UNIVERSITY OF LIVERPOOL

MSc

Applied Computational Earth Science

Study mode	**Duration**	Apply by: **28 August 2026**
Full-time	12 months	Starts on: **21 September 2026**

About this course

The MSc in Applied Computational Earth Science is designed to prepare the next generation of scientists for the evolving demands of the energy transition and sustainable geoenergy resource management.

Introduction

This cutting-edge programme combines geoscience knowledge with advanced computational skills, offering two specialised pathways: 'Big Data and AI' and 'Geoenergy'. You'll gain expertise in computational methods, geomodelling, machine learning, and geoenergy solutions, enabling you to tackle real-world challenges such as carbon capture and storage, geothermal energy, and geological subsurface modelling.

The modules available in the Big Data and AI pathway develop key skills in data mining, machine learning, optimisation, and visualisation – essential for analysing complex Earth science datasets. Optionality in these modules reflects the growing and diverse role of AI and data science in Earth science, providing students with in-demand, transferable skills. The Geoenergy pathway was designed in consultation with industry to address a critical skills gap in geothermal energy, carbon storage, and subsurface resource management. Its structure ensures students gain both the technical knowledge and practical experience for careers in the energy transition.

Throughout the programme, you'll develop essential skills in algorithm design, collaborative problem-solving, and independent research while applying software engineering principles to geoscience problems. You will also enhance your ability to

communicate technical findings to diverse audiences – both in-person and digitally – and derive evidence-based conclusions through quantitative analysis.

With a curriculum aligned to industry needs and delivered by leading experts, this MSc ensures you are equipped for emerging careers in sectors such as renewable energy, environmental consulting, and digital geoscience, all of which operate within a globally relevant context.

As industries pivot toward sustainable energy solutions, the demand for professionals with computational geoscience skills is rapidly increasing. Our MSc in Applied Computational Earth Science provides an opportunity to be at the forefront of this pivotal transition.

Who is this course for?

The programme is designed to be accessible to all students, anticipating and accommodating a wide range of backgrounds, experiences, and learning approaches.

What you'll learn

- To design and implement algorithms
- Critically analyse complex geoscientific data
- Apply advanced modelling techniques
- Prepare for leadership roles in the digital geoscience and geoenergy sectors by fostering innovation and independent research skills
- Effective communication of technical information to diverse audiences
- A critical awareness of the global and societal context of Earth science.

Course content

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

Semester one

Compulsory:

- ENVS 610: Computation and Algorithm Development for Earth Scientists
- ENVS612: Earth Science for Computational Scientists
- ENVS616: Computational Earth Science Methods
- ENVS617: Geomodelling
- ENVS618: Computational Earth Science Project.

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

Semester two

Students will follow their pathways in semester two.

Students choosing the Geoenergy pathway will study these compulsory modules:

- ENVS650: Geoenergy Solutions
- ENVS651: Earth Science for Computational Scientists.

Students choosing the Big Data and AI pathway will choose two modules from the following options:

- COMP527: Data Mining and Visualisation
- COMP532: Machine Learning and BioInspired Optimisation
- COMP534: Applied Artificial Intelligence
- ENVS453: Spatial Modelling for Data Scientists
- ENVS456: Advanced Geovisualisation.

Modules

Optional modules	Credits
DATA MINING AND VISUALISATION (COMP527)	15
MACHINE LEARNING AND BIOINSPIRED OPTIMISATION (COMP532)	15
APPLIED ARTIFICIAL INTELLIGENCE (COMP534)	15
SPATIAL MODELLING FOR DATA SCIENTISTS (ENVS453)	15
ADVANCED GEOVISUALISATION (ENVS456)	15

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

Teaching and assessment

How you'll learn

The programme employs a blended approach that combines lectures, practical workshops, tutorials, group projects, fieldwork, and independent study. Fieldwork is an integral component, particularly in the Geoenergy pathway, where students engage in hands-on data collection, analysis, and problem-solving in real-world settings. This experiential learning approach enhances practical skills, contextual understanding, and employability. This wide range of teaching methods using both in-person and online resources reflects the diversity of the student population and their learning styles, and is designed to be inclusive. This includes a combination of synchronous and asynchronous lectures, collaborative projects that encourage teamwork and knowledge exchange, and practical workshops that cater to different learning styles.

Teaching methods and module syllabuses are designed to facilitate authentic assessment, a key component of our programme, aligning with real-world applications and industry practices, frequently using real-world case studies. These are drawn from diverse international contexts, highlighting where geoscience challenges and solutions vary, or do not vary, across different economic and geographical contexts.

How you're assessed

We employ several innovative assessment techniques, including independent research projects that simulate real-world research and industry scenarios, group projects that reflect professional teamwork, and fieldwork assessments that provide hands-on experience and reinforce theoretical knowledge through practical application.

To accommodate our diverse student body, we offer a variety of assessment formats, including coding assignments, data analysis reports, group projects, oral presentations, and practical demonstrations. This variety ensures that all students can showcase their competencies effectively and are not only academically accomplished but equipped with the practical skills and experience necessary to excel in their professional careers.

Research components are integrated progressively into assessment throughout the programme to build and assess students' critical understanding of enquiry. This culminates in a substantial independent research project, which acts as a capstone assessment where students can draw on a wide range of elements from the modules they have taken. This project requires students to manage a complex, real-world problem from conception to completion, mirroring professional practice and thus serving as a key research-connected authentic assessment.

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.

Careers and employability

Graduates of the MSc in Applied Computational Earth Science will be well-prepared for a range of career opportunities in the rapidly evolving fields of digital geoscience, geoenergy, and environmental consultancy.

The programme's strong emphasis on computational methods, data analysis, and Earth science applications makes graduates highly employable in industries such as:

- Renewable energy
- Carbon capture and storage
- Environmental modelling
- Geospatial analytics.

Additionally, the Big Data and AI pathway equips students with skills relevant to data science and machine learning roles, while the Geoenergy pathway provides specialised knowledge for careers in sustainable energy systems and subsurface resource management.

Career support from day one to graduation and beyond

Career planning

From education to employment

Networking events

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Fees and funding

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

Tuition fees

Tuition fees for the academic year 2026/27 will be announced soon.

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.

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 a relevant subject.

Non-graduates with very extensive professional experience and/or other prior qualifications may also be considered.

International qualifications

Select your country or region to view specific entry requirements.

Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the University of Liverpool International College, means you're guaranteed a place on your chosen course.

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

88 overall, with minimum scores of listening 19, writing 19, reading 19 and speaking 20. 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 with minimum scores of 59 in each component

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 no component below 6.0	6 weeks	On campus
6.0 overall, with no component below 5.5	10 weeks	On campus and online options available
6.0 overall, with no more than one component below 5.5, and no component below 5.0	12 weeks	On campus and online options available
5.5 overall, with no more than one component below 5.5, and no component below 5.0	20 weeks	On campus
5.0 overall, with no more than one component below 5.0, and no component below 4.5	30 weeks	On campus
4.5 overall, with no more than one component below 4.5, and no	40 weeks	On campus

Your most recent IELTS score	Pre-sessional English course length	On campus or online
component below 4.0		

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.

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