The University Of Sheffield.

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

Programme Details

1. Programme title	Pharmaceutical Engineering
2. Programme code	CMBT009
3. QAA FHEQ level	Masters - 7
4. Faculty	Engineering
5. Department	CBE
6. Other departments providing credit bearing modules for the programme	None
7. Accrediting Professional or Statutory Body	Not applicable
8. Date of production/revision	December 2022, March 2026

Awards	Type of award	Duration
9. Final award	MSc	1 year
10. Intermediate awards	PG Diploma as exit award	
	PG Certificate as exit award	

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	H812		
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100144		

Programme Delivery

13. Mode of study	*Full-time*
14. Mode of delivery	Face to face

15. Background to the programme and subject area

This programme has been developed taking into consideration the requirements of the global pharmaceutical industry and the strong infrastructure and expertise available across the Department of Chemical and Biological Engineering at the University of Sheffield.

This Masters programme provides students with a thorough understanding of pharmaceutical engineering, combining theoretical aspects of the discipline with hands-on practical experience, which ensures that our graduates are well-equipped to enter and succeed in a wide range of career areas and to meet the challenge of working within an ever-changing discipline. In particular, the programme specialises in:

- the science and application of products
- oral drug delivery
- the production of medicines and new technologies

Students will gain hands-on experience with high-value formulated products using our industrial-scale continuous powder processing plant, become equipped with an enhanced capability for independent learning, and carry out a novel research project.

Graduates from the programme will be highly sought in the pharmaceutical industry. The knowledge and skills gained during this programme in the field of particle technology will also allow graduates to work in other sectors such as food products or detergents.

16. Programme aims

The MSc in Pharmaceutical Engineering aims to:	
A1	provide access to an engineering degree to students from a range of academic and social backgrounds;
A2	prepare students for a professional career in industry, education, public and commercial sectors;
A3	develop interpersonal skills appropriate to a professional person;
A4	encourage students to think for themselves, work effectively on their own initiative, and develop a social awareness;
A5	provide experience in conducting extended individual projects;
A6	develop the students' ability to make technical decisions;
A7	provide students with an education through a firm understanding and practical knowledge in pharmaceutical engineering;
A8	allow students to obtain a broad knowledge and deep understanding of pharmaceutical engineering.

17. Programme learning outcomes

Knowledge and understanding On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:		
		Links to Aim(s)
K1	the science appropriate to the discipline of pharmaceutical engineering;	7
K2	the impact of design on pharmaceutical engineering, processing and manufacturing;	6-8
K3	the implications of bio-engineered materials and components on pharmaceutical engineering;	7-8
K4	the professional and ethical responsibilities including the regulatory framework and the global and social context of pharmaceutical engineering;	2, 7, 8
K5	the operational practice of (bio)processing and integrated unit operations for producing APIs and pharmaceutical products;	2, 7, 8
K6	the requirements for safe operation, the nature of hazards and their operation;	2, 6, 7, 8
K7	the relevant engineering practice and its limitations and have an appreciation of likely new developments;	2, 6, 7, 8
K8	the ability to integrate knowledge of mathematics, science, information technology, design, business context and engineering practice to solve a substantial range of pharmaceutically oriented engineering problems.	4, 5, 6, 7, 8
Skills and other attributes (I for Intellectual Skills, P for Practical Skills, T for Transferable Skills) On successful completion of the programme, students will be able to:		
I1	use scientific principles: in the development of engineering solutions to practical problems; in the modelling and analysis of pharmaceutical manufacturing processes and products;	5, 6, 7, 8
I2	undertake technical risk evaluation of pharmaceutical processes and products;	6, 7, 8
I3	produce solutions to problems through the application of pharmaceutical engineering knowledge and understanding;	7, 8
I4	make use of computer-based models for solving problems in pharmaceutical engineering, and be able to assess the limitations of particular cases;	6, 7, 8
I5	assimilate data from a wide range of sources, extract that which is pertinent to an unfamiliar problem, and apply this to a particular problem;	6
P1	make use of relevant test and measurement equipment in experimental laboratory-based research work;	4, 5
P2	undertake practical testing of scientific hypotheses in the laboratory or through simulation, with technical analysis and critical evaluation of results;	5
P3	apply engineering techniques taking account of industrial and commercial constraints;	4, 7, 8

