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	Drug Discovery Science
2. Programme code	CHMT17
3. QAA FHEQ level	7
4. Faculty	Science
5. School	Mathematical and Physical Sciences
6. Other schools providing credit bearing modules for the programme	Biosciences Medicine and Population Health Chemical, Materials and Biological Engineering
7. Accrediting Professional or Statutory Body	Not applicable
8. Date of production/revision	September 2024

Awards	Type of award	Duration
9. Final award	MSc	12 months
10. Intermediate awards	PGDip	9 months
	PGCert	9 months

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	F150	F151	F110
12. HECoS code(s) *Select between one and three codes from the HECoS vocabulary.*	100420	100423	100417

Programme Delivery

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

15. Background to the programme and subject area

The need for the pharmaceutical industry to produce a constant stream of new chemical entities (NCEs) as therapeutic drugs has never been more important. The field of drug discovery is therefore paramount as we continue to push the boundaries in the discovery of new drugs and applications in healthcare.

Drug discovery science is a multidisciplinary subject that integrates chemistry, pharmacology and various other biological specialties, focusing on the discovery of pharmaceutical agents, or bio-active molecules (drugs). Appropriately trained graduates who can apply their expertise effectively at the interface between biology and chemistry are under demand. The latest HESA data analysis showed that there is a gap in the market for a bespoke Drug Discovery MSc course.

The department has already successfully developed MChem/BSc with Biological and Medicinal Chemistry degree programmes, so it is well placed to develop an MSc programme in Drug Discovery Science to expand our course portfolio and provide a further education route for home and overseas students who are graduated with a BSc in chemistry or biological science or relevant subject areas and have interests in developing their career in drug discovery and development areas.

An MSc in Drug Discovery Science will offer students an opportunity to specialise in this fascinating and vitally important field that focuses on the development of safe and effective drugs by the potential exploitation of genome databases and producing medicine in an inexpensive and greener manner using modern synthetic techniques. The programme will comprise of core chemistry modules which are complemented with specialised and tailored biological/biomedical components and drug design skills. The course will be supported by a wide range of advanced material reflecting current research interests in the department and across the university in the area.

16. Programme aims

MSc in Drug Discovery Science aims to:	
A1	Provide students with knowledge and understanding of key components in the drug discovery and development process through exposure to advanced, research-led teaching materials.
A2	Enable students to acquire an insight into contemporary and multi-disciplinary drug design strategies and tools.
A3	Develop students' understanding of underpinning chemistry and biology of drug actions.
A4	Develop in students an appreciation of the challenges in drug discovery and the pharmaceutical industry and a familiarity with regulatory issues related to drug discovery and production.
A5	Help students to improve and augment their transferable skills.
A6	Develop students' independence of thought, intellectual curiosity and critical approach to evidence, theories and concepts in drug discovery science.
A7	Prepare students for a professional career in drug discovery areas working in pharmaceutical industries or academia.

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	Basic pharmacology, toxicology, genomics and specialist fields of drug discovery such as cancer biology, neurobiology and antimicrobial resistance.	A1-A4
K2	Contemporary drug design strategies and tools such as bioisosterism, fragment-based lead discovery, prodrugs, quantitative structure-activity relationship (QSAR) and structure-based drug design.	A1-A4
K3	A wide range of inter-disciplines such as genomics, proteomics, high speed computing, high throughput screening and bio-imaging.	A1-A7
K4	Regulatory issues related to drug discovery and production including FDA and EMA regulations.	A4
K5	Data acquisition and handling, literature searching, report writing and oral presentational skills.	A5-A7
K6	Conducting an independent research project involving research planning, experimental design and execution.	A1-A7
Skills and other attributes On successful completion of the programme, students will be able to:		
S1	Use a range of laboratory techniques such as assay techniques and data processing.	A5, A7
S2	Apply fundamental principles to solve problems in drug discovery at a research level.	A1-A7
S3	Carry out research planning to address a substantial research question, including experimental design.	A6, A7
S4	Analyse and appraise research data quantitatively and qualitatively using a variety of data processing techniques such as error analysis and estimations.	A5-A7
S5	Present research findings in a variety of formats to a range of audiences.	A5-A7
S6	Work as a member of a team and reflect and critically evaluate both the team's performance and individual contribution.	A5-A7
S7	Work towards deadlines and show effective time management.	A5-A7

18. Learning and teaching methods

The MSc programme has 180 credits which consists of 120 credits of taught material and a 60 credit of a research project.

