



# National Institute of Technology Meghalaya

An Institute of National Importance

**CURRICULUM**

<b>Program</b>	<b>Minor Degree in Aerospace Engineering</b>	Year of Regulation	2026
<b>Department</b>	<b>Department Mechanical Engineering</b>	Semester	III

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total

<b>ME263</b>	<b>Introduction to Aeronautics</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>
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Course Objectives	<p>To provide fundamental knowledge of aircraft, aerodynamics, airplane performance, and propulsion systems.</p>	Course Outcomes	<p>ME2XX.1</p>	<p>Students should be able to know the history of aviation and should know the classification of aircraft and identify various parts of an aircraft.</p>
			ME2XX.2	Students should be able to explain fundamental aerodynamic principles, fluid flow behavior, thermodynamic relations, wind tunnel operations.
			ME2XX.3	Students should be able to analyze the aerodynamic characteristics of airfoils, wings, and aerodynamic shapes including lift, drag, and wing performance.
			ME2XX.4	Students should be able to evaluate airplane performance characteristics including climb, range, endurance, takeoff, landing, and maneuvering flight.
			ME2XX.5	Students should be able to analyze and compare the operating principles and performance of reciprocating engines, gas turbine engines, ramjet and scramjet engines.
			ME2XX.6	Students should be able to analyze and evaluate emerging technologies in aerospace engineering, including UAVs/MAVs, smart dust, hydrogen-powered and electric aircraft, blended-wing-body configurations, etc.

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	ME2XX.1															
2	ME2XX.2															
3	ME2XX.3															
4	ME2XX.4															
5	ME2XX.5															
6	ME2XX.6															

**SYLLABUS**

No.	Content	Hours	COs
I	<b>Introduction:</b> History of aviation; Classification of aircraft – aerostats and aerodynes; Anatomy of the airplane; Formation of NACA and NASA; Standard atmosphere – absolute, geometric, geopotential, pressure, temperature and density altitudes.	<b>05</b>	ME2XX.1
II	<b>Basic Aerodynamics:</b> Continuity equation, Incompressible and compressible flows, Momentum equation, Elementary thermodynamics, Isentropic flow, Energy equation, Wind tunnels and their applications; Low-speed subsonic and supersonic wind tunnels, Airspeed measurement.	<b>06</b>	ME2XX.2
III	<b>Airfoil and Wing Aerodynamics:</b> Airfoils and wings, lift, drag and moment coefficients, infinite and finite wings, induced drag and wave drag, swept wing.	<b>07</b>	ME2XX.3
IV	<b>Airplane Performance:</b> Drag polar, equations of motion; Thrust required and available, power required and available, altitude effects on power required and power available; Rate of climb, Gliding flight; Absolute and service Ceilings; Time to climb; Range and endurance; Takeoff and landing Performances, Turning flight and V-n diagram.	<b>12</b>	ME2XX.4
V	<b>Elements of Propulsion:</b> Reciprocating and gas turbine engines; Turbojet, turboprop, turbofan and turboshaft engines; Engine components - inlets, compressors, combustors, turbines, and nozzles; Thrust reversers; Gas turbine fuels; Ramjet and scramjet engines.	<b>08</b>	ME2XX.5
VI	<b>Emerging Technologies:</b> UAVs/MAVs, Smart Dust; Hydrogen powered aircraft; Electric aircraft; Blended wing body aircraft; Eco-friendly propulsion; Distributed propulsion systems.	<b>04</b>	ME2XX.6
<b>Total Hours</b>		<b>42</b>	

**Essential Readings:**

1. J. D. Anderson Jr., M. L. Bowden, *Introduction to Flight*, McGraw Hill, 9th Edition, 2022.
2. L. J. Clancy, *Aerodynamics*, Himalayan Books, 2006 Reprint Edition, 1996.
3. R. A. Shevell, *Fundamentals of Flight*, Pearson Education, 2nd Edition, 1989.
4. E. L. Houghton, P. W. Carpenter, *Aerodynamics for Engineering Students*, Butterworth-Heinemann, 5th Edition, 2003.
5. D. Anderson, S. Eberhardt, *Understanding Flight*, McGraw-Hill Publishing, 2nd Edition, 2009.

**Supplementary Readings**

6. A. C. Kermode, *Mechanics of Flight*, Pearson Education, 12th Edition, 2006.