UNIVERSITY OF
LIVERPOOL

MSc

Digital Chemistry: AI, Machine Learning, Automation and Robotics

Study mode

Full-time

Duration

12 months

Apply by: **11 September 2026**
Starts on: **28 September 2026**

About this course

Chemistry is in the midst of a transformation driven by advances in Robotics and Artificial Intelligence. With cutting-edge facilities, world-beating research, and an outstanding network of industrial partners, Liverpool is one of the best places in the world to study how these technologies are upending traditional approaches to research and giving rise to a new discipline: digital chemistry.

Introduction

Digital chemistry is the use of AI, big data, and robotics to transform the way we design and make new molecules and materials. Liverpool sits at the forefront of this revolution, from making groundbreaking findings in computational materials discovery to building our own suite of robotic chemists.

Our Digital Chemistry: AI, Machine Learning, Automation, and Robotics MSc is a cross-disciplinary programme that makes you part of that transformation, providing you with expertise in machine learning, automation, and digitalisation. We teach you these techniques from the ground-up, from Python and Arduino to cheminformatics and applied robotics, empowering you to directly tackle real-world chemistry problems, from climate change to drug

discovery. You will develop critical digital skills and apply them across a range of chemical contexts, including pure materials, pharmaceuticals, and formulated materials.

Why choose us?

- **State-of-the-art facilities –** Gain exclusive access to the £81million Materials Innovation Factory, a cutting-edge hub for AI-driven chemistry, automation, and robotics

- **World-leading teaching centres** – study the fundamentals of automation and robotics for chemistry in our Central Teaching Laboratory, where outstanding teaching facilities bring hands-on learning to life

- **World-class expertise** – your final research project will be hosted in academic and industry labs that are pioneering some of the world's first fully autonomous laboratories, where AI and robotics collaborate to innovate new molecules

- **Industry connections –** build your professional network through partnerships made in the heart of the UK's chemicals industry

- **Authentic assessment** – demonstrate what you have learnt through your ability to solve real problems in chemistry, not just pass an exam.

This MSc is also available with the alternative title Chemistry with AI MSc for September 2026 entry. You have the option to graduate with either of these two MSc titles.

Who is this course for?

This programme is for BSc (Hons) Chemistry, Biochemistry, Physics, Engineering, Computer Science graduates, or graduates in other chemistry-related fields, with a 2:2 or equivalent, who want to see how code and data are transforming chemistry.

We'll teach you to code in Python from the ground-up and no prior programming experience is needed. We aim to develop your skills and knowledge in the digital chemistry domain, equipping you for contemporary and pioneering professional practice or further study at the doctoral level.

What you'll learn

- Acquire and apply the key maths and programming skills underpinning AI, automation, robotics, and digitalisation of chemistry and their applications in chemistry research

- Explore the use of robotics, microcontrollers, and computer vision and their applications to experimental chemistry
- Investigate how to apply machine learning and cheminformatics in a range of chemical contexts, from pharmaceuticals to product formulation
- Discover how digitalisation and automation are disrupting all areas of chemistry and materials science
- Through team-based learning and research projects undertaken in world-leading research groups, develop digital literacy and interdisciplinary collaboration skills that leave you prepared for ground-breaking professional practice or further study at doctoral level.

Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

Semester one

Modules

Compulsory modules	Credits
DIGITAL ALCHEMY: SYNTHESISING CODE AND CHEMISTRY (CHEM501)	15
KEY SKILLS FOR DIGITAL CHEMISTRY (CHEM503)	15
MATHS AND STATISTICS FOR AI AND DATA SCIENCE (COMP533)	15
PROGRAMMING FUNDAMENTALS (COMP517)	15

Programme details and modules listed are illustrative only and subject to change.

Semester two

Modules

Compulsory modules	Credits
ROBOTICS AND AUTOMATION IN CHEMISTRY (CHEM504)	15
CHEMICAL DATA, DISCOVERY AND DESIGN (CHEM502)	15

Compulsory modules	Credits
RESEARCH PROJECT PLANNING AND MANAGEMENT IN DIGITAL CHEMISTRY (CHEM506A)	30

Programme details and modules listed are illustrative only and subject to change.

