frequency Response: Low and high frequency response; Miller effect.
- **Module 4:** Digital Circuits: Switching characteristics; TTL, ECL, and CMOS logic families; Propagation delay; Power dissipation.

EE2008D: Analog Electronic Circuits and Systems

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Operational Amplifiers: Differential amplifiers; Ideal vs. practical Op-Amps; Applications (Summing, Integrating, Differentiating); Voltage regulators.
- **Module 2:** Feedback and Oscillators: Voltage series/shunt feedback; Stability (Barkhausen criterion); Phase shift and Wein's bridge oscillators.
- **Module 3:** Nonlinear Applications: Comparators; Schmitt trigger; 555 Timer; Phase Locked Loops (PLL).
- **Module 4:** Signal Conditioning: Active filters (Butterworth); A/D and D/A converters (Successive Approximation, Dual Slope, R-2R ladder).

EE2002D: Signals and Systems

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Signal classification; LTI systems; Convolution integral; Differential equation models.
- **Module 2:** Impulse response; Step response; Stability analysis.
- **Module 3:** Frequency Domain: Fourier Transforms (CTFT); Sampling theorem; Laplace Transforms; Transfer functions.
- **Module 4:** Discrete-Time Systems: Z-Transforms; Difference equations; Discrete-time convolution; Frequency response of DT systems.

EE3002D: Digital Signal Processing (DSP)

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Discrete Time Fourier Transform (DTFT); Discrete Fourier Series (DFS).
- **Module 2:** Z-Transforms: ROC; System transfer function; All-pass and Minimum phase systems.
- **Module 3:** Filter Design: IIR filters (Butterworth, Impulse Invariant, Bilinear transform); FIR filters (Windowing method).
- **Module 4:** DFT and FFT: Discrete Fourier Transform properties; Fast Fourier Transform (Radix-2 DIT/DIF); Linear vs. Circular convolution.

EE3001D & EE3004D: Control Systems I & II

- **Total Credits:** 6
- **Total Hours:** 78
- **Control Systems I:** Transfer functions; Block diagram reduction; Time domain analysis; Routh-Hurwitz stability; Root Locus; Bode plots; Nyquist plots; State space analysis.
- **Control Systems II:** Discrete time control systems; Z-transform analysis; State space design (Controllability, Observability, Pole placement); Nonlinear systems (Phase plane, Lyapunov stability).

EE2004D: Microprocessors and Microcontrollers

- **Credits:** 3
- **Total Hours:** 39
- **Module 1 & 2:** PIC Microcontroller architecture; CISC vs. RISC; Assembly programming; I/O interfacing.
- **Module 3:** MSP430 family; Low power RISC architecture.
- **Module 4 & 5:** Intel 8086 architecture; Addressing modes; Interrupts; Peripheral interfacing (8255, 8253, 8251, 8259).

EE3007D: Power Electronics

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Power semiconductor switches: Thyristors, MOSFETs, IGBTs.
- **Module 2:** Rectifiers: Phase controlled converters (Single/Three phase).
- **Module 3:** Inverters and Cycloconverters: PWM inverters; AC voltage regulators.
- **Module 4:** DC-DC Converters: Choppers; Buck/Boost regulators; Switched Mode Power Supply (SMPS).

EE2009D: Applied Electromagnetics

- **Credits:** 3
- **Total Hours:** 39
- **Module 1 & 2:** Coordinate systems; Electrostatics (Gauss's Law, Poisson's equation); Magnetostatics (Biot-Savart Law, Ampere's Law).
- **Module 3:** Maxwell's Equations; Poynting's Theorem; Plane wave propagation.
- **Module 4:** Transmission lines; Reflection coefficient; VSWR.

