



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	Advanced Metallurgy
2	Programme Code	CMBT012
3	JACS Code	J200
4	Level of Study	Postgraduate
5a	Final Qualification	Master of Metallurgy (MMet)
5b	QAA FHEQ Level	Masters
6	Intermediate Qualification(s)	Postgraduate Diploma (PG Dip), Postgraduate Certificate (PG Cert)
7	Teaching Institution (if not Sheffield)	Not applicable
8	Faculty	Engineering
9	Department	Materials Science and Engineering
10	Other Department(s) involved in teaching the programme	None
11	Mode(s) of Attendance	Full-time
12	Duration of the Programme	1 year starting September / October each session
13	Accrediting Professional or Statutory Body	The Engineering Council through the Institute of Materials, Minerals and Mining
14	Date of production/revision	March 2016, March 2021, March 2026

15. Background to the programme and subject area

This long-standing (began in 1952) programme has been continuously modified to provide an in-depth and up-to-date understanding of metallurgy and metallurgical engineering and the developments currently underway. Students on this programme will be expected to have a strong background in a relevant engineering or science discipline and the course will build on this foundation to provide knowledge of the manufacturing, processing, and properties of a wide variety of metals for a variety of industries. Students will apply the information they gain in case studies and as a basis for an extended research project on materials behaviour or development.

16. Programme aims

The aims of the programme are to:

1. provide an advanced course in metallurgy 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 metallurgy, 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 areas of particular relevance, such as steelmaking and microstructure characterisation.
4. provide students with an opportunity to undertake and report upon a selected, advanced practical or modelling project in a topical area of metallurgy (MMet only).
5. equip students with the experience and knowledge to make distinctive contributions in future careers in the metallurgical field 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 MMet, 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 metals and alloys.
K2	familiarity with essential primary and secondary source materials appropriate to the programme of study.
In addition, candidates for MMet or PG Dip will gain:	
K3	a sound knowledge and understanding in specialist areas of metallurgy, especially in microstructure quantification and production advanced metals and alloys.
In addition, candidates for MMet will gain:	
K4	A detailed knowledge and critical understanding in a current and topical area of research in metallurgy.

Intellectual skills	
On successful completion of the programmes, candidates for MMet, PG diploma and PG Cert will be able to:	
I1	select appropriate metals and alloys for design purposes based on an understanding of their production and performance.
I2	assimilate information from a variety of sources, and précis it in reports, both written and oral.
I3	manipulate and critically evaluate experimental data acquired through practical work.
I4	be resourceful, think analytically and construct and sustain logical argument in both oral and written forms.
In addition candidates for MMet will be able to:	
I5	design experiments that achieve the desired outcomes in optimum fashion.

Practical skills	
On successful completion of the programmes, candidates for MMet, PG Dip and PG Cert will be able to:	
P1	produce or process metals and alloys for research on a laboratory scale.
P2	characterise the performance of metals and alloys by measuring relevant properties.
In addition candidates for MMet will be able to:	
P3	design and execute an original research project.

Transferable skills	
On successful completion of the programmes, candidates for MMet, 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 MMet will be able to:	
T5	prepare an extended written dissertation, to a deadline, based upon an original research project.

18. Teaching, learning and assessment

<p>Development of the learning outcomes is promoted through the following teaching and learning methods:</p> <ol style="list-style-type: none">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.2. Traditional lectures are used to impart essential knowledge relating to K1 - K3 above.3. Seminars which may be staff-led or student-led, 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 seminar 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.

5. **Practical classes** are held in connection with the modules taught in Semester 1 of the programme. These are designed to reinforce material taught in lectures and discussed in seminars and tutorials. The specific learning outcomes addressed are K1, K2 and P1, P2, T1, I1, I3, I5.

6. 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.

7. **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.

LEARNING OUTCOME (abbreviated – see Section 17 for full text)	TEACHING								ASSESSMENT					
	Lectures	Practical classes	Coursework assignments	Tutorials/examples classes	Industrial seminars/visits	Group project	Individual research project		Written examinations	Coursework submissions	Laboratory reports	Oral presentations	Group project report	Individual project report
K1 Metallurgical 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	
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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 MMet (Advanced Metallurgy) consists of eight taught modules which contribute 120 credits to the programme. MMet students undertake an extended research project (MAT6040) principally during the Summer but with a start during the Spring Semester. 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 the 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, and provide many opportunities to improve on transferable skills, including language skills for overseas students. These modules total 60 credits and success in these is a prerequisite to progression on either the MMet or PG Dip programmes. There is a possible exit point at this stage with the award of PG Cert (requires 60 credits).

Students registered for the MMet 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 MMet, 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 the programme is available at <http://www.shef.ac.uk/study>

23. Additional information

For further information, students are directed to the Materials Science and Engineering website 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>.

The Sheffield MMet in Advanced Metallurgy is a unique one year advanced course with no close equivalent in any other institution. As such, many international metallurgical based companies send staff to the course to upgrade their

skills before embarking on a PhD.