

Proposed Curriculum Framework

Bachelor of Science (B.Sc.) in Electronics

University of Engineering & Management (UEM), Jaipur

(NEP 2020 Aligned | Semiconductor, Embedded Systems & AI Integrated | Industry-Oriented | Effective from Academic Session 2026–27)

Programme Duration: 4 Years (8 Semesters)

Total Credits: 160 Credits (20 Credits/Semester)

Eligibility: 10+2 with Physics and Mathematics (Chemistry/Computer Science preferred)

Multiple Exit Options (NEP 2020)

- * After 1 Year: Certificate in Electronic Systems
- * After 2 Years: Diploma in Electronics Technology
- * After 3 Years: B.Sc. Electronics
- * After 4 Years: B.Sc. Electronics (Honours/Research)

The curriculum is designed by benchmarking modern NEP-aligned Electronics programmes offered by leading Indian universities and incorporates emerging domains such as semiconductor technology, embedded systems, IoT, VLSI, AI-enabled electronics, robotics, renewable energy systems, and Industry 4.0 applications.

Programme Educational Objectives (PEOs)

Graduates will be able to:

- * Build strong theoretical and practical foundations in electronics.
- * Design, analyze, and troubleshoot analog and digital electronic systems.
- * Develop embedded systems and IoT-based applications.
- * Apply AI, signal processing, and automation in modern electronic systems.
- * Contribute to India's Semiconductor Mission and Electronics Manufacturing ecosystem.

- * Pursue higher education, research, entrepreneurship, and careers in electronics industries.
-

Programme Outcomes (POs)

Graduates will be able to:

- * Analyze electronic circuits and systems.
 - * Design analog and digital electronic devices.
 - * Develop embedded and IoT solutions.
 - * Apply semiconductor technologies in product development.
 - * Use simulation software and modern laboratory tools.
 - * Demonstrate innovation, ethics, teamwork, and lifelong learning.
-

Semester I (20 Credits)

Course Credits

Engineering Mathematics-I	4
Semiconductor Devices & Electronic Components	4
Basic Electrical & Electronic Circuits	4
Programming Fundamentals using Python	2
Electronics Laboratory-I	4
Environmental Science / Value Added Course	2

Course Highlights

Semiconductor Devices

- * Atomic Structure
- * PN Junction
- * Diodes
- * Bipolar Junction Transistor (BJT)

- * Field Effect Transistor (FET)
- * MOSFET
- * Power Semiconductor Devices

Laboratory

- * Basic Circuit Design
 - * Soldering
 - * PCB Assembly
 - * Multimeter
 - * Oscilloscope
 - * Function Generator
-

Semester II (20 Credits)

Course Credits

Analog Electronics-I 4

Digital Electronics 4

Network Theory 4

Engineering Mathematics-II 2

Electronics Laboratory-II 4

Community Engagement / Ability Enhancement Course 2

Topics

- * Operational Amplifiers
- * Amplifiers
- * Oscillators
- * Boolean Algebra
- * Logic Gates

- * Flip-Flops
 - * Counters
 - * Registers
 - * Network Theorems
 - * AC Circuit Analysis
-

Semester III (20 Credits)

Course Credits

Analog Electronics-II 4

Microprocessors & Microcontrollers 4

Electronic Instrumentation 4

Embedded C Programming 2

Electronics Laboratory-III 3

Internship-I 3

Topics

- * 8086 Architecture
 - * ARM Fundamentals
 - * Arduino
 - * Sensors
 - * Signal Conditioning
 - * Measurement Systems
 - * Data Acquisition
-

Semester IV (20 Credits)

Course Credits

Signals & Systems 4

Communication Electronics	4
Embedded Systems	4
Research Methodology	2
Electronics Laboratory-IV	3
Minor Project	3

Topics

- * Fourier Analysis
- * Modulation
- * Demodulation
- * Embedded Linux
- * ARM Cortex
- * Real-Time Operating Systems (RTOS)

Semester V (20 Credits)

Course Credits

Digital Signal Processing	4
Internet of Things (IoT)	4
VLSI Design Fundamentals	4
Electronics Laboratory-V	2
Elective-I	3
Internship-II	3

Topics

- * DSP Algorithms
 - * FIR & IIR Filters
 - * IoT Protocols
 - * ESP32
 - * Raspberry Pi
 - * CMOS Technology
 - * FPGA Basics
 - * HDL (Verilog/VHDL)
-

Semester VI (20 Credits)

Course Credits

Wireless Communication	4
Industrial Automation & Robotics	4
Renewable Energy Electronics	4
Electronics Laboratory-VI	2
Elective-II	3
Industry Project	3

Topics

- * GSM
- * Wi-Fi
- * Bluetooth
- * ZigBee
- * PLC
- * SCADA

- * Robotics
 - * Solar Electronics
 - * Battery Management Systems
-

Semester VII (20 Credits)

Course Credits

Artificial Intelligence for Electronics	4
Advanced Embedded Systems	4
Semiconductor Manufacturing & Packaging	4
Elective-III	2
Research Project-I	3
Industrial Internship	3

Topics

- * Machine Learning Applications
 - * Edge AI
 - * Smart Sensors
 - * ASIC Design Flow
 - * Semiconductor Fabrication
 - * IC Packaging
 - * MEMS
 - * System-on-Chip (SoC)
-

Semester VIII (20 Credits)

Course Credits

Emerging Technologies in Electronics 4

Product Design & Innovation 4

Dissertation / Research Thesis / Startup Project 8

Seminar 2

Viva Voce 2

Suggested Electives

Semiconductor Technology

- * Advanced VLSI Design
- * CMOS Fabrication
- * Nanoelectronics
- * MEMS & NEMS

