

Thermodynamics of Combustion: First law analysis and limitations, Dissociation and equilibrium, Gibbs free energy; Chemical kinetics, Combustion waves, stirred reactors; Premixed flames: flame velocity, analytical models and flammability limits; Diffusion flames: droplet combustion, analytical models for droplet combustion

Aircraft combustors, geometry, combustor sizing; Injection, Ignition and flame stabilization, flame holding in high speed combustion systems; Combustion instabilities, active and passive control of instabilities; Methods of combustor cooling; Combustion and flame stabilization in afterburners

Combustion in rockets, Combustion of Solid propellants, liquid propellants and hybrid propellants, Types of instabilities in rocket combustion, thrust chamber cooling; Design study: Combustors for Aero Engine & Rocket engine; Combustion in advanced propulsion systems: Introduction to supersonic combustion, the challenges, methods for mixing enhancement and flame stabilization

**TEXT BOOKS/ REFERENCES:**

1. Stephen Turns, "An Introduction to Combustion: Concepts and Applications", 2<sup>nd</sup> Edition, McGraw-Hill, 1999.
2. Eugene L. Keating , "Applied Combustion", Second Edition, CRC Press, 2007.
3. Chung K. Law, "Combustion Physics", Cambridge University Press, 2010.
4. Kenneth Kuan-yun Kuo, "Principles of Combustion", 2nd Edition, Wiley, 2005