

INTRODUCTION TO

Physical Metallurgy



MONDAY 4 FEBRUARY TO FRIDAY 8 FEBRUARY 2019

WHO SHOULD ATTEND?

This course is designed for scientists and technologists in the manufacturing industries, graduates undertaking research and development in academic institutions or research organisations and MSc students. It will serve as an introduction or an update. No specific previous qualifications will be assumed but the level is set to appeal to those of graduate status with some industrial experience.

THE COURSE

The course aims to provide a general introduction to the field of Physical Metallurgy. It covers phase diagrams, transformation diagrams and the associated thermodynamics, diffusion, liquid-solid transformations, ferrous and non-ferrous materials and cold work, recovery and recrystallisation.

At the end of the course students should be able to use phase diagrams and transformation diagrams, having acquired an understanding of the underlying thermodynamics. They should be able to describe and explain diffusion, solid-state and liquid to solid transformations in metals and alloys, and relate these processes to microstructures.

KEY POINTS

For course calendar and online registration:
surrey.ac.uk/department-mechanical-engineering-sciences/short-courses

If you have a question please call:
+44 (0)1483 686122

OUTLINE OF THE COURSE

- Kinetics and Thermodynamics of Phase Transformations
- Characterisation of Microstructures I
- Characterisation of Microstructures II
- Diffusion
- The Liquid-Solid Transformation
- Solid State Transformations I: Precipitation
- Solid State Transformations II: Pearlite, Bainite and Martensite
- Heat Treatment: Microstructure and Processing
- Defects
- Cold Work, Recovery, Recrystallisation and Grain Growth
- Strengthening Mechanisms
- Real Alloys I: Titanium and it's Alloy
- Real Alloys II: Steels
- Real Alloys III: High-Strength Aluminium Alloys

Courses run for one week from Monday morning to Friday afternoon.

Delegates may request a list of local accommodation

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-msc-2018

COURSE DIRECTOR

The Course Director is Dr Mark Whiting
surrey.ac.uk/people/mark-j-whiting

He will be joined by colleagues from across the University of Surrey's nanomaterials activity.

These short courses have been approved for "Professional Development" by IOM3

(Institute of Materials, Minerals and Mining).



CENTRE FOR ENGINEERING MATERIALS

The course is delivered from the Centre for Engineering Materials, home to the biggest concentration of materials researchers at Surrey with interests spanning all materials groups from the nanoscale through to macroscopic engineering structures. Across the University there are over 50 academics, residing in six engineering/ physical science departments, for whom materials is a primary research interest:

surrey.ac.uk/centre-engineering-materials

The research, which is recognised as being internationally excellent, spans topics as diverse as the production of graphene through to the mechanical testing of metre long sections of Victorian water mains. Much of the work is underpinned by the University's world-leading capability in characterisation, which comprises both facilities and expertise. Further, Surrey has a history of working in partnership with industry and a proven track record in delivering academically acclaimed and industrially relevant postgraduate courses.

The University is also home to the thriving, much-admired Engineering and Physical Sciences Research Council (EPSRC) Centre for Doctoral Training in Micro and NanoMaterials and Technologies which was established in 2009, and subsequently refunded in 2014, with awards amounting to over £9 million from the EPSRC and sponsorship of engineering doctorate students from over forty companies, to date:

surrey.ac.uk/minmat



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The Institute of Materials,
Minerals and Mining

ACCREDITED PROGRAMME

Introduction to Physical Metallurgy is also part of the
Advanced Materials MSc programme which is accredited by IOM3

We've made all reasonable efforts to ensure that the information in this publication was correct at the time of going to print in September 2018, but we can't accept any liability for any inaccuracies in the information published, and the information might change from time to time without notice. For the latest and most up-to-date information, please visit our website at surrey.ac.uk