The objective of this course is to introduce students to the scientific aspects of material behaviour during a fire. Materials to be covered include liquids, plastics, fibres, concrete, steel, and wood. On completion of this course, participants will have an in-depth understanding of material specifications, standards, and international fire codes.

Prerequisite: bachelor degree in one of the following: Engineering, Science, Architecture Studies, Industrial Design

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TOPICS

Fundamentals of the Fire Hazards of Materials

Materials Specifications, Standards, and Testing

Plastics and Rubber
Polymeric Materials, Fire Behaviour of Plastics, Thermoplastics, Thermosets, the Burning Process, Glass Transition Temperature, Charring, Ignition, Heat Release Rate

Flame Retardants for Plastics

Fibres and Fabrics

Structural Materials (Steel)

Structural Materials (Concrete)
Property Variations, Thermal Properties of Concrete at Elevated Temperatures (Light/Normal Weight, High-Strength, Fiber-Reinforced), Compressive Strength Retention, Modulus of Elasticity, Development of Fire Resistance Testing, Protection of Structural Materials from Fires, Role of Concrete Cover.

Structural Materials (Wood and Wood Products)
Wood as a Construction Material, Physical and Chemical Characteristics, Reaction to Fire, Thermal and Mechanical Properties, Thermal Decomposition and Pyrolysis, Density & Mass Loss, Dimensional Changes Due to Drying, Steam Softening, Charring Rate, Modulus of Elasticity, Tensile/Compressive, Bending Strength, Fire-Retardant Treatments, Gypsum Board
COURSE FORMAT

- Lectures: Three hours a week
- 2 Papers (#1 = 15% and #2 = 20%) + Presentation (10%)
- Final Examination (55%)

REFERENCES:


Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy/Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://carleton.ca/equity/accommodation/student_guide.htm

Students with disabilities requiring academic accommodations: in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please submit your request for accommodations to PMC by the last official day to withdraw from classes in each term. For more details visit the PMC website: http://www.carleton.ca/pmc/students/acad_accom.html

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