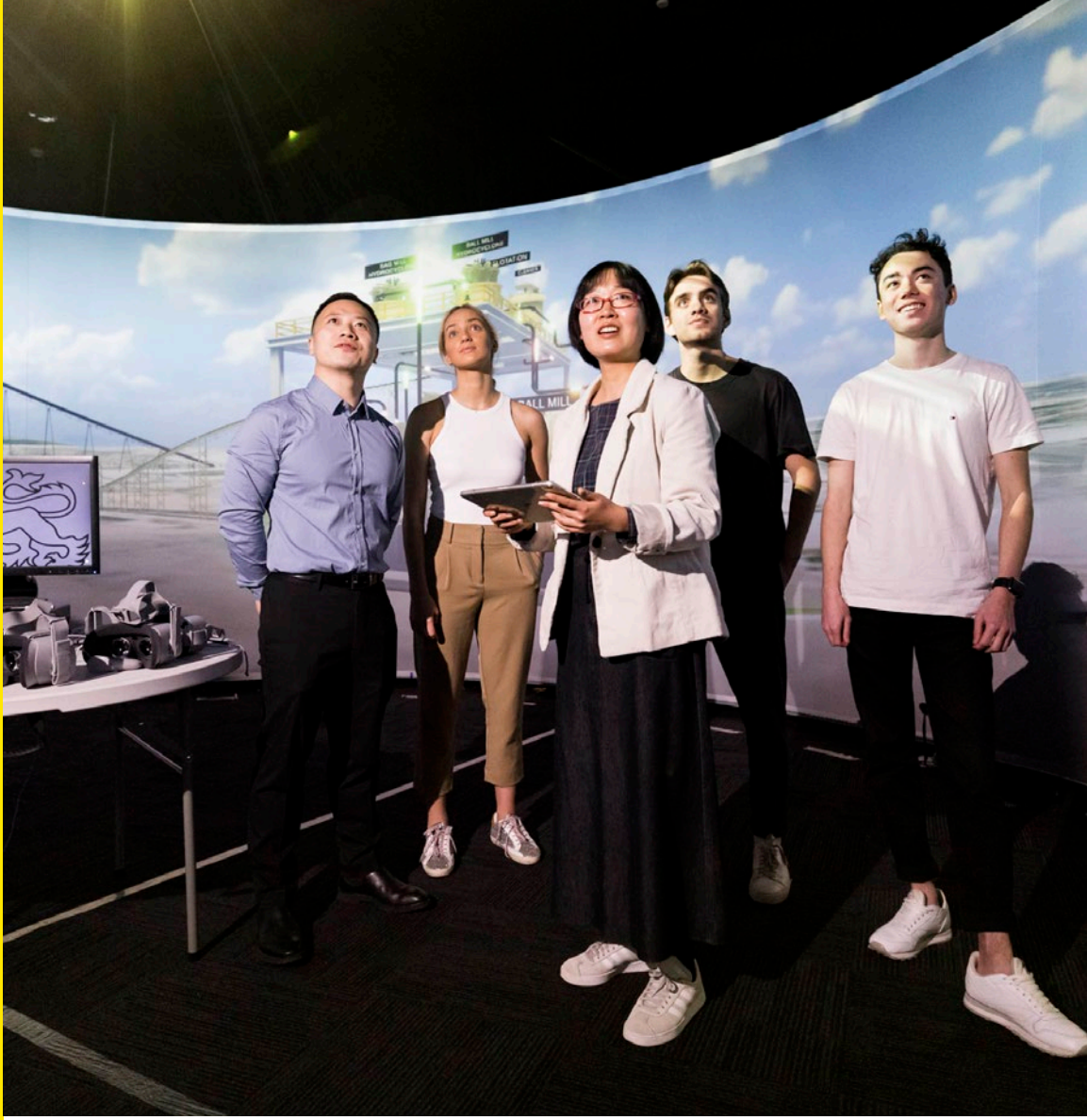
UNSW SYDNEY



UNSW ENGINEERING

Minerals & Energy Resources Engineering

partnering with industry
innovating in education

Welcome from the Head of School

Welcome to the School of Minerals and Energy Resources Engineering. The School has been a provider of innovative world class engineering education and research in mineral and energy resources engineering for 75 years. Our school continues to thrive with highly sought-after undergraduate and postgraduate programs, along with an increase in our internationally acclaimed research output.

