

## Fire Science and Fire Dynamics (E900527)

**Course size** (nominal values; actual values may depend on programme)  
**Credits** 9.0      **Study time** 270 h      **Contact hrs** 33.0 h

### Course offerings in academic year 2017-2018

A (semester 1)

### Lecturers in academic year 2017-2018

Carvel, Ricky

EDINBU lecturer-in-charge

### Offered in the following programmes in 2017-2018

	crdts	offering
<a href="#">International Master of Science in Fire Safety Engineering</a>	9	A

### Teaching languages

English

### Keywords

Fire science, fire dynamics, fire safety engineering, structural engineering

### Position of the course

The course is intended to provide the knowledge required for quantitative fire hazard analysis. Physical and chemical behaviour of combustion systems as well as the impact of fire on structures and materials will be addressed. The student will acquire skills for quantitative estimation of the different variables of fire growth. Basic principles of fire dynamics will be used to provide analytical formulations and empirical correlations that can serve as tools for design calculations and fire reconstruction. Focus will be given to the scientific aspects of fire but some basic features of fire safety engineering will be also developed.

### Contents

- 1 How gases burn, including basic chemistry
- 2 How liquids burn, including convection and radiation heat transfer
- 3 How solids burn, including conduction heat transfer
- 4 Spontaneous ignition and smouldering (guest lecture)
- 5 Piloted ignition
- 6 Fire spread and fire plumes
- 7 Compartment fires, including flashover
- 8 Compartment fires, continued
- 9 Ceiling jet, structural interactions, backdraft
- 10 Smoke
- 11 Fire safety engineering applications

#### Tutorials:

1. Basic fire dynamics
2. Applied fire dynamics
3. Fire test methods

### Initial competences

None are assumed.

### Final competences

- 1 Demonstrate understanding of the science which underpins current fire safety engineering calculations.
- 2 Estimate certain parameters of fires such as flame length, heat release rate, plume temperature and smoke production, for simple, well defined fuel packages.
- 3 Explain fire behaviour in each of the stages in a compartment fire.
- 4 Perform certain typical fire safety engineering calculations, such as sprinkler

- activation times and compartment smoke filling, using a spread sheet model.  
5 Give appropriate consideration to uncertainties in fire problems.

**Conditions for credit contract**

This course unit cannot be taken via a credit contract

**Conditions for exam contract**

This course unit cannot be taken via an exam contract

**Teaching methods**

Lecture

**Extra information on the teaching methods**

22 hours of lectures; 11 hours of seminars/tutorials; 1 hour of formative assessment; 6 hours of summative assessment; 4 hours of programme level learning and teaching; 136 hours of directed and independent learning.

Formative feedback on tutorial.

Students will be given the opportunity to provide Stop, Start and Continue feedback and comments on this will be provided back by the course lecturer.

Exam Post-Mortem comments.

**Learning materials and price**

Dougal Drysdale "Intro to Fire Dynamics" 3rd Edition (2011), Wiley

**References**

**Course content-related study coaching**

**Evaluation methods**

end-of-term evaluation and continuous assessment

**Examination methods in case of periodic evaluation during the first examination period**

Written examination

**Examination methods in case of periodic evaluation during the second examination period**

**Examination methods in case of permanent evaluation**

Skills test

**Possibilities of retake in case of permanent evaluation**

not applicable

**Extra information on the examination methods**

Intermittent Assessment (30%)

Assessment will be made of the material studied in the tutorial exercises (including heat transfer calculations).

Written Examination (70%)

The written examination will have a 2 hours duration with 2 compulsory questions

**Calculation of the examination mark**

Written Exam 70 %, Coursework 30 %