Materials under Stress: An Introduction to Fracture Mechanics and Fatigue

Department of Mechanical Engineering Sciences

Faculty of Engineering & Physical Sciences

Monday 19 March to Friday 23 March 2018

Materials under Stress is also part of the Advanced Materials MSc programme which is accredited by IOM3 and IMechE
The Course
This is an intensive course covering the basic concepts of fracture mechanics and fatigue, with emphasis on practical applications for metals, ceramics, polymers and composites. The course is suitable for those with no previous formal introduction to the science of fracture and no prior knowledge or experience is assumed. All topics will be introduced from first principles and the emphasis will be on developing an understanding of concepts of fracture mechanics rather than presenting a “state-of-the-art” review. Lectures will be given by experts in the field with experience of teaching this material to practising engineers and materials scientists on post-experience courses. Supervised examples classes will enable delegates to work on the solution of typical problems and discuss these with the lecturers.

Who Should Attend?
The course would be invaluable for scientists and technologists seeking an introduction to fracture mechanics. It will be suitable for recent graduates in science or engineering and others who are entering the field of fracture and fatigue.

Overview of the Course
• Introduction
• Basic stress analysis and mechanical properties
• Stress intensity factor and its use in fracture mechanics
• Fracture of ceramics
• Energetics approach to fracture
• Limitations of linear elastic fracture mechanics
• Aspects of fracture of metals
• Elastic/plastic fracture mechanics
• Fatigue 1 and 2
• Fatigue Assessment of welded structures
• Application of fracture mechanics to polymers and composites

Exercise classes
Three sessions will be devoted to exercise classes during the course, as well as laboratory sessions on the final two days.

These classes will assist students in working through simple stress analysis problems and enable them to gain the confidence to handle concepts taught in the lecture programme.

Course attendees will find a simple scientific calculator a help!

Key Points
surrey.ac.uk/mma/study/pd/courses – For Course Calendar & Online Registration Form
Courses run for one week from 9am – 5pm Monday to Friday
Delegates may request a list of local accommodation
Comprehensive lecture notes will be distributed at registration
Enquiries to: 01483 686122
Previous attendees

- The course was taught very well with a good combination of presentations, tutorials and lab sessions.
- I found all lectures to be excellent both in terms of presentation quality and content.
- I obtained an understanding of fracture mechanics as hoped.
- Generally excellent, covering each topic in detail, combined with a comprehensive set of notes.

Previous delegates comments.

Course Director

This course will be led by an academic from the Mechanical Engineering Sciences department.

The Course Director will be joined by colleagues from across the University of Surrey’s materials activity, as well as external experts.

Further details of all the lecturers on the course can be obtained from: [surrey.ac.uk/mma/people](surrey.ac.uk/mma/people).

These short courses have been approved for “professional development” by IOM3 (Institute of Materials, Minerals and Mining).

Materials at Surrey

Across the University there are over 50 academics, residing in six engineering/physical science departments, for whom materials is their primary research interest. Together they form [materials@surrey](surrey.ac.uk/materials). Their research is recognised as being internationally excellent. Further, the University has world-leading expertise in characterisation and a proven track record in delivering academically acclaimed and industrially relevant postgraduate courses.

The scope of the research spans topics as diverse as the production of graphene through to the mechanical testing of metre long sections of Victorian water mains.

Over the last decade, over £20 million has been invested in extending and upgrading buildings and equipment to support materials research and teaching at Surrey.

The University is also home to the thriving, much-admired Industrial Doctorate Centre in Micro and NanoMaterials and Technologies [surrey.ac.uk/minmat](surrey.ac.uk/minmat), which was established in 2009 following an award of £6.2 million from the Engineering and Physical Sciences Research Council (EPSRC).

MSc in Advanced Materials

This short course is offered as a module in our part-time or full-time Modular MSc Programme in Advanced Materials. Further details of our programme can be found on our web pages: [surrey.ac.uk/postgraduate/advanced-materials](surrey.ac.uk/postgraduate/advanced-materials).
For further information please contact:
MSc Short Courses Administrator
Faculty of Engineering & Physical Sciences
University of Surrey
Guildford, Surrey GU2 7XH, UK

T: +44 (0)1483 686122
E: advancedmaterialsmsc@surrey.ac.uk
surrey.ac.uk/mma/study/pd/courses