Our vision for the School is one of global leadership in teaching and research excellence in the minerals and energy resources sector of the economy. We will drive the national agenda across the breadth of Minerals and Energy Resources Engineering, and in doing so will enhance the quality of life for humanity in a sustainable way.

I encourage you to find out more about our diverse and extensive teaching programs, our advanced research and our strong links with industry and alumni. If you have any further enquiries, we would be delighted to hear from you.

Professor Ismet Canbulat
Head of School
School of Minerals and
Energy Resources Engineering
UNSW Sydney

Our school continues to thrive with highly sought-after undergraduate and postgraduate programs, along with an increase in our internationally acclaimed research output.

What we do

The School of Minerals and Energy Resources Engineering is a leading provider of world class education and research; specialising in education for both undergraduate and postgraduate students. The School also continues to produce internationally acclaimed research, working closely with industry to provide innovative solutions to the minerals and energy resources industry.

Our researchers are working with industry partners and government orgranisations to help solve the most complex problems facing the sector.

Our academics are world experts in their fields and internationally respected and recognised

408 BILLION | **66%**

Resources and energy industries represent two-thirds of Australia's export income, equating to $408 billion a year.

We offer the largest range of teaching programs for our industries.

Our mission is to provide high quality education and research to support future cleaner energy and sustainable supply of mineral resources.

A Research powerhouse

Research Strengths

GEOENERGY & GEOSTORAGE

Geoenergy focuses on fundamental and applied research related to minerals and energy extraction, while geostorage includes the geological (permanent) storage of carbon dioxide and the seasonal storage of hydrogen. Of particular interest are technologies that improve recovery and provide new insights into the production of transition fuels and critical minerals.

Traditional knowledge and expertise in petroleum and mining engineering will drive new technologies related to the geological storage of CO2 and hydrogen, recovery of critical minerals, production of transition fuels, and extraction of geothermal energy.

- Multiscale Reservoir Engineering
- Integrated Storage and Recovery Systems
- Coupled Geotechnical Systems

STRATEGIC MINERALS

This research area focuses on fundamental and applied geomechanics related to mining and geotechnics including well integrity. Our interests are oriented towards improving safety performance related to current and emerging technologies.

Our experts closely collaborate with industry partners to find innovative ways to ensure environmentally safe and sustainable practices are incorporated in all aspects of design and operation.

- Mine Safety
- Critical Minerals
- Mineral Resource Extraction and Production

TRANSFORMATIVE TECHNOLOGIES

Our Transformative Technologies work focuses on innovating new technologies and operational excellence to accelerate the transformation of the minerals and energy resources sectors. Of particular interest is to adopt scientific knowledge and emerging technologies from other disciplines tailored for the minerals and energy resources sectors.

This includes monitoring and communication technologies to improve operational safety, evaluate environmental impact and expand efficiencies, and artificial intelligence for automation and data analytics.

- Data Analytics and Digital Integration for Resources Engineering
- Net Zero Technologies
- Exploring and Engineering Extreme Environments

Research highlights

Each year our academics and research centres work with businesses, government and community organisations on specific projects, transferring our research into practice. We are making an impact that matters with the following research:

Next Generation Mining
Integration of advanced technology and developing new minerals extraction and processing systems

To assist in sustaining the Australian mining industry's comparative advantage of costcompetitive, safe and environmentally responsible operations. Our research aims to be a catalyst for transforming mining systems through integration of advanced technology and mining operational excellence. Our objective is to create smart mining outcomes which generate expanded research capability and knowledge, to improve productivity with greater safety while creating new jobs and to reduce mining's environmental footprint. This will help sustain and grow the mining industry in Australia in response to global megatrends.

We are focused on four key technical themes supported by our industry partners:

- Technology Integration
- Machine Learning & Robotics
- Mine Internet of Things (MIoT)
- Automation

Clean Energy Technology Research Laboratory

Our facility is unique as it enables researchers and industry to measure and characterise complex material structure and properties in 3D at high resolution under reservoir pressure conditions.

Understanding heterogeneity is important, as it can lead to uncertainties in reservoir performance parameters. This is imperative to understand as a single well can cost up to $270 million.