EE4001D: Instrumentation Systems

- **Credits:** 3
- **Total Hours:** 39
- **Module 1:** Measurement errors; Statistical analysis; Calibration standards.
- **Module 2:** Amplifiers; Measurement of non-electrical quantities (Temperature, Pressure, Flow).
- **Module 3:** Transducers: Resistive, Capacitive, Inductive, Piezoelectric.
- **Module 4:** Data Acquisition; Programmable Logic Controllers (PLC); Distributed Control Systems (DCS).

6. Electrical Machines and Power Systems

Electrical Machines Sequence

- **EE2006D Electrical Machines-I:** DC Generators and Motors (Construction, Characteristics, Speed Control, Testing); Transformers (Equivalent circuit, Regulation, Efficiency, Parallel operation).[1]
- **EE3003D Electrical Machines-II:** Alternators (Voltage regulation methods, Parallel operation); Synchronous Motors (V-curves); Induction Motors (Torque-slip characteristics, Speed control); Generalized Machine Theory.

Power Systems Sequence

- **EE3005D Power Systems-I:** Generation economics; Transmission line parameters (Inductance, Capacitance); Distribution system design; Switchgear and Protection.
- **EE3006D Power Systems-II:** Transmission line modeling; Load Flow Studies (Gauss-Seidal, Newton-Raphson); Short Circuit Analysis (Z-bus algorithm); Economic Dispatch; Power System Stability (Swing equation, Equal area criterion).

7. Laboratory and Practical Training

- **EE2091D: Basic Electrical Engineering Lab:** Verification of circuit theorems; Load characteristics of electrical devices.
- **EE2094D: Electronics Lab-I:** Characteristics of Diodes, BJTs, FETs; Rectifiers; Amplifiers.
- **EE3093D: Electronics Lab-II:** Op-Amp circuits (Filters, Oscillators, DAC/ADC); PLL applications.
- **EE3091D / EE3092D (Machines Labs):** Load tests on DC machines and Induction motors; Regulation of Alternators.
- **EE4095D: Control Systems Lab:** Modeling of DC motors and Inverted Pendulum; MATLAB simulation; Real-time control using dSPACE and PLC.
- **EE4093D: Power Engineering Lab:** Relay characteristics; Power converter design; Load flow/Short circuit analysis using PSCAD and ETAP.

8. Projects and Research Components

- **EE4091D: Project-Part 1 (3 Credits):** Problem identification; Literature survey; Formulation of design proposal.
    - **Problem Identification:** Analyzed voltage instability issues in DC microgrids due to renewable energy fluctuations and Constant Power Loads.
    - **Preliminary Work:** Implemented a Deep Q-Learning algorithm for fake banknote detection to establish a foundation in Reinforcement Learning, achieving 98.7% accuracy compared to 97% with SVM.
    - **Proposal Formulation:** Proposed a model-free control strategy using the DDPG algorithm to replace conventional PID/MPC methods for DC-DC converters.

- **EE4092D: Project-Part 2 (6 Credits, 117 Hours):** Implementation of design; Analytical studies; Validation of results; Thesis submission and defense.
    - **Implementation:** Developed a MATLAB/Simulink simulation for a Boost DC-DC converter integrated with a DDPG agent utilizing an Actor-Critic neural network architecture.
    - **Analytical Studies:** Tuned hyperparameters (learning rate, discount factor) to optimize the reward function for nominal voltage maintenance.
    - **Validation:** Conducted comparative analysis against a PID controller; the DRL model showed a 68% reduction in settling time (0.11s vs 0.35s) and lower peak overshoot under voltage variations.
    - **Thesis Defense:** Submitted and defended the efficacy of self-optimizing DRL agents in power electronic systems.

- **EE4094D: Seminar (1 Credit):**
    - **Coursework:** Conducted an in-depth study of research papers, followed by a summary, critical review of technical literature, and an oral presentation.
    - **Seminar Topic:** Presented on "Heuristic Energy Management of Hybrid Electric Vehicle based on DRL with Accelerated Gradient Optimization," analyzing the application of Deep Reinforcement Learning for optimizing energy efficiency in hybrid electric vehicles.