Embedded Systems

- * Real-Time Embedded Systems
- * Automotive Electronics
- * FPGA Design
- * System-on-Chip (SoC)

Communication

- * Optical Communication
- * Satellite Communication
- * 5G & 6G Technologies
- * Software Defined Radio

Artificial Intelligence

- * AI for Embedded Systems
- * Edge Computing
- * Computer Vision
- * Intelligent Robotics

Power Electronics

- * Electric Vehicle Electronics
- * Power Converters
- * Smart Grid Technologies
- * Energy Storage Systems

Industrial Electronics

- * PLC Programming
- * Industrial IoT
- * Automation Engineering
- * Digital Twins

Laboratory Components

Students will gain extensive hands-on experience in:

- * Analog Electronics
- * Digital Electronics
- * Electronic Instrumentation
- * PCB Design & Fabrication
- * Embedded Systems
- * Arduino & Raspberry Pi
- * FPGA Programming

- * VLSI Simulation
 - * MATLAB/Simulink
 - * IoT Development
 - * Communication Systems
 - * DSP
 - * Robotics
 - * Industrial Automation
-

Software & Industry Tools

Students will receive training in:

- * MATLAB & Simulink
- * Multisim
- * LTspice
- * Proteus
- * KiCad
- * Altium Designer (Introduction)
- * Xilinx Vivado
- * Keil μ Vision
- * Arduino IDE
- * STM32CubeIDE
- * Embedded Linux
- * Verilog HDL
- * VHDL
- * Python
- * LabVIEW
- * TensorFlow Lite
- * Git & GitHub

Internship Structure

Semester III

4 Weeks: Electronics Assembly & Testing Internship

Semester V

6 Weeks: Embedded Systems / IoT / Semiconductor Internship

Semester VII

8–10 Weeks: Industrial Internship / Research Project in Electronics

Suggested Industry Collaborations

- * Texas Instruments
- * Intel
- * Qualcomm
- * NVIDIA
- * NXP Semiconductors
- * STMicroelectronics
- * Analog Devices
- * Bosch
- * Siemens
- * Tata Electronics
- * Micron Technology
- * Tata Elxsi
- * BEL
- * CDAC
- * DRDO

- * ISRO
 - * Semiconductor Laboratory (SCL), Chandigarh
 - * Centre for Development of Advanced Computing (C-DAC)
-

Skill Enhancement Certifications

Students should be encouraged to complete certifications in:

- * Embedded Systems Design
 - * PCB Design
 - * Arduino & Raspberry Pi
 - * IoT Development
 - * MATLAB
 - * FPGA Programming
 - * VLSI Design
 - * Semiconductor Technology
 - * Industrial Automation
 - * Robotics
 - * AI for Edge Devices
 - * Python Programming
 - * EV Electronics
-

Assessment Pattern

- * Continuous Internal Assessment: 40%
- * End Semester Examination: 60%

Assessment methods include:

- * Laboratory performance
- * Circuit design assignments

- * Simulation exercises
 - * PCB design projects
 - * Mini-projects
 - * Industry case studies
 - * Technical seminars
 - * Internship reports
 - * Research publications
 - * Capstone project
 - * Viva voce
-

Career Opportunities

Graduates can pursue careers as:

- * Electronics Design Engineer
- * Embedded Systems Engineer
- * VLSI Design Engineer
- * Semiconductor Process Engineer
- * PCB Design Engineer
- * IoT Engineer
- * Automation Engineer
- * Robotics Engineer
- * FPGA Design Engineer
- * Test & Validation Engineer
- * Communication Systems Engineer
- * Instrumentation Engineer
- * Consumer Electronics Engineer
- * EV Electronics Engineer
- * AI Hardware Engineer

- * Research Associate
- * Technical Consultant
- * Electronics Entrepreneur

The programme also provides an excellent foundation for M.Sc. Electronics, M.Tech. (VLSI, Embedded Systems, Communication Systems, Robotics), MBA (Technology Management), Integrated Ph.D., and Ph.D., as well as competitive examinations such as GATE, CSIR-NET, ISRO, DRDO, BEL, BARC, CDAC, and UPSC Engineering-related services.

Distinctive Features for UEM Jaipur

To establish UEM Jaipur as a premier destination for Electronics education, the programme should include:

- * UEM Centre for Semiconductor Technology & Embedded Systems aligned with India's Semiconductor Mission.
- * Advanced VLSI and Chip Design Laboratory equipped with FPGA development boards, EDA software, and HDL design environments.
- * IoT, Robotics & Smart Systems Laboratory supporting interdisciplinary innovation.
- * Electronics Innovation & Product Development Centre with rapid prototyping, PCB fabrication, and hardware startup incubation.
- * Mandatory credit-based internships every academic year, integrated with live industry projects.
- * Annual UEM Electronics, Semiconductor & Embedded Systems Summit featuring industry leaders, researchers, and startup founders.
- * Integration of AI-enabled electronics, edge computing, robotics, semiconductor manufacturing, Industry 4.0, electric vehicle electronics, and sustainable technologies across the curriculum.
- * Collaborations with semiconductor companies, embedded systems industries, research laboratories, and national organizations to support internships, certifications, sponsored projects, and placements.

This curriculum combines rigorous theoretical foundations with extensive laboratory practice, modern software tools, industry exposure, research orientation, and entrepreneurship. It prepares graduates for India's rapidly expanding semiconductor, electronics manufacturing, embedded systems, automation, and intelligent systems sectors while remaining aligned with the objectives of the National Education Policy (NEP) 2020.