The technique has other significant advantages, including:

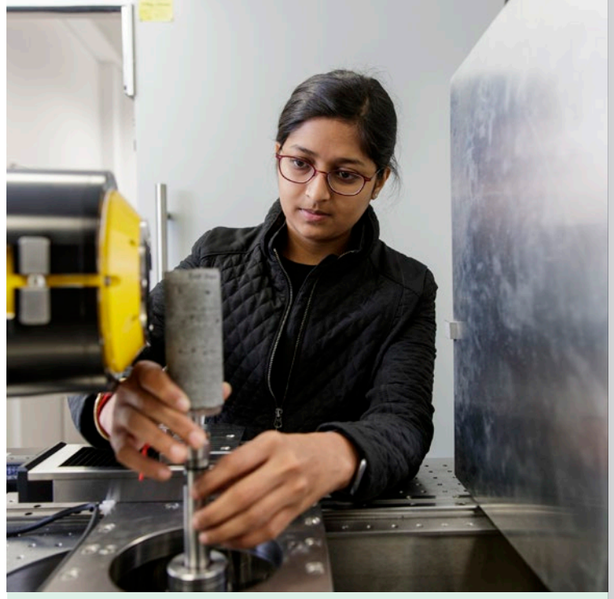
- it is faster, reducing analysis to weeks instead of months
- it enables researchers to carry out numerical experiments where standard laboratory experiments are impossible

State of the art facilities

Immersive Technology Laboratory

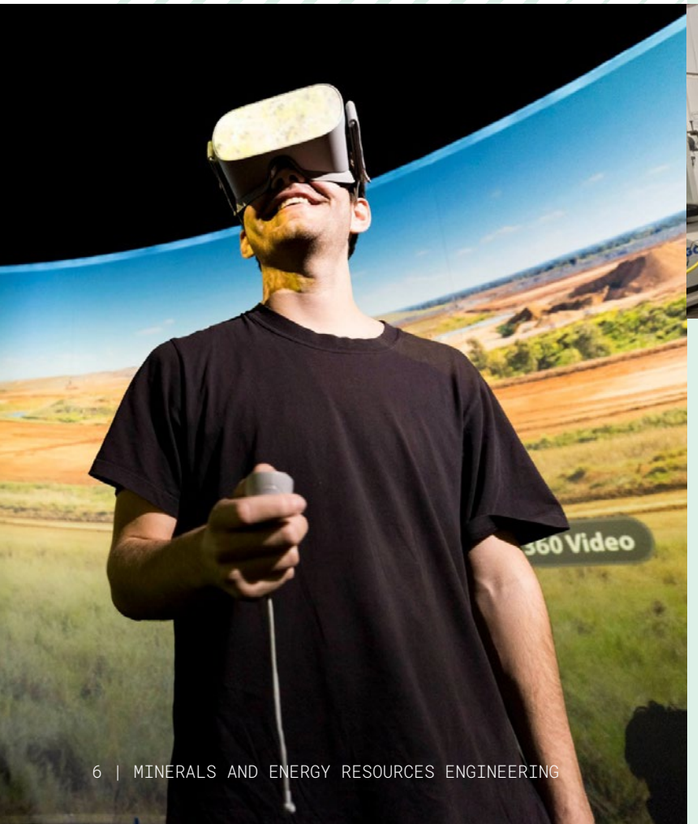
Developed for student use and industry training, it consists of a floor-to-ceiling, 360-degree, 3D VR theatre, a holographic simulator, and mobile-based AR and consumer VR headsets. These devices are used to immerse students in site environments, to explain complex four-dimensional concepts and to conduct interactive virtual group assessments.

We simulate various mine environments - from open-cut to underground, from hard rock to gas reservoirs. By using 3D simulation, potential hazards can be safely experienced, evacuation procedures tested, and feasibility studies consolidated, resulting in a cost-effective, low risk, high impact learning experience.



Tyree Micro-CT Facility

Our lab offers bespoke X-ray and neutron beam transparent flow and deformation cells with 4D-Material Characterisation down to the molecular level. What makes us unique is the range of reservoir conditions and time lapse imaging capability. Various materials such as rocks, cement, sand, composite, coal, steel, coral, battery and biological samples (insect, animal tissues and bones) can be imaged.



Geomechanics Laboratory

An advanced experimental geomechanical laboratory integrates field data, laboratory testing, advanced imaging technologies and numerical modelling techniques that allow to test rock, soil and ground support tools for coupled physical properties under extreme environments including high stress and temperatures.

