



Programme Specification

A statement of the knowledge, understanding and skills that underpin
a taught programme of study leading to an award from
The University of Sheffield

1	Programme Title	Materials Science and Engineering
2	Programme Code	CMBT014
3	JACS Code	F200, J511
4	Level of Study	Postgraduate
5a	Final Qualification	MSc
5b	QAA FHEQ Level	F7
6a	Intermediate Qualification(s)	Postgraduate Diploma (PGDip); Postgraduate Certificate (PGCert)
6b	QAA FHEQ Level	F7
7	Teaching Institution (if not Sheffield)	Not applicable
8	Faculty	Engineering
9	Department	Materials Science and Engineering
10	Other Departments involved in teaching the programme	None
11	Mode(s) of Attendance	Full time
12	Duration of the Programme	1 year (Full-time)
13	Accrediting Professional or Statutory Body	Not applicable
14	Date of production/revision	June 2012, March 2021, March 2023, March 2026

15. Background to the subject area and main features of the programme

Materials science and engineering is a wide-ranging discipline that cuts across the boundaries of physics, chemistry and engineering. The discipline involves an in-depth study of the production, properties, processing and applications of man-made materials, that is underpinned by two central themes:

- i. The link between structure (from the atomic scale through nano and micro to the macro scale) and the chemical, physical and mechanical properties of materials; and
- ii. How control of structure through processing can be used to optimise engineering performance.

Materials scientists and engineers are involved in the development of new materials, or new technologies for reducing the environmental impact and/or enhancing the properties of existing materials. To do this they must determine appropriate design criteria for a particular application and consider how materials with the required properties can be synthesised.

This programme enables students with a first degree in engineering, chemistry or physics to build on that foundation and develop the necessary specialist skills and knowledge to become high quality materials scientists and engineers. The strong research base and significant industrial links of the Department of Materials Science and Engineering at Sheffield means that both the engineering and pure science aspects of the discipline are strongly represented in the programme.

16. Programme aims

The aims of the programme are to:

1. provide an advanced course in materials science and engineering suitable for graduate students from a range of backgrounds and disciplines.
2. provide students with in-depth understanding, practical knowledge and training in fundamental areas of materials science and engineering, ranging from processing, through characterisation, microstructure and properties, to behaviour and applications.
3. provide students with specialist knowledge, understanding and expertise in a selection of specialist materials areas.
4. provide students with an opportunity to undertake and report upon a selected, advanced practical or modelling project in a topical area of materials science and engineering (MSc only).
5. equip students with the experience and knowledge to make distinctive contributions in future careers in materials science and engineering whether in industry (small and large) or academia.
6. improve and augment the existing transferable skills of students, especially in areas of data acquisition and handling, literature searching, report writing and oral presentational skills.

17. Programme learning outcomes

Knowledge and understanding:

Candidates for MSc, PG Dip and PG Cert will gain:

K1	a sound knowledge and understanding of the important principles that underpin the design, processing microstructure, properties, behaviour and applications of materials.
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K2	familiarity with essential primary and secondary source materials appropriate to the programme of study.
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In addition, candidates for MSc or PG Dip will gain:

K3	a sound knowledge and understanding in selected specialist areas of materials science and engineering.
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In addition, candidates for the MSc will gain:

K4	a detailed knowledge and critical understanding in a current and topical area of research in materials science and engineering.
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Skills and other attributes:

Intellectual skills

On successful completion of the programmes, candidates for the MSc, PG diploma and PG Cert will be able to:

I1	select appropriate materials for design purposes based on an understanding of their production and performance.
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I2	assimilate information from a variety of sources, and précis it in reports, both written and oral.
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I3	manipulate and critically evaluate experimental data acquired through practical work.
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I4	be resourceful, think analytically and construct and sustain logical argument in both oral and written forms.
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In addition candidates for the MSc will be able to:

I5	design experiments that achieve the desired outcomes in optimum fashion.
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Practical skills

On successful completion of the programmes, candidates for the MSc, PG Dip and PG Cert will be able to:

P1	produce or process materials for research on a laboratory scale.
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P2	characterise the performance of materials by measuring relevant properties.
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In addition candidates for the MSc will be able to:

P3	design and execute an original research project.
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Transferable skills	
On successful completion of the programmes, candidates for the MSc, PG Dip and PG Cert will be able to:	
T1	report the results of practical work in a coherent and easily assimilated manner, both orally and in writing.
T2	use word processing, spreadsheet and presentation software and a range of appropriate packages to a high standard.
T3	carry out individual directed and self-directed study, and participate effectively in group activities such as seminars and workshops.
T4	find information and learn independently.
In addition candidates for the MSc will be able to:	
T5	prepare an extended written dissertation, to a deadline, based upon an original research project.

