

ENGR 5001 FIRE ENGINEERING 1 (FIRE DYNAMICS)

Credit Points 10

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Description This subject is essential for anyone considering a career in Fire Safety and aims to develop detailed knowledge of fire behaviour and dynamics in the built environment. Students will better understand fuels and combustion processes, the chemistry of combustion, flammability limits, ignition characteristics and different types of flames and fire plumes. The subject also introduces students to the basic principles of fire safety design so that they can appreciate fire safety and develop appropriate fire safety engineering solutions.

School Eng, Design & Built Env

Discipline Fire Technology

Student Contribution Band HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Postgraduate Coursework Level 5 subject

Equivalent Subjects ENGR7006 Fire Engineering 1 (Fire Dynamics)

Restrictions

Only students enrolled in a postgraduate program can enrol in this subject.

Assumed Knowledge

Basic physics, chemistry and mathematics

Learning Outcomes

After successful completion of this Subject, students will be able to:

1. Apply mathematical calculations to estimate fire dynamics including heat transfer, burning of gases, liquids and solids, initiation and propagation, products of combustion and retardants.
2. Describe the principles used in fire engineering design and assessment and the functions of various fire safety subsystems according to the Australian Fire Engineering Guidelines.
3. Explain the dynamics and behaviour of fire plumes, suppression systems, smoke and heat control, detection, warning and how these parameters and how these parameters are used in the development of a fire safety engineering solution.
4. Apply mathematical principles to calculate fire loads, fire growth, ventilation factor.
5. Analyse a range of fire scenarios to develop fire safety engineering solutions.

Subject Content

- Fuels and the combustion process
- Chemistry of combustion in fire
- Flammability limits
- Premixed flames
- Diffusion flames

- Flames from natural fires
- Fire plumes
- Burning of gases and vapours
- Burning of liquids
- Burning of solids
- Smouldering combustion
- Flaming combustion
- Self-induced ignition
- Piloted and non-piloted ignition
- Propagation of smouldering and flaming combustion
- Growth to flashover
- Flashover
- Post-flashover fires
- Fire resistance
- Spread of fire from a compartment
- Production and measurement of heat, smoke and toxic gases
- Methods for assessment of fire behaviour
- Australian Fire Engineering Guidelines and fire safety sub-systems

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type | Length | Percent | Threshold | Individual/ Group Task | Mandatory |
|-------------------|--------------|---------|-----------|------------------------|-----------|
| Quiz | 2 hours | 30 | N | Individual | N |
| Numerical Problem | 2000 words | 30 | N | Individual | N |
| Solving | (equivalent) | | | | |
| Numerical Problem | 2000 words | 40 | N | Individual | N |
| Solving | (equivalent) | | | | |

Teaching Periods

Autumn (2025)

Online

Online

Subject Contact Sameera Wijesiri Pathirana (<https://directory.westernsydney.edu.au/search/name/Sameera Wijesiri Pathirana/>)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=ENGR5001_25-AUT_ON_2#subjects)