The taught material will be delivered largely through lectures supported by tutorials, workshops and online learning support (K1-6). The 120 credits of taught material consist of a collection of 15- credit modules, of which 90 credits are core and 30 credits are optional. The compulsory core modules (90 credits) lay the foundations and cover the skills all students require, and the optional modules (30credits) provide in-depth knowledge and specialist training/preparation for a final research dissertation (60 credits) and their future career.

The lecture modules are designed to extend students' knowledge and understanding to more advanced levels than at bachelor undergraduate levels and into cutting-edge areas of research. Optional modules offer the students maximum flexibility in selecting subjects that match their strengths and interests. Each module will be research led and delivered by research-led, world leading academic staff using a range of delivery methods:

- Classroom lecturing - Face-to-face direct contact lecturing will give students intimate connections to the course and academic staff.
- Tutorial - This is again a method of face-to-face teaching which allows students to interact closely with the staff and their peers. It will help to develop students' abilities to apply their knowledge of the fundamental principles to solving problems, and other subject related skills (S2, 3, 4, 5).
- Workshop – Training in critical thinking and scientific report writing (S6, 7).
- Independent research project on selected topics - The students will be directed to conduct a piece of independent research into the literature in a specific area, analyse the information collected and present their findings to different audiences (peers and non-specialists) (S1, 3, 5, 6, 8).
- Group led activities – This is to train the students to work as a team (S4, 6, 7).

The 60-credit research project will be carried out by the students for 13 weeks after Easter holiday in new, state-of-the-art research laboratories, under the direction of a member of academic staff from a participating department. These projects can potentially lead to research publications in peer reviewed journals and play an important part in fulfilling learning outcomes K5, 6 and S1, 2, 3, 4, 5, 6, 7.

19. Assessment and feedback methods

Assessment The classroom "lecture" modules are assessed by a combination of formal examination and coursework. The exam~~exams~~ questions are structured and an indicative marking scheme for course work will be provided. The questions are designed to test whether students have grasped the fundamental concepts of a subject (competence), as well as application of their knowledge to demonstrate higher skills such as solving problems.

The coursework exercises are designed to allow the students to demonstrate their ability to push their understanding of the topic beyond the scope of the lectures by encouraging self-study, information finding/organising/communicating and critical thinking, without the pressure of the time constraint of the exam hall.

It is believed this combination of written exam and coursework will give opportunity for students to demonstrate their ability to study at this high-level, regardless of their educational background.

The research project module (60 credits) will be assessed using a combination of literature review, oral presentation, dissertation report, mini viva, project performance (attitude, competency, intellectual input and contribution). Each assessment will be carefully structured and use well-defined criteria. There will be lectures that describe research skills including transferable skills important for successful communication in science. The students will develop an understanding of the context in which

research takes place through critical reading and evaluation of a range of literature. The students will produce a critical report of the literature in a specific research area.

Feedback The students will have a personal tutor in chemistry, with whom they will meet regularly to discuss their progress on the course, and to help them to process the feedback they are given so that they can get the best learning experience.

The tutorials/workshops will provide an opportunity for students to ask questions about the lecture material and staff to give students feedback on the problem-solving questions set prior to the tutorial/workshop individually as well as a class. The workshop/tutorial questions may be in the format of exam-type or short quizzes or MCQs.

