

# 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)
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## 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, Turboshaft, 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)