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

An aerospace engineering program covering aircraft and spacecraft design, aerodynamics, propulsion, structures, and flight control, combining simulation with wind tunnel and systems labs.

Program Overview

- **Award:** B.Eng. in Aerospace Engineering
- **Duration:** 8 Semesters (4 academic years)
- **Total Credits:** 240 ECTS
- **Delivery:** Lectures (L), Tutorials (T), Laboratories (P), Design Studio (S), Flight/Field Testing (F), Internship (I)
- **Workload:** 1 ECTS ≈ 25–30 hours
- **Program Pillars:** Aerodynamics • Propulsion • Aerospace Structures • Flight Dynamics & Control • Avionics & Systems • Space Systems • Computational Methods (CFD/FEM) • Materials • Design & Certification • Safety & Ethics
- **Signature Experiences:** wind tunnel testing, flight simulation labs, and an industry-aligned design review capstone.

Graduate Learning Outcomes

Graduates will be able to:

1. **Aerospace Fundamentals.** Apply aerodynamics, propulsion, and structures to analyze aerospace vehicles.
2. **Modeling & Simulation.** Use CFD/FEM and dynamics tools to predict performance and structural response.
3. **Flight Dynamics.** Model stability and control and design feedback controllers for flight performance.
4. **Systems Engineering.** Integrate subsystems (propulsion, avionics, structures) with requirements and trade-offs.

5 **Testing.** Plan wind tunnel, structural, and avionics tests and interpret results with uncertainty analysis.

6 **Safety & Standards.** Consider certification, safety margins, and reliability in aerospace design decisions.

7 **Communication.** Communicate technical results through design reviews, reports, and presentations.

8 **Innovation.** Design solutions for sustainable aviation and modern space missions.

Curriculum Structure

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

Year 1

Semester 1 (30 ECTS)

- Calculus I - 6 ECTS
- Engineering Physics I (Mechanics) - 6 ECTS
- Introduction to Aerospace Engineering - 6 ECTS
- Engineering Graphics & CAD - 6 ECTS
- Engineering Communication - 6 ECTS

Semester 2 (30 ECTS)

- Calculus II - 6 ECTS
- Engineering Physics II (E&M;) - 6 ECTS
- Linear Algebra & Differential Equations - 6 ECTS
- Programming for Aerospace (Python/MATLAB) - 6 ECTS
- Engineering Ethics & Safety - 6 ECTS

Year 2

Semester 3 (30 ECTS)

- Statics & Mechanics of Materials - 6 ECTS
- Aerodynamics I - 6 ECTS
- Thermodynamics for Aerospace - 6 ECTS
- Aerospace Structures I - 6 ECTS
- Technical Elective I - 6 ECTS

Semester 4 (30 ECTS)

- Dynamics - 6 ECTS
- Aerodynamics II (Compressible) - 6 ECTS
- Propulsion I (Gas Turbines) - 6 ECTS
- Aerospace Laboratory I (Wind Tunnel) - 6 ECTS
- Technical Elective II - 6 ECTS

Year 3

Semester 5 (30 ECTS)

- Flight Dynamics I - 6 ECTS
- Propulsion II (Rockets) - 6 ECTS
- Aerospace Structures II - 6 ECTS
- Control Systems (Intro) - 6 ECTS
- Technical Elective III - 6 ECTS

Semester 6 (30 ECTS)

- Avionics & Aircraft Systems - 6 ECTS
- Computational Fluid Dynamics (Intro) - 6 ECTS
- Finite Element Methods (Intro) - 6 ECTS
- Technical Elective IV - 6 ECTS
- Industry Internship - 6 ECTS

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Year 4

Semester 7 (30 ECTS)	• Flight Dynamics II (Stability & Control) - 6 ECTS • Space Systems Engineering - 6 ECTS • Sustainable Aviation & Emissions - 6 ECTS • Technical Elective V - 6 ECTS • Capstone Design I (Concept & Trade Studies) - 6 ECTS
Semester 8 (30 ECTS)	• Capstone Design II (Detail Design & Review) - 12 ECTS • Aerospace Certification & Safety - 6 ECTS • Engineering Project Management - 6 ECTS • Advanced Seminar & Presentation - 6 ECTS

Technical Elective Tracks

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

Track A — Aircraft Design

- Advanced Aerodynamics
- Structural Optimization
- Aircraft Performance
- Systems Integration

Track B — Spacecraft & Missions

- Orbital Mechanics
- Satellite Subsystems
- Attitude Determination & Control
- Mission Operations

Track C — Propulsion

- Advanced Turbomachinery
- Combustion (Intro)

- Electric Propulsion
- Propulsion Testing

Track D — Autonomy & Avionics

- Navigation & Estimation
- Autonomous Flight
- Embedded Avionics
- Fault-Tolerant Systems

Laboratories & Facilities

Wind Tunnel Laboratory

Subsonic wind tunnel for lift/drag measurements and flow visualization.

Structures & Materials Lab

Tensile, fatigue, and composite testing plus strain-gauge instrumentation.

Avionics & Flight Simulation

Hardware-in-the-loop benches and flight simulators for controls and avionics.

Computational Suite

CFD/FEM tools and compute resources for high-fidelity simulation and optimization.

Capstone Design Examples

- **Hybrid-Electric Regional Aircraft**
  Design a low-emission aircraft concept with propulsion sizing and performance analysis.
- **CubeSat Mission Concept**
  Develop subsystem budgets, ADCS approach, and operations plan for a CubeSat payload.
- **Supersonic Inlet Study**
  Simulate compressible flow and evaluate inlet performance and stability.
- **Autonomous UAV for Inspection**
  Design a UAV and autonomy stack for safe inspection missions with constraints.