

Fire Safety Program - ME 671 Fire Safety Engineering

Course Objectives

This course introduces the fundamentals of fire behaviour and practical issues in fire safety, compartment fire development, fire control and hazard assessment. Theoretical concepts and practical examples related to fuels, flammability, and applications of flame spread, ignition, heat transfer and fluid dynamics principles in estimating fire growth and development will be examined.

Through class discussions, examples and case studies, students will obtain the background required to make fundamental fire dynamics calculations, gain entry-level experience with applications in compartment fire dynamics principles taught in the course and explore several current issues related to fire safety engineering

Course Outline

Fuels and Fire

- nature of common fuels - thermal decomposition and heat release
- basic stoichiometry and flammability limits

Heat Transfer in Fires

- radiation, conduction and convection heat transfer as related to fires
- burning velocity and heat release
- measurement of fire heat release rate (cone calorimetry)

Flames and Fire Plume Behaviour

- diffusion flames
- flames and fire plumes from natural fires
- fluid dynamics of plumes and correlations for fire plume development

Recommended References

- Dougal Drysdale, "An Introduction to Fire Dynamics", Third edition, John Wiley and Sons, Toronto (or second edition).

Supplementary Materials

- Karlsson, B. and Quintiere, J., Enclosure Fire Dynamics, CRC Press, 1999.
- Quintiere, J., Fundamentals of Fire Phenomena, Wiley, 2006 and Principles of Fire Behaviour, Cengage Delmar, 1997.
- SFPE Handbook and other chemical/thermophysical property data tables and sources

Compartment Fires

- pre flashover (early growth) and post flashover (fully developed) behaviour
- fire, smoke and CO detection
- practical issues - radiation hazards, smoke detectors, sprinklers
- models and correlations for prediction of fire behaviour
- fire suppression - chemicals, hoseline and sprinklers

Introduction to Computer Fire Modeling

Principles of Risk Assessment

Contact Us

For information on Fire Safety Group courses, registration, and admissions:
Tanya Yoworski
Graduate Administrator, MEng & Recruitment
Dept. of Mechanical and Mechatronics Engineering
University of Waterloo
Engineering 7, Room 3336
200 University Avenue
Waterloo, ON, Canada
N2L 3G1

Phone: (519) 888-4567, ext. 43625
e-mail: tyoworski@uwaterloo.ca

