



University College Dublin  
Ireland's Global University

# MSC SUBSURFACE CHARACTERISATION & GEOMODELLING

*For a geoscience career in a changing world*



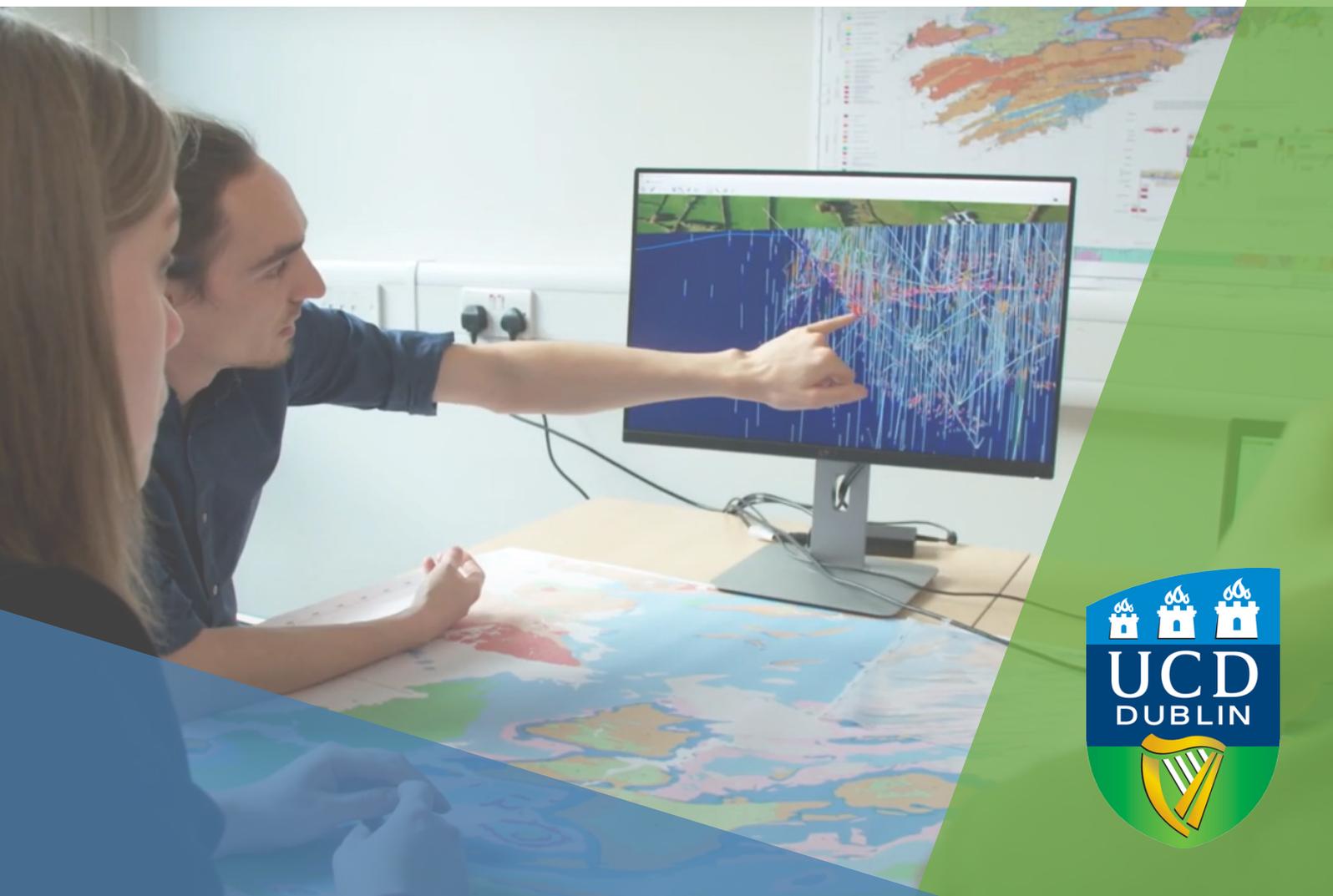
**90 ECTS, COURSE CODE F181**

**One-year, full time taught MSc**

# WELCOME TO OUR MSc

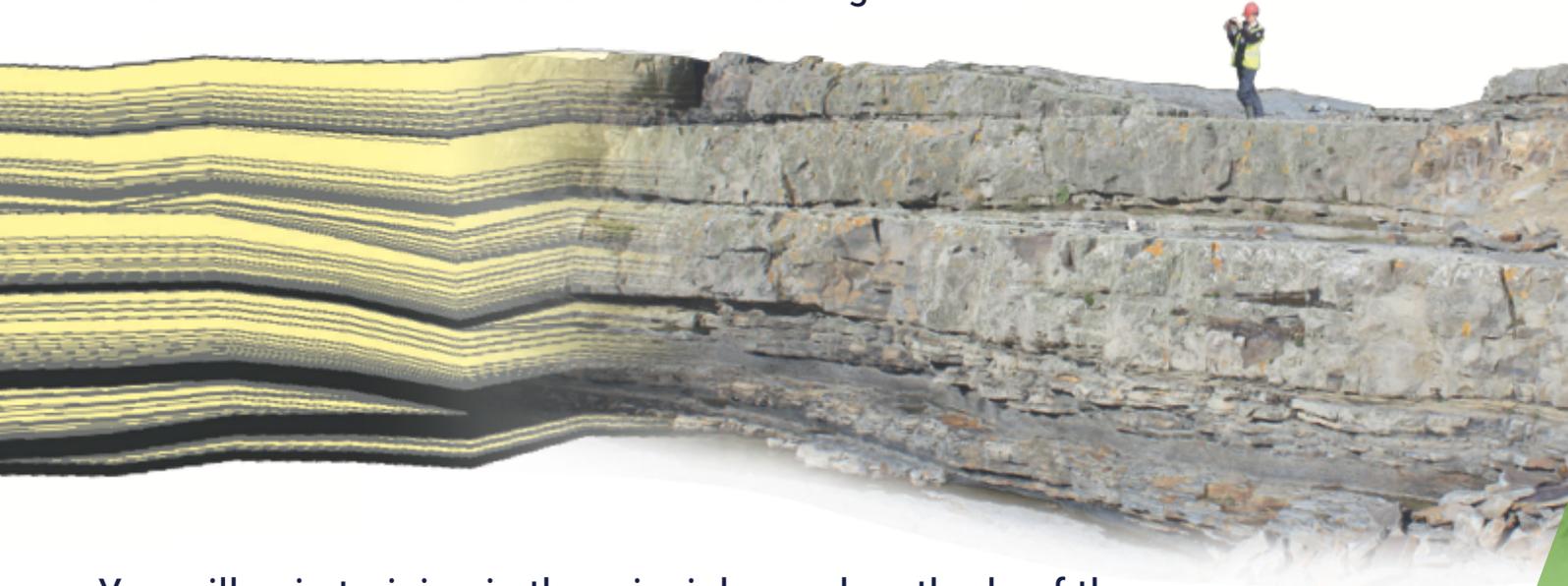
Geoscientists able to understand, model and visualise the subsurface are critical in our increasingly populous and resource-constrained world.

In this 1-year, full time, taught MSc in applied geoscience, you will gain skills in data interpretation, analysis and computer modelling of the deeper and shallow subsurface. Upon completion, you will be employable in a range of industry and applied research areas, including carbon capture and storage, geothermal energy, sourcing energy critical elements, groundwater supply and protection, geotechnical services and waste management.



# ABOUT THIS COURSE

This MSc in applied geoscience is designed to provide you with a wide range of sought-after, transferable skills which will provide flexibility in your future career choices in either industry or regulatory and applied research organisations requiring digital subsurface characterisation and modelling.



You will gain training in the principles and methods of the acquisition, analysis and digital modelling of data from the shallow and deep subsurface. Modules will cover aspects of: 3D mapping; stratigraphic prediction; 'hard rock' characterization; Quaternary geology; applied structural geology; data processing; geophysical methods; remote sensing; geostatistics; fractured rock characterisation; geofluids; geomechanics and geomodelling.

As part of the course you will also receive training in state of the art industry software (e.g., Petrel and Leapfrog, GIS) and develop a range of soft skills (e.g. presenting, reporting and programming) required by industry and academia.



# WHAT COURSE INSTRUCTORS SAY

Sustainable access to mineral resources is of critical importance to our society. Many mineral resources are essential components of the technologies we need for the low carbon society we are aiming for. But because in many cases, the depth at which we find these resources increases year after year, we need to get smarter at finding and managing them. This will require us to better understand the subsurface, and to produce better interpretations and models. One of the great challenges we face is to better understand what's beneath our feet. In this age of information, geoscientists and geophysicists need the skills to manage, integrate and interpret subsurface data in three dimensions. In the MSc you will learn to do just that. At the end of the degree you will be able to visualise, model and analyse almost any subsurface information and apply it to industry-relevant problems across different geoscience sectors.

