THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Combustion

MECHENG 6526

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Fundamentals of energy conversion through combustion, thermodynamics and chemical kinetics of combustion, premixed flames, deflagration vs. detonation waves, diffusion flames, droplet combustion, and thermal ignition.

Prerequisites and Co-requisites:
Prereq: 3503, 3504 (504), or 4510 (510), or permission of instructor.

Course Goals / Objectives:
- Develop a comprehensive understanding of combustion processes as applied to energy conversion through premixed and diffusion flames, and controlled autoignition
- Develop an ability to apply the fundamental principles of thermo-fluid science toward modeling, analysis, and design of advanced combustion systems
- Develop an ability to apply contemporary computational tools to combustion kinetics and physics
- Instill life-long learning habits in the field combustion evolving rapidly in terms of energy conversion devices and alternative fuels

Course Topics:

- Thermochemistry
- Chemical kinetics, low- vs. high-temperature oxidation mechanisms
- Premixed flames
- Hugoniot relations: deflagration vs. detonation waves
- Laminar flame speed: Mallard/Le Chatelier vs. Zeldovich/Frank-Kamenetskii/Semenov theories
- Turbulent flame speed
- Detonation: Chapman-Jouguet Point, Zeldovich/von Neumann/Doring theory
- Diffusion flames
- Gaseous fuel jets and the Burke-Schumann development
- Droplet combustion
- Thermal ignition: Semenov and Frank-Kamenetskii theories
- Contemporary computational approaches, including CHEMKIN

Designation:

Elective