

AE 344: Aero Propulsion

2024-25 (semester-1)

Instructors

- Prof. Krishnendu Sinha (krish@aero.iitb.ac.in) - (Aerospace propulsion 75%)
- Prof. Nagendra Kumar (nagendra@aero.iitb.ac.in) - (Rocket propulsion 25%)

Teaching Assistants

- Deep Narayan Singh Baudh (22d0005@iitb.ac.in)
- Vishnu Madabhushi (23m0025@iitb.ac.in)
- Avishi Dinesh Pareek (23m0019@iitb.ac.in)
- Abhi Sharma (23m0021@iitb.ac.in)

Objectives

- Learn to apply thermodynamic analysis jet engines.
- Learn the details of engine components (compressor, turbine, etc.)
- Application to realistic engines

Course content

Introduction to various aircraft propulsive devices: Piston-prop, Turbo-prop, Turbojet, Turbofan, Turboshift, Vectored-thrust, Lift engines. Gas Turbine Cycles and cycle-based performance analysis; 1-D and 2-D analysis of flow through gas turbine components - Intake, Compressors, Turbines, Combustion Chamber, Afterburner, and Nozzle. Other propulsion systems: ramjets, scramjets and pulsejets Introduction to various rocket engine concepts: thrust equation, Rocket Performance parameters Mission analysis, and Multi-staging Nozzle theory, combustion of propellants, thrust vectoring. Rocket vehicles: Solid propellant rockets, liquid propellant rockets, electric thrusters: Concepts, constructional features, propellants

Grading

- Attendance etc. - 5%
 - HW/Quiz/Project - 20%
 - Midsem - 25%
 - Endsem - 50%
1. Midsem and Endsem exams will include problem-solving, derivations, MCQs, etc.
 2. The project will be conducted in groups of 4 students each. Each group will have to pick an aircraft engine of their choice and do a thorough analysis for each of the engine components. Evaluation will be done on the basis of presentation and individual viva

Textbooks

1. N. Cumpsty and A. Heyes, "Jet Propulsion", 3rd Edition, Cambridge University Press, ISBN: 978-1107511224
2. K. Ramamurthi, "Rocket Propulsion", 1st Edition, Laxmi Publications, ISBN: 978-9385750007
3. S. Heister, W. E. Anderson, T. L. Pourpoint, R. J. Cassady, "Rocket Propulsion", 1st Edition, Cambridge University Press, ISBN: 978-1108422277
4. S. Farokhi, "Aircraft Propulsion", 2nd Edition, Wiley, ISBN: 978-1119718642
5. P. Hill, C. Peterson, "Mechanics and Thermodynamics of Propulsion", 2nd Edition, Pearson, ISBN: 978-8131729519

Lecture Timings (Classroom CL 109)

- Monday (11:30 AM to 12:30 PM)
- Tuesday (8:30 AM to 9:30 AM)
- Thursday (9:30 AM to 10:30 AM)

Office Hours (Hypersonic CFD Lab)

- Thursday (10:30 AM to 11:30 PM)