18. Teaching, learning and assessment

Development of the learning outcomes is promoted through the following teaching and learning methods:

- 1. Induction procedures** in the first few weeks of the programme are designed to familiarise students with the important facilities and services within the University. These procedures include an introduction to a variety of information resources, and to departmental stores, workshop and laboratory facilities. Valuable information is available also through the relevant departmental web pages and in the Student Handbook for the programme.
- Traditional **lectures** are used to impart essential knowledge relating to K1 - K3 above.
- 3. Problems classes** are used throughout the programmes to reinforce material imparted through lectures by allowing students to undertake problem-solving exercises, both ahead of the class and during the class. They are designed to build understanding and to aid confidence in discussion. Seminars and workshops thus contribute both to the attainment of knowledge and understanding, K1 - K4, and to the development of key skills, particularly T1, I1 and I4.
- 4. Tutorials** are smaller-group versions of the problems class and they serve a similar purpose and deliver similar learning outcomes. However, tutorials can also better address individual learning needs and allow discussion of individual problems. They particularly address skills I1, T3 and I4 but include elements also of T2.
- The individual **research project** is viewed as a very important contributor to the learning outcomes of the MSc programme, contributing to all elements of knowledge and understanding, K1-K4, and to all skills, I1-5, P1-3, T1-5. Each project is carried out under the guidance of at least one supervisor.
- 6. Independent study** is essential to the successful completion of the programme. New students are introduced to study skills during the induction procedures and these are reinforced through seminar, workshop, tutorial and practical assignments. Such study is vital to the proper attainment of all the knowledge, understanding and skills outcomes. Students are positively encouraged to undertake independent study, and are given feedback on the results of this study, particularly through seminars, workshops and tutorials, but also by supervisors during practical classes and (for students on the MSc programme) during the extended research project.

Opportunities to demonstrate achievement of the learning outcomes are provided through the following assessment methods:

LEARNING OUTCOME (abbreviated – see Section 17 for full text)	ASSESSMENT											
	Lectures	Practical classes	Coursework assignments	Tutorials/examples classes	Industrial seminars/visits	Individual research project		Written examinations	Coursework submissions	Laboratory reports	Oral presentations	Individual project report
K1 Materials principles	(-)	.	.
K2 Source materials
K3 Key topics		
K4 Research area
I1 Find information		
I2 Assimilate and précis		
I3 Analyse/interpret data	
I4 Think analytically
I5 Design experiments		
P1 Produce materials		(-)
P2 Characterise materials		(-)
P3 Undertake individual research	
T1 Communicate effectively	
T2 Use IT effectively	
T3 Work individually/in teams	
T4 Learn independently
T5 Manage projects/time	

19. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Subject Benchmark Statements

<https://www.qaa.ac.uk/quality-code/subject-benchmark-statements>

Framework for Higher Education Qualifications (2014)

<https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf>

University Vision

<https://www.sheffield.ac.uk/vision>

Learning and Teaching Strategy (2016-21)

https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf

The research interests of the academic staff and the research strategies of the Department of Materials Science and Engineering

20. Programme structure and regulations

The MSc in Materials consists of eight taught modules which contribute 120 credits to the programme. MSc students undertake an extended research project (MAT6040) principally during the Summer but with a start early in the academic year. The project contributes a further 60 credits, making 180 credits for the overall programme.

Students registered for the PG Dip are offered the same combination of taught modules (120 credits) plus they undertake a research project.

Students registered for PG Cert take a combination of taught modules worth a minimum total of 60 credits.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available on-line at

<http://www.sheffield.ac.uk/calendar/regs>

21. Student development over the course of study

The modules taken in the Autumn Semester provide the basic knowledge required for the course and are designed to provide a bridge between existing knowledge possessed by the student and that required by those graduating from the programme. These modules also include training in practical aspects of metallurgy covering aspects of manufacturing, microstructure, properties and applications. Built into the first semester are many opportunities to improve on transferable skills, including language skills for overseas students. These modules total 60 credits and success in these is essential to ensure that you are prepared to undertake the more specialised modules in the Spring semester. There is a possible exit point at this stage with the award of PG Cert (requires 60 credits).

In the Spring Semester you select 4 out of 7 15 credit modules on selected specialist topics within materials. These modules reflect the research interests of the Department of Materials Science and Engineering and are designed to introduce you to some of the cutting edge areas of the topics concerned. Students registered for the MSc will undertake a research project (MAT6040) in a selected area or topic, principally during the Summer period. The choice, which requires appropriate consultation with members of staff contributing to the course, is made early in the Autumn Semester so that 1) skills development activities can be related to the project and 2) you can undertake any necessary preliminary work. To graduate with MSc, students are required to pass also this project which contributes a further 60 credits to the programme, making 180 in total.

22. Criteria for admission to the programme

Detailed information regarding admission to programmes is available from the University's On-Line Prospectus at <http://www.shf.ac.uk/courses/>.

23. Additional information

For further information, students are directed to the Department of Materials Science and Engineering web site at <http://www.shef.ac.uk/materials>

This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the teaching department(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at <http://www.shef.ac.uk/ssid>.