The University Of Sheffield.

Department Of Materials Science & Engineering

Course Information
2020 Entry

MEng Materials Science and Engineering (Nuclear Engineering)

UCAS Code: F2H8

This course covers all aspects of Materials Science and Engineering, including both the fundamental science behind the behaviour of materials, and how they are processed and used industrially.

There is a mix of lecture courses, practical work, tutorials and experience of projects, both in an academic and industrial setting. In the later part of the course there is a particular focus on materials issues associated with nuclear technology.

Year 1

The first year of the course is intended to build the fundamental background knowledge required for all Materials Science and Engineering study. As such this year contains introductory courses across a broad range of key Materials topics.

Core Modules **100/120 credits**

Courses introduce the chemistry of materials (how atoms arrange themselves in crystalline materials and how polymers are formed), microstructure, mechanical properties of materials and their use in structural applications, thermodynamics and energy and how these relate to materials, magnetic, electrical and optical properties, natural and replacement biomaterials, nanomaterials, the life cycle of materials and the key elements of mathematics.

Optional Modules **20/120 credits**

There are also options to replace some of the materials components with modern languages as part of the course.

Other parts of the course

Lecture courses are supported by a program of practicals and tutorials. You will also participate in the week-long Global Engineering Challenge, working in multidisciplinary teams with other engineers to come up with solutions to sustainable development needs.

Year 2

In the second year the ideas from year 1 are developed further, with a number of courses that build directly on first year topics. Certain material classes are addressed separately, and processing and manufacturing considered.

Core Modules **100/120 credits**

Topics explored further include the mechanical behaviour and deformation of materials, microstructure and thermodynamics, as well as underpinning mathematics.

New topics include functional materials (where they are used for electrical, magnetic or similar applications), formal methods for the selection of materials for different applications are presented, along with industrial materials processing from primary production to final component manufacture.

Optional Modules **20/120 credits**

As well as language modules, there are opportunities to select topics on current materials research, further biomaterials or materials and energy (conventional, nuclear and renewable generation, batteries and storage).

Other parts of the course

Lecture courses are supported by a further program of practicals and tutorials. There is another week-long project with other engineers (Engineering: You're hired) where projects are provided by industry.

Note: the courses have a lot in common for the first 2 years. It is therefore possible to change to another degree in the Department at the end of year 2 (provided that a 60% average is achieved for MEng degrees).

Year 3

In year 3 nuclear-specific topics are introduced for the first time. There is also an increased use of other types of teaching as compared to the traditional lectures. The intent here is to give high-level knowledge in major areas of materials science and technology.

Core Modules — 70/120 credits

The main areas addressed in detail in the 3rd year are the underlying nuclear physics, reactor designs and materials selection issues within these. There are also modules on diffusion and heat transfer, surface degradation by corrosion and wear and treatments to protect against these, engineering alloys and modern manufacturing methods, and an introductory module on finance and law.

Other parts of the course — 50/120 credits

Some significant other parts of the course allow a wider range of experience to be developed in this year.

Industrial Training Program: students will gain a deep appreciation of 2 major industrial sectors for materials in the UK by interacting with 2 different companies, learning about their technical areas and ways of working, and carrying out a technical or research project based on their current needs.

Industrial Placement: Students will undertake a 5-6 month paid industrial placement within the nuclear industry, working on a technical project, and producing a report that can be assessed as part of the degree.

Year 4

Core Modules — 60/120 credits

The final remaining core modules explore nuclear technology in more detail, including the operation of reactor plant, nuclear waste immobilisation and disposal, processes such as radiation damage that can occur in materials, and advanced nuclear reactor designs and components.

There is also coverage of further advanced manufacturing topics, including quality control and optimisation methods used industrially, and Finite Element Modelling methods.

Optional Modules — 15/120 credits

Optional modules are selected from glasses and cements, metals processing, composites and materials for energy.

Other parts of the course — 45/120 credits

Individual Research Project: Students will have the opportunity to select projects of interest from within the nuclear materials research areas, and then spend the entire academic year working on the project with one of the research groups.

The content of our courses is reviewed annually to make sure it's up-to-date and relevant. This is in response to discoveries through our world-leading research, funding changes, professional accreditation requirements, student or employer feedback, outcomes of reviews, and variations in staff or student numbers.

We aim to provide accurate and up-to-date information in all of our publications, but applicants should always refer to our website for the most up to date course information.

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