**Dr Koen Torremans,**  
**Course instructor**



**Dr Claire Harnett,**  
**Course instructor**

As we go through the energy transition, it is important to have a range of applied skills that are up-to-date with society's changing demands. In this MSc, we're ensuring the skills we are teaching are applicable to industry in the current day. One of the key elements of this MSc degree is that it has a lot of industry facing training so you learn how to work with key industry software, and we cover all topics that you would be expected to have some experience of when you go into an industry job or other applied geoscience roles. We aim to give you a really good grounding, such that you have the right experience when entering workplace environments. You will also undertake a research project as part of the MSc, which can be tailored to whatever your particular goals are for the future or whatever your interests are, be that in research or industry.

You will learn about the different geophysical methods used to image the subsurface, and how to apply them to understand what's going on deep within the earth. My own expertise is in 3D modelling of the Earth using geophysical data, and in integrating and interpreting data with multiple physical properties in a quantitative way to understand geology at depth. I use machine learning to extract information from large datasets as it allows different physical properties of the Earth to be integrated and understood. This process allows us to transform data into knowledge and empower our decisions as geologists.



**Dr Aline Melo,**  
**Course instructor**

# CAREER OPPORTUNITIES

Through this MSc, you will acquire modern skills in applied geoscience that are applicable across a range of sectors, including:

- Mineral resources
- Energy
- Geothermal
- Groundwater
- Carbon sequestration
- Geotechnical services
- National geological surveys
- Waste management
- Research careers



# WHAT GEOSCIENTISTS FROM INDUSTRY SAY

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I am delighted to see that University College Dublin is starting this new MSc. As a career Mining and Exploration Geologist I can state that most undergraduate courses in Earth Sciences are weak in the areas of applied geology and graduates are often inadequately prepared for roles in industry or applied research. With the world embarking on a period of decarbonization to stabilize climate, graduates are well versed in the reasons for these changes but not in the technological solutions to the enormous challenges raised. It is clear that increased mining of metals will be needed, combined with better husbanding of hydrocarbon resources.



DR JOHN ASHTON,  
CONSULTANT  
MINING AND  
EXPLORATION  
GEOLOGIST  
ADVISING  
BOLIDEN TARA  
MINES

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MARIA NOONE,  
ENGINEERING  
GEOLOGIST WITH  
ARUP & UCD  
GEOLOGY  
GRADUATE, 2019



“

Being able to use digital skills to understand the subsurface is really important when you go into industry. I am currently working as an Engineering Geologist with Arup. I use my background in geology to interpret a wide variety of ground conditions which includes soil and rock mechanics, which helps geotechnical engineers design safe and environmentally sustainable projects. It's very important to be able to conceptualise the difference between the shallow and the deep subsurface and to be able to digitally analyse the subsurface using geophysical data. Communication skills and team work are key skills as well. I did my undergraduate degree in UCD and the support I received from the lecturers was fantastic. It's basically one-on-one teaching which is amazing.

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# WHAT GEOSCIENTISTS FROM INDUSTRY SAY



From a commercial exploitation perspective, energy and materials sourced in the subsurface continue to underpin how our societies function, and despite the growing focus on the consequences, geoscientists will be needed to analyse the subsurface during the energy transition and beyond.

UCD, Dublin and the School provided me with one of my most enjoyable and fulfilling phases of life experience, not just a route for continuing education. The PhD experience was highly sociable with great atmosphere and camaraderie. This was not just on a Friday evening but every day conversations around the long table of the coffee room and on the football pitch for our Tuesday and Thursday kick arounds, involving a mix of PhDs, Post-Docs, Professors and undergrads. I genuinely miss my time there.

The global exposure and impact of the various research groups and Professors meant access as a PhD to an excellent global network of academia and industry, options for funding and facilities, and of course, attending some of the top conferences. I would not hesitate to recommend UCD as a great place to study geosciences.