Summer research project

Modules

Compulsory modules	Credits
MSC DIGITAL CHEMISTRY RESEARCH PROJECT (CHEM506B)	60

Programme details and modules listed are illustrative only and subject to change.

Teaching and assessment

How you'll learn

Teaching is delivered through a blend of interactive lectures, hands-on workshops, and self-directed study. As a Masters-level course, there is a strong emphasis on independent study and project-based learning. The programme blends both individual and group work, both giving you space to discover the topic at your own pace as well as ensuring you acquire the key teamwork skills that are essential for employability. Mini-projects undertaken throughout the year give you the chance to tackle problems by developing ideas and hypotheses, designing strategies to solve problems, and analysing and interpreting your findings.

As you advance through the course, semesters 1 and 2 lay the groundwork for the semester 3 research project. Semester 1 content introduces you to the basic skills required to become a digital chemist. Semester 2 builds on this content, translating into more applied settings.

Liverpool Curriculum Framework attributes and hallmarks are at the centre of this programme, and it is also informed by the University Education Strategy 2031. Research-connected teaching, active learning, and authentic assessment are embedded in all aspects of teaching. As you progress through the programme, you will enhance your problem-solving skills, independent learning, confidence and digital fluency. Inclusivity is at the heart of this programme, encompassing all aspects of equality, diversity and inclusion as part of value-based programme design. The programme is representative of the diversity of students and provides equal access to the curriculum.

How you're assessed

Assessments in our Digital Chemistry MSc allow you to demonstrate a systematic knowledge and critical understanding of the application of AI, automation, machine learning, and robotics in chemistry.

The learning activities, resources, and assessments are aligned with learning outcomes, ensuring that you can demonstrate your knowledge and abilities effectively. We favour authentic assessment over final exams, meaning you will complete tasks that simulate real-world scenarios, such as hands-on workshops and project-driven assessments. This approach allows you to apply digital technologies in practical contexts and address real-world challenges in chemistry.

Assessment strategies will ensure that you can demonstrate your knowledge and skills through various methods, including coursework, teamwork, presentations, dissertation writing, and oral examinations. By engaging with these varied assessment types, you will gain experience in industry-relevant tasks, preparing them for professional practice.

You will receive feedback to support your learning progress across all modules, allowing for adjustments and improvements. You will also evaluate your own progress.

Liverpool Hallmarks

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

The Liverpool Curriculum framework sets out our distinctive approach to education. Our teaching staff support our students to develop academic knowledge, skills, and understanding alongside our **graduate attributes**:

- Digital fluency
- Confidence
- Global citizenship

Our curriculum is characterised by the three **Liverpool Hallmarks**:

- Research-connected teaching
- Active learning
- Authentic assessment

All this is underpinned by our core value of **inclusivity** and commitment to providing a curriculum that is accessible to all students.

∧ Back to top

Careers and employability

Upon completion of the MSc in Digital Chemistry, students will be qualified to enter a wide range of employment or pursue further study leading to a PhD.

The pharmaceutical, data science, analytics & informatics and chemical research industries are possible employers of graduates, especially given the anticipated increases in the use of next-generation sequencing and the corresponding data analysis that will be required.

Upon completion of the MSc in Digital Chemistry, graduates will also be qualified to enter careers such as finance & banking, software development, teaching and consultancy, where the skills obtained in the degree programme are highly valued.

Occupations linked to students who have studied chemistry in a higher education setting are set to grow across the UK. There is an anticipated growing demand for adaptable scientists who can harness the knowledge and skillsets of digital chemists.

The pharmaceutical, data science, analytics & informatics and chemical research industries are possible employers of graduates, especially given the anticipated increases in the use of next-generation sequencing and the corresponding data analysis that will be required.

Upon completion of the MSc in Digital Chemistry, graduates will also be qualified to enter careers such as finance & banking, software development, teaching and consultancy, where the skills obtained in the degree programme are highly valued.

Career support from day one to graduation and beyond

Career planning

From education to employment

Networking events

Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

Tuition fees

UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)

Full-time place, per year - £14,000

International fees

Full-time place, per year - £32,000

Tuition fees are for the academic year 2026/27.

Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support.

- You can pay your tuition fees in instalments.
- All or part of your tuition fees can be funded by external sponsorship.
- International applicants who accept an offer of a place will need to pay a tuition fee deposit.

If you're a UK national, or have settled status in the UK, you may be eligible to apply for a Postgraduate Loan worth up to £12,167 to help with course fees and living costs. **Learn more about paying for your studies**.

Additional costs

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This could include buying a laptop, books, or stationery.

Find out more about the additional study costs that may apply to this course.

Entry requirements

The qualifications and exam results you'll need to apply for this course.

We accept a 2:2 honours degree from a UK university, or an equivalent academic qualification from a similar non-UK institution. This degree should be in Biochemistry, Physical Sciences, Engineering, Computer Science or another chemistry-related field.

Postgraduate entry requirements

We accept a 2:2 honours degree from a UK university, or an equivalent academic qualification from a similar non-UK institution. This degree should be in Chemistry, Chemical Engineering, or a Chemistry-related degree.

In addition, international candidates are required to have a level of English equivalent to IELTS 6.5 or reach this standard by satisfactorily completing equivalent pre-sessional English language classes at the University of Liverpool.

International qualifications

Select your country or region to view specific entry requirements.

The minimum entry requirements are equivalent to the UK BSc (Hons) Chemistry, Chemical Engineering, or Chemistry-related degrees 2.2.

International candidates are required to have a level of English equivalent to IELTS 6.5 or reach this standard by satisfactorily completing equivalent pre-sessional English language classes at the University of Liverpool.

English language requirements

You'll need to demonstrate competence in the use of English language, unless you're from a majority English speaking country.

We accept a variety of international language tests and country-specific qualifications.

International applicants who do not meet the minimum required standard of English language can complete one of our [Pre-Sessional English courses](#) to achieve the required level.

IELTS

6.5 overall, with no component below 6.0

TOEFL iBT

If you took a TOEFL test on or before 20 January 2026, you'll need 88 overall, with minimum scores of listening 19, writing 19, reading 19 and speaking 20. If you took a TOEFL test from 21 January 2026 onwards, when a new scoring system was introduced, you'll need 4.5 overall, with 4 or above in all components. TOEFL Home Edition not accepted.

Duolingo English Test

125 overall, with writing not less than 125, speaking and reading not less than 115, and listening not below 110. For academic year 2025/26 only, we will also accept the production, literacy, comprehension and conversation score set: 120 overall, with no component below 105.

Pearson PTE Academic

61 overall, with no component below 59

LanguageCert Academic

70 overall, with no skill below 65

PSI Skills for English

B2 Pass with Merit in all bands

INDIA Standard XII

National Curriculum (CBSE/ISC) - 75% and above in English. Accepted State Boards - 80% and above in English.

WAEC

C6 or above

Pre-sessional English

Do you need to complete a Pre-sessional English course to meet the English language requirements for this course?

The length of Pre-sessional English course you'll need to take depends on your current level of English language ability.

Pre-sessional English in detail

If you don't meet our English language requirements, we can use your most recent IELTS score, or the equivalent score in selected other English language tests, to determine the length of Pre-sessional English course you require.

Use the table below to check the course length you're likely to require for your current English language ability and see whether the course is available on campus or online.

Your most recent IELTS score	Pre-sessional English course length	On campus or online
6.0 overall, with writing at 6.0 and no component below 5.5	6 weeks	On campus or online
5.5 overall, with writing at 5.5 and no component below 5.0	10 weeks	On campus or online
5.5 overall, with no more than one component at 5.0	12 weeks	Online
5.5 overall, with no component below 5.0	20 weeks	On campus
5.0 overall, with no more than one component at 4.5	30 weeks	On campus

Your most recent IELTS score	Pre-sessional English course length	On campus or online
4.5 overall, with no more than one component at 4.0	40 weeks	On campus

If you've completed an alternative English language test to IELTS, we may be able to use this to assess your English language ability and determine the Pre-sessional English course length you require.

Please see our guide to Pre-sessional English entry requirements for IELTS 6.5 overall, with no component below 6.0, for further details.

∧ Back to top