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9. Humanities, Management, and Economics

- **MS1001D: Professional Communication:** Technical writing; Presentation skills; Verbal/non-verbal communication.
- **ME3104D: Principles of Management:** Planning; Organizing; Decision making models; Functional management (HR, Marketing).
- **MS3001D: Engineering Economics:** Micro/Macroeconomics; Cost concepts; Break-even analysis; Financial indicators (NPV, IRR).
- **ZZ1094D: Value Education:** Social justice; Human rights; Professional ethics.

10. Basic Sciences and Foundational Engineering

- **Basic Sciences:**
  - **PH1001D Physics / CY1001D Chemistry:** Quantum physics; Solid state physics; Spectroscopy; Electrochemistry.
  - **BT1001D Introduction to Life Science:** Biomolecules; Cell structure; Genetics.
- **Engineering Foundations:**
  - **ZZ1001D Engineering Mechanics:** Statics and dynamics.
  - **ZZ1002D Engineering Graphics:** Orthographic projection; CAD.
  - **ME2010D Mechanical Engineering:** Thermodynamics; Fluid Mechanics.
  - **ZZ1091D/ZZ1092D Workshops:** Carpentry; Fitting; Electrical wiring

11. Specialized Electives and Non-Credit Courses

- **EE3029D: Electric Power Utilization:** Electric traction; Heating; Illumination.
- **EE3032D: Illumination Engineering:** Photometry; Light sources; Lighting design.
- **EE3037D: Non-Conventional Energy Systems:** Solar; Wind; Biomass; Fuel cells.
- **Mandatory Non-Credit Courses:** Physical Education (ZZ1093D); Environmental Studies (EE2011D); NSS (ZZ1095D).

12. Sources and Verification

This Course Description Document is based on the official curriculum of:

National Institute of Technology Calicut (NITC)
B.Tech in Electrical and Electronics Engineering (EEE)
Curriculum Year: 2017 (Applicable for students from 2019-2023)
Department of Electrical Engineering

NIT Calicut periodically revises its undergraduate curricula.

The 2017 EEE Curriculum & Syllabi was the version officially applicable to my batch (**2019-2023**).

Digital Verification: The official 2017 EEE Curriculum is available on the NITC website at the following permanent link:
https://nitc.ac.in/imgserver/uploads/attachments/Ed__56a3cdac-0189-4ad6-bb18-b94b9887cc6e_.pdf *(Accessed: November 2025)*

Cross-Referenced Courses

A small number of courses I had selected during my programme were courses under other departments. Accordingly, the following official curriculum booklets were used for verification:

2017 ECE Curriculum – for "Introduction to Internet of Things (IoT)"
Digital Verification: The official 2017 ECE Curriculum is available on the NITC website at the following permanent link:
https://nitc.ac.in/imgserver/uploads/attachments/curriculum-and-brief-syllabus---2017-btech_08a425ec-10f9-4fe0-b892-60207cf33881_0.pdf *(Accessed: November 2025)*

2017 CSE Curriculum – for "Foundations of Programming (FOP)"
Digital Verification: The official 2017 CSE Curriculum is available on the NITC website at the following permanent link:
https://nitc.ac.in/imgserver/uploads/attachments/btech-curriculum-2017_cb1ecc9f-cdb8-43c6-9eb6-3c81243256b1_0.pdf *(Accessed: November 2025)*

Accreditation Context

NITC's B.Tech programmes are accredited by the National Board of Accreditation (NBA), Government of India.
The current accreditation cycle (2022–2028) applies to the latest curriculum revision, but the curriculum applicable to my batch remains the 2017 syllabus.

Verification Note

All course descriptions, modules, and hour distributions in this document were transcribed and condensed from the official NITC Curriculum Booklets (EEE 2017, ECE 2017, CSE 2017).
The complete official syllabus documents are available upon request.