DR SIMON BARKER,  
PRINCIPAL GEOLOGIST  
AT EQUINOR, BERGEN,  
NOWAY, AND UCD PHD  
GRADUATE



# COURSE STRUCTURE

90 credits  
taught masters

=

60 credits  
taught modules

+

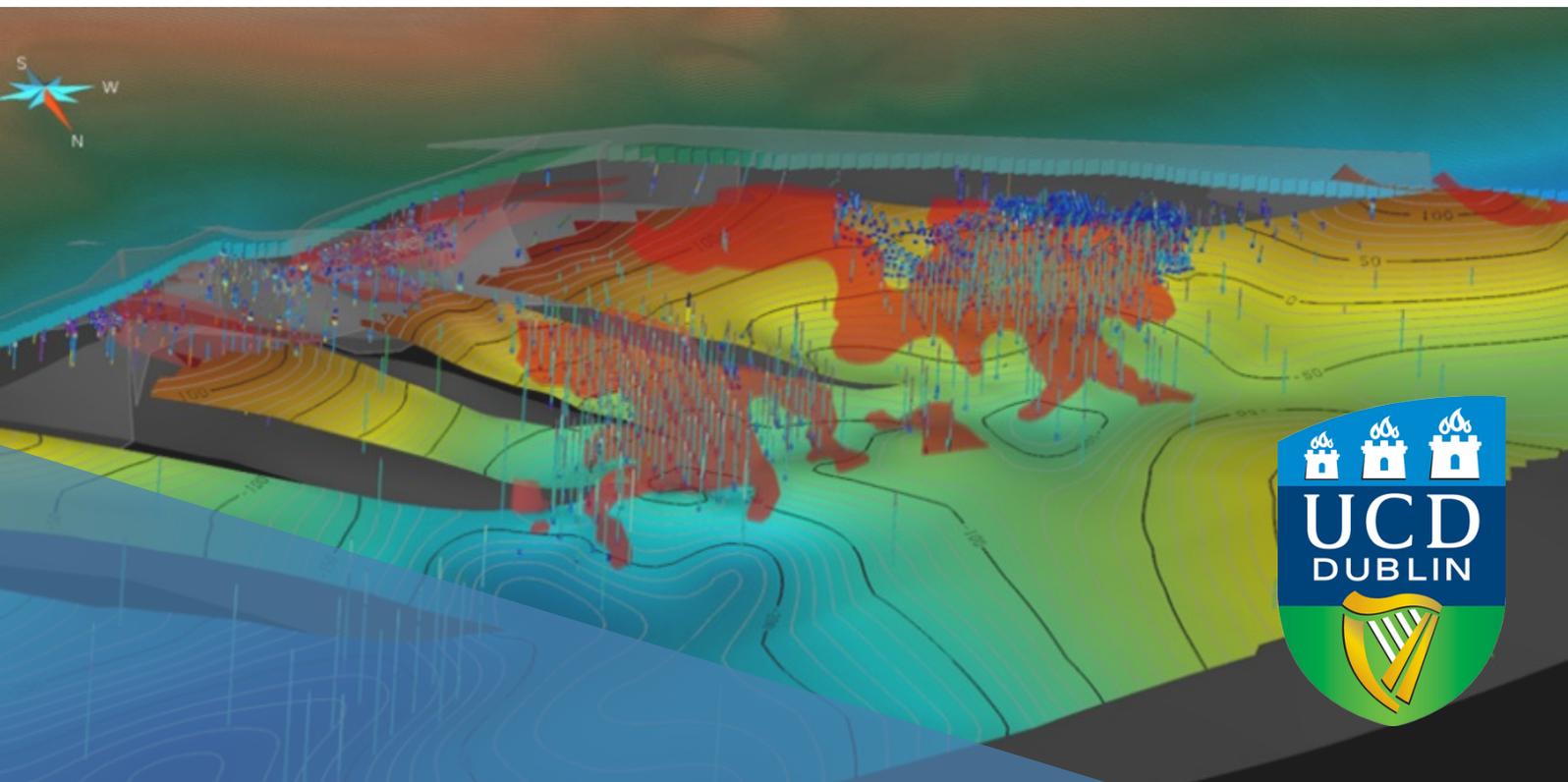
30 credits  
applied research project

The programme combines classroom-based instruction, practical workstation experience, team-based exercises and field visits. It also includes a three-month applied research project.

