

# Combustion - Video course

## COURSE OUTLINE

- Review of thermodynamics.
- Chemical kinetics.
- Mass transfer definitions: Fick's law.
- Equations of conservation of species mass, momentum, and energy; multi-component diffusion equation.
- Schvab-Zel'dovich formulation.
- Rankine-Hugoniot relations.
- Laminar premixed flames: Flame speed, flammability limits, flame stabilization, ignition and quenching.
- Laminar diffusion flames: Burke-Schumann problem and droplet burning.
- Partially premixed flames.
- Introduction to turbulent flames: premixed and diffusion flames.
- Solid Propellant Combustion.
- Spray combustion.
- Detonations: ZND model.
- Combustion instabilities.

## COURSE DETAIL

A video course shall consist of 40 or more lectures with 1 hour duration per lecture.

S.No	Topics	No.of Hours
1	Review of Thermodynamics.	3
2	Chemical kinetics.	3
3	Mass transfer definitions: Fick's law.	2
4	Equations of conservation of species mass, momentum and energy. Multi-component diffusion equation.	3
5	Schvab-Zel'dovich formulation.	3
6	Rankine-Hugoniot relations.	4



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Aerospace Engineering

### Pre-requisites:

1. Fluid Mechanics.

### Additional Reading:

1. W. C. Strahle, Introduction to Combustion.
2. H. S. Mukunda, Understanding Combustion.

### Coordinators:

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7	<b>Laminar premixed flames:</b> Flame speed. Flammability limits. Flame stabilization. Ignition and quenching.	4 1 1 2
8	<b>Laminar diffusion flames:</b> Burke-Schumann problem. Droplet Burning.	3 3
9	Partially premixed flames.	1
10	Introduction to turbulent premixed and diffusion flames.	2
11	Solid propellant combustion.	2
12	Spray combustion.	2
13	Detonation: ZND model.	2
14	Combustion instabilities.	1

**References:**

1. K. K. Kuo, Principles of Combustion, Second Edition.