Programs

Undergraduate

- Bachelor of Engineering (Honours) in Mining Engineering
- Bachelor of Engineering (Honours) in Geoenergy and Geostorage Engineering
- Bachelor of Engineering (Honours)/Bachelor of Engineering Science – with Mining and/or Geoenergy and Geostorage and other Engineering disciplines

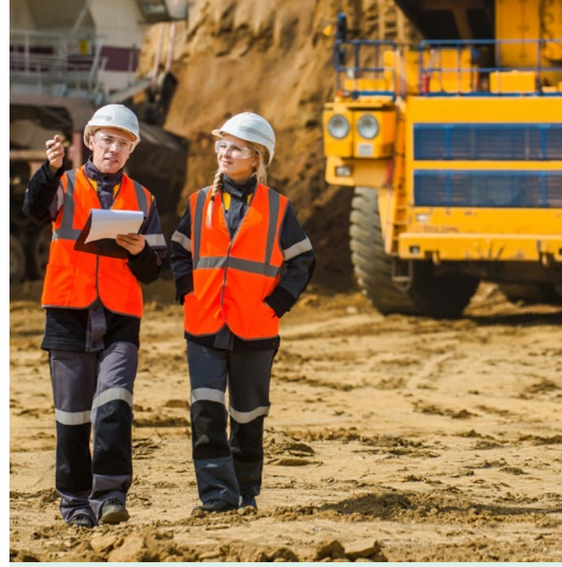
Plus a range of other dual degrees in Arts, Science, Commerce and Law.

Postgraduate Coursework

- Master of Engineering (Mining Engineering) – EA Accredited
- Master of Mining Engineering
- Graduate Diploma in Mining Engineering
- Graduate Certificate in Mining Engineering
- Master of Mine Geotechnical Engineering
- Graduate Diploma in Mine Geotechnical Engineering
- Graduate Diploma in Mine Ventilation
- Statutory Coal Mine Ventilation Officers Course
- Master of Engineering Science (Geoenergy and Geostorage Engineering)
- Graduate Diploma in Engineering Science (Geoenergy and Geostorage Engineering)
- Graduate Certificate in Geoenergy and Geostorage Engineering

Postgraduate Research

- Doctor of Philosophy (PhD) in Mining Engineering
- Doctor of Philosophy (PhD) in Petroleum Engineering
- Master of Philosophy (MPhil) in Mining Engineering
- Master of Philosophy (MPhil) in Petroleum Engineering



We are able to bring together the brightest minds in research and industry to create bespoke development programs to suit you.

Customised professional development programs

Our alumni

"UNSW Engineering is really big, so there's a corresponding amount of opportunities – societies, projects, volunteering, travel; there really is something for everyone. We get a lot of industry exposure from quite early in the degree; working on projects from real mines, guest lecturers, vacation work and countless networking opportunities so it gives us a great head start in our careers."

Lucy
Bachelor of Engineering (Mining Engineering)

Graduate Mining Engineer, Glencore Copper

"If you've ever been interested in what makes things tick, I would highly recommend engineering at UNSW. The teaching allows you to get both a practical and theoretical knowledge on your chosen field of study. Beyond that, UNSW is one of the best universities for engineering so there is endless help from lecturers, tutors and your peers."

Kosta
Bachelor Commerce / Bachelor of Engineering (Petroleum Engineering)

Graduate Drilling and Completions Engineer, Woodside Energy

Current major industry partners

- Anglo American
- BHP
- BP
- Centennial
- CCTEG
- DSI Underground
- Epiroc
- Glencore
- Jennmar Australia
- Maptek
- Mitsubishi Development Corporation
- New Hope Group
- Newmont
- Peabody Energy
- Rio Tinto
- Roobuck
- Santos
- Saudi Aramco
- Schlumberger
- Shell
- Sino Pec
- South 32
- Total Energies
- Woodside

Industry sponsored chairs

These senior positions are held by our academics who have a strong research reputation in their area of expertise:

Kenneth Finlay Chair in Rock Mechanics
Professor Ismet Canbulat

Chair in Mining Engineering
Professor Serkan Saydam

Get in touch

Industry Partnership & Collaborations enquiries

T +61 2 9385 5006

E mere.admin@unsw.edu.au

Future Student Enquiries

Ask a question unsw.edu.au/ask
Call 1300 UNI NSW (1300 864 679)

Visit **engineering.unsw.edu.au**