Samples of modules include:

- Overview of Industrial Geology
- 3D Mapping and Modelling
- Stratigraphic Prediction
- 'Hard rock' Characterisation
- Applied Structural Geology
- Geophysical Methods
- Geostatistics
- Geomodelling
- Geodata
- Manipulation
- Drilling and Well Logging
- Geofluids and Geomechanics
- Quaternary Geology
- Remote Sensing
- Fractured Rock Characterisation
- Team-Based Modelling Exercises
- Field Skills

Modules and topics shown are subject to change and are not guaranteed by UCD



# WHAT UCD GRADUATES SAY

UCD's MSc in Subsurface Characterisation and Geomodelling is a brand new course. Below are the words of recent graduates of past MSc courses offered by UCD's School of Earth Sciences.



PRIVEEN RAJ, GEOMECHANICS CONSULTANT,  
UCD MSC PETROLEUM GEOSCIENCE  
GRADUATE 2017

"I really liked the small, intimate nature of the class sizes. The fact that a lecturer was just beside you, guiding you through the steps, was really helpful. You could ask whatever question you had in mind. A knock on the door, a simple email or a phone call was all I needed to do to have a chat on anything I needed clarity on. Through the course, I gained confidence in my thought process, and the course definitely gave me the confidence to speak up in my current role – that's what comes with knowledge, and with having really good lecturers. If you really want value for money, I think UCD in Ireland is definitely the way to go."

"The MSc in Petroleum Geoscience at UCD prepared me extremely well for working life. The professors were always reachable and very accommodating. The social support I received throughout this MSc program made the work enjoyable and fun. I came to Dublin alone, with no family or friends, but I never felt alone."



PETER EYRAM DJOBLE  
D'ALMEIDA - GEOLOGIST WITH  
PETROLEUM COMMISSION,  
GHANA AND UCD PETROLEUM  
GEOSCIENCE MSC GRADUATE,  
2017.

# ENTRY REQUIREMENTS

Entry to the programme requires an Honours undergraduate degree at 2.1 or higher (or equivalent) level in Earth Science or Geoscience.

Consideration will be given to applicants with similar qualifications in cognate areas (e.g. Geophysics/Physical Geography), and to those with significant and relevant work experience but who do not meet this criterion.

Applicants whose first language is not English must also demonstrate English language proficiency of IELTS 6.5 (no band less than 6.0 in each element), or equivalent.

Full details of the fees and application process are available on:  
<http://www.ucd.ie/graduateadmissions/>



# UNIVERSITY COLLEGE DUBLIN IRELAND'S GLOBAL UNIVERSITY

You will study in UCD's modern parkland campus on the south side of Dublin, Ireland's vibrant capital city, and you will become part of UCD's School of Earth Sciences, the largest Geoscience School in Ireland.

The UCD School of Earth Sciences has an internationally recognised reputation for excellence in teaching and research in the areas of Fault Analysis, Geochronology, Petrology & Isotope Geochemistry, Geophysics, Marine Geology, Surface Processes, Palaeobiology and Palaeoclimatology.

We have a vibrant international community comprising of researchers from over 15 countries and our schools research funding typically exceeds €2 million per year, with research projects currently supported by more than 13 international energy and resource companies.

The school is the lead participant and host for the Irish Centre for Research in Applied Geosciences (iCRAG), one of only 12 National SFI Research Centres: iCRAG conducts applied research in groundwater, hydrocarbons, marine geoscience and raw materials, as well as in geochemistry, geophysics, 3D modelling and Public Perception and Understanding.

***BOOK A VIRTUAL TOUR OF UCD [HERE](#)***



To learn more about UCD,  
visit: [www.ucd.ie/global](http://www.ucd.ie/global)

# HOW TO APPLY



To apply, visit: [www.ucd.ie/apply](http://www.ucd.ie/apply).

## FEES

- EU fee: €9,000
- Non-EU fee: €24,200

\* UK students are currently eligible for the EU rate with exceptions, but fees and fee status are subject to change. For full details, please check: <https://www.ucd.ie/students/fees/>

For full details of fees and application process, visit: <http://www.ucd.ie/graduateadmissions/>

## FIND OUT MORE



If you have questions and for further details, contact Course Director Prof Peter Haughton at: [Peter.Haughton@ucd.ie](mailto:Peter.Haughton@ucd.ie)  
Non-EU enquiries can be also directed to:  
[internationaladmissions@ucd.ie](mailto:internationaladmissions@ucd.ie)



Find out more about the course content and hear from UCD School of Earth Sciences graduates and staff here:  
<https://www.ucd.ie/earthsciences/study/mscsubsurfacecharacterisationandgeomodelling/>