Bachelor of Engineering in Computer Engineering (4 Years, 240 ECTS)

A hardware-to-software engineering program focused on embedded systems, digital design, computer architecture, and edge AI, combining hands-on labs with systems-level thinking.

Program Overview

- **Award:** B.Eng. in Computer Engineering
- **Duration:** 8 Semesters (4 academic years)
- **Total Credits:** 240 ECTS
- **Delivery:** Lectures (L), Tutorials (T), Laboratories (P), Design Studio (S), Internship (I)
- **Workload:** 1 ECTS ≈ 25–30 hours
- **Program Pillars:** Digital Logic & FPGA • Computer Architecture • Embedded Systems • Operating Systems • Networks & Security • Electronics & Sensors • Real-Time Systems • Hardware/Software Co-Design • Engineering Design • Safety & Ethics
- **Signature Experiences:** FPGA design labs, embedded verification bootcamp, and a year-long capstone build.

Graduate Learning Outcomes

Graduates will be able to:

1. **System Design.** Design computing systems spanning hardware, firmware, and software components.

2. **Embedded Development.** Develop reliable embedded applications with real-time constraints and sensor integration.

3. **Digital Design.** Implement and verify digital circuits using HDLs and FPGA toolchains.

4. **Architecture & OS.** Analyze performance, memory, and concurrency across architectures and operating systems.

5. **Networking & Security.** Build networked systems and apply foundational cybersecurity practices.

6   **Testing & Debugging.** Use instrumentation and systematic debugging to isolate faults and validate designs.

7   **Teamwork & Ethics.** Collaborate in engineering teams and apply ethical, safety, and sustainability considerations.

8   **Industry Applications.** Apply computer engineering to robotics, IoT, automotive, medical devices, and edge AI.

Curriculum Structure

Structured across 8 semesters (30 ECTS each). Most courses are 6 ECTS unless otherwise noted.

Year 1

Semester 1 (30 ECTS)
- Programming I (C/C++) - 6 ECTS
- Calculus I - 6 ECTS
- Engineering Physics I (Mechanics) - 6 ECTS
- Digital Systems I (Logic) - 6 ECTS
- Engineering Communication - 6 ECTS

Semester 2 (30 ECTS)
- Programming II (Data Structures) - 6 ECTS
- Linear Algebra for Engineers - 6 ECTS
- Engineering Physics II (E&M;) - 6 ECTS
- Electronics I (Circuits) - 6 ECTS
- Engineering Ethics & Safety - 6 ECTS

Year 2

Semester 3 (30 ECTS)
- Computer Organization & Assembly - 6 ECTS
- Digital Systems II (FPGA/HDL) - 6 ECTS
- Embedded Systems I - 6 ECTS
- Signals & Systems (Intro) - 6 ECTS
- Technical Elective I - 6 ECTS

Semester 4 (30 ECTS)
- Operating Systems - 6 ECTS
- Microcontrollers & Interfaces - 6 ECTS
- Electronics II (Analog & Mixed Signal) - 6 ECTS
- Networks I - 6 ECTS
- Technical Elective II - 6 ECTS

Year 3

Semester 5 (30 ECTS)
- Computer Architecture - 6 ECTS
- Real-Time Systems - 6 ECTS
- Embedded Systems II (RTOS & Drivers) - 6 ECTS
- Security Engineering Fundamentals - 6 ECTS
- Technical Elective III - 6 ECTS

Semester 6 (30 ECTS)   • Hardware/Software Co-Design - 6 ECTS
• Networks II (Wireless & IoT) - 6 ECTS
• Control Systems (Intro) - 6 ECTS
• Technical Elective IV - 6 ECTS
• Industry Internship - 6 ECTS

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Year 4

Semester 7 (30 ECTS)	• VLSI & SoC Design (Intro) - 6 ECTS • Edge AI & TinyML - 6 ECTS • Advanced Embedded Verification - 6 ECTS • Technical Elective V - 6 ECTS • Capstone Design I (Requirements & Prototype) - 6 ECTS
Semester 8 (30 ECTS)	• Capstone Design II (Build & Test) - 12 ECTS • Reliable Systems Engineering - 6 ECTS • Engineering Entrepreneurship - 6 ECTS • Advanced Seminar & Presentation - 6 ECTS

Technical Elective Tracks

Choose at least 5 electives; focus on one track for specialization.

Track A — Embedded & IoT

- Low-Power Design
- Sensor Fusion
- Wireless Protocols
- IoT Cloud Integration

Track B — Digital Design & FPGA

- Advanced HDL Design
- Formal Verification
- High-Speed Interfaces
- Hardware Acceleration

Track C — Security & Systems

- Secure Boot & TPM
- Applied Cryptography

- Systems Hardening

- Penetration Testing Lab

Track D — Robotics & Edge AI

- Robotics Fundamentals

- Computer Vision at the Edge

- Control for Robotics

- Autonomous Systems

Laboratories & Facilities

Embedded Systems Lab

Benches with oscilloscopes, logic analyzers, debuggers, and sensor kits for rapid prototyping.

FPGA & Hardware Design Studio

Modern FPGA boards and EDA tool access for HDL development and verification.

Makerspace & PCB Prototyping

3D printers, laser cutters, and PCB milling/assembly resources for capstone builds.

Secure Systems Sandbox

Isolated environment for security labs, firmware analysis, and network experimentation.

Capstone Design Examples

- **Smart Home Energy Controller**
  Design an IoT controller with secure onboarding, telemetry, and optimization logic.

- **FPGA Image Processing Pipeline**
  Implement a real-time filter/feature pipeline accelerated on FPGA hardware.

- **Wearable Health Sensor Node**
  Build a low-power wearable with signal conditioning and on-device inference.

- **Autonomous Line-Following Robot**
  Integrate perception, control, and real-time constraints for robust autonomy.