ME 6060: Fundamentals of Combustion

Instructor

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#203 Thermodynamics and Combustion Engineering Lab
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General information

- 3 credit course
- 4 lecture hours per week: 'F' slot
  - Tuesdays 4:50–5:40 PM
  - Wednesdays 11–11:50 AM
  - Thursdays 9:00–9:50 AM
  - Fridays 8:00–8:50 AM
- Every second Friday hour is a tutorial hour (unless stated otherwise)
- Teaching Assistants:
  - Rohit Khare, Mayuresh Maradkar
  - Office hours: Fridays 12–1 PM, TDCE 115
- Announcements via moodle: (https://courses.iitm.ac.in)

Pre-requisites

- Undergraduate thermodynamics
- Knowledge of engineering mathematics – vector calculus, matrix algebra
- Consent of Teacher (COT) required

Syllabus

1. Fuels and their properties
2. Review of basic thermodynamics and gaseous mixtures
3. Combustion Thermodynamics; Stoichiometry
4. I and II Laws of Thermodynamics applied to combustion – equilibrium composition

5. Fundamentals of combustion kinetics
6. Transport properties
7. Governing equations for a reacting flow
8. Mass transfer – Stefan flow, droplet vaporization

9. Non-premixed flames
10. Premixed flames
11. Limit phenomena – flammability limits, quenching of laminar flames, ignition, flame stabilization

12. Combustion of gaseous fuel jets
13. Turbulent premixed and non-premixed flames
14. Combustion of a carbon particle

Suggested Textbooks

- An Introduction to Combustion Concepts and Applications by S.R. Turns, McGraw Hill
- Principles of Combustion by Kenneth Kuo, John Wiley
- Combustion by Irvin Glassman, Academic Press
- Combustion Theory by F. A. Williams, ABP
- Understanding Combustion by H. S. Mukunda, Macmillan India
- Combustion Physics by C. K. Law

Grading Policy

- Mid semester exam – 50%
- Final exam – 50%
- About 30% of exams will be derived from tutorial sets