The coursework (essay writing and projects) which is associated with lectured modules has two stages of feedback; a meeting prior to submission when students are encouraged to take examples of their writing along with plans of how they intend to tackle the exercise so they can get comments directly from the coursework setter. After submission, the students will receive extensive feedback on their work, within two weeks in most cases, so that the students can learn from it and make improvements to their next piece of coursework (multiple submissions throughout the year allows progressive improvements in their skills). All written coursework will be submitted via Turnitin and some will involve peer-review. Feedback for skills projects may be given as a group or cohort or as self-reflection.

In the research project, the students will meet regularly with their supervisor for feedback on their performance in managing their project, quality of laboratory work, teamwork etc. The literature review has a two-stage assessment - initially they submit a draft of their report. This is commented on by the supervisor, and time given to react to those comments, before the final submission is made. The students again get feedback. The viva, oral presentation, and supervisor's assessment (project performance) also yield feedback for the student. The thesis has a deadline for students to get a final draft to their supervisors ahead of the final submission date, to give them the opportunity to give feedback.

In addition to information and IT support provided by the library and ITServices, language support will be supplied by the ELTC to the department, scheduled around various assessment points. This allows students to take examples of their scientific writing to get feedback on the quality of their English and how to improve it.

20. Programme structure and student development

The MSc in Drug Discovery Science is a programme in which the teaching material is drawn from across various and faculties. The 90 credits of core modules cover a wide range of knowledge and techniques required for a successful modern drug discovery campaign. The core modules, worth 15 or 30 credits each, are:

- **CHM61017 (S1/S2, 30) –** Drug Design, Pharmacology & Medicinal Chemistry
- **CHM455 (S1/S2, 30) –** Research, Presentation and Professional skills
- **CHM458 (S1, 15) –** Statistics and Laboratory Techniques
- **CHM61013 (S1/S2, 15)** – Medicinal Chemistry and Drug Synthesis

The 30 credits of optional modules offer the maximal flexibility for students to choose topics that suit their career and research interests and education background. The students will pick up 30 credits worth of modules from the following list:

- **BIS440 (S2, 15) –** Genomic Approaches for Drug Discovery
- **BIS448 (S2, 15) –** Cancer Biology
- **BIS437 (S1, 15) –** The Biotech and Pharmaceutical Industry
- **MPS460 (S1/S2, 15) –** Chemical Biology

The delivery of teaching material will be spread over both Semester 1 and 2. Most modules are ones already developed at the Master level to extend the students' knowledge, and their ability to apply that knowledge to solve problems at the frontier of the subject. The modules will be delivered in blocks as much as possible to avoid timetable clashes.

The research project unit (60 credits) involves a number of components with a focus on an extended research project where students will be asked to choose their project/supervisor at the start of the programme and will start work on a literature survey and planning before Christmas. The laboratory work starts immediately after the Easter break. There will be seminars to provide information on skills in research. The project progress review and assessments (poster/oral presentation, report and viva) will be conducted and delivered within a defined schedule. The research project is the culmination of the students' prior work and development and allows the students to develop a substantial degree of independence by taking ownership of their project and developing their own ideas.

The combination of the core and optional lecture modules (120 credits in total) and a research project (60 credits) gives 180 credits for the programme as a whole which is required for a successful MSc degree to be awarded.

The PG Cert exit qualification will be offered only for partial completion of the programme. The PG Cert can be obtained for satisfactory completion of 60 credits of taught units and these students will not have completed a research project.

This MSc programme offers extensive student opportunities to sample the full breadth of drug discovery science through a range of teaching modules and independent research project.

The programme will work towards the accreditation by the RSC. Upon the completion of the programme students will be equipped with sufficient knowledge, understanding and experience required for a future research scientist working at the forefront of drug discovery.

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 programmes is available from the University's On-Line Prospectus at http://www.shef.ac.uk/courses/.

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 (2024)
https://www.qaa.ac.uk/the-quality-code/qualifications-frameworks#

University Vision and Strategic Plan
https://www.sheffield.ac.uk/vision

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.