P4	effectively manage their time in the context of research project;	2, 3
P5	understand the design methodologies, engineering and IT tools related to pharmaceutical engineering and apply and adapt them in unfamiliar situations;	5, 6, 7
P6	research and use new methods required for novel situations and adapt to specific purposes as necessary;	4, 5
T1	undertake manipulation sorting and presentation of data;	1, 2, 3
T2	make use of scientific evidence-based methods in the solution of problems;	2, 6, 8
T3	make use of general IT tools;	2, 3
T4	work with limited or contradictory information and apply creativity and innovation to the solving of problems;	2, 3
T5	manage time and resources and effectively communicate as a team member and demonstrate leadership skills;	1, 2, 3
T6	understand concepts from a range of areas, and the ability to apply them effectively in technical and business decisions;	1, 2, 3, 4
T7	integrate presentational techniques and the information to be presented for maximum impact;	2, 3
T8	work with the minimum of supervision, being proactive in their approach to learning and be able to: ● be innovative in the use of a broad range of scientific principles in solving engineering problems; ● develop, monitor and update a plan to reflect a changing operating environment; ● monitor and adjust a personal programme of work on an on-going basis and can learn independently.	1, 2, 3, 4

18. Learning and teaching methods

The main teaching methods adopted for each learning outcome are shown below. In most cases a combination of methods is used. Emphasis is on 'learning by doing', in particular for developing self-directed learners. Knowledge and understanding are gained through a combination of lectures, tutorials, example classes, design classes, laboratory experience, open-ended problem solving and coursework assignments. Skills are acquired mainly through coursework and individual and group projects.

The teaching will be delivered by a team of highly skilled academics with specific background in chemical engineering and pharmaceutical engineering. Guest lectures from industry/practitioners will be included. A range of learning spaces will be used, including the Diamond Pilot Plant. The teaching and learning material will be shared via Blackboard.

Lectures – used to transmit information, explain theories and concepts, and illustrate methods of analysis or design.

Practical classes – students undertake experiments in laboratory and pilot plant, and computing to gain practical skills.

Tutorials and example classes – to help students with their understanding and to resolve problems in their programme materials.

Research project – individual project contributing to novel research in pharmaceutical engineering.

In most cases a combination of methods is used. Formal lectures are the principal means of imparting knowledge, and understanding is gained through a combination of tutorials, example classes, practical laboratory sessions and coursework assignments.

The programme also provides a number of opportunities for personal development, including the interaction with those working in the field, during lectures and workshop sessions, and by encouraging responsibility in the decision-making process, often when confronting complex industrial scenarios.

In addition to planned teaching and learning activities, students are also expected to learn through the preparation of coursework assignments and other assessment activities which generally require students to seek additional information and work on their own, or in small groups, to develop further understanding of the subject matter.

19. Assessment and feedback methods

Knowledge and understanding are primarily assessed in written examinations. However further knowledge and understanding is gained through project work and assessed in written reports and oral presentations. Skills are acquired mainly through coursework and individual or group projects.

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

Written examinations – unseen examinations.

Coursework submission – designed to test knowledge and communication skills; these include design studies, computing assignments and laboratory reports.

Class tests – tests conducted during the main teaching periods to assess progress.

Oral presentations – The research projects and some taught modules include an oral presentation.

Individual project reports – these include intermediate and final reports for the Research Project and some taught modules.

We will use a range of feedback mechanisms that we have designed and successfully utilised in the department. They include written and verbal, group and individual feedback from tutors; peer to peer feedback, self-reflection via keeping a skills journal, concept-check online quizzes and tutorials. All students have access to a Feedback Handbook available on the MSc Community on Blackboard, which describes in depth the different types of feedback provided in the Department.

For each module, a ‘Module Assessment and Feedback’ Form is provided at the beginning of the term on Blackboard, which clearly outlines feedback details and date for each assessment component.

In addition, the Department provides an ‘Assessment and Feedback Overview’ which summarises all assessment and feedback details per Programme per Semester.

20. Programme structure and student development

In common with most degrees at the University of Sheffield, the programme of study is modular in nature allowing students a certain level of flexibility in the design of their degrees. Postgraduate taught modules offered by the Department are usually 15 credits, which is nominally equivalent to 150 hours of work by a student. Of this between 30 and 40 hours are usually contact time and the remainder directed/private study. Credits are accumulated by obtaining a mark of at least 50 in the assessment for the module.

Students studying for the award of Masters’ are required to take modules to the value of 180 credits, comprising 6 compulsory 15-credit modules, a choice of two optional modules of 15 credits each, and a 60-credit supervised research project. The credits will be divided approximately evenly between both semesters. Students who do not successfully complete the full Masters’ programme are eligible for either the award of Postgraduate Diploma if they have accumulated 120 credits from the study of taught modules or the award of Postgraduate Certificate if they have accumulated 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 online at http://www.sheffield.ac.uk/calendar/.

21. Criteria for admission to the programme

Detailed information regarding admission to the programme is available from:
Pharmaceutical Engineering MSc | 2023 | Postgraduate (sheffield.ac.uk)

22. 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 Strategic Plan
http://www.sheffield.ac.uk/strategicplan

Education Strategy (2020-2025)
https://staff.sheffield.ac.uk/vision/education

23. Additional information

None

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.