

The University of Queensland capacity in
bioeconomy research



About UQ

For more than a century, The University of Queensland (UQ) has educated and worked with outstanding people to deliver knowledge leadership for a better world.

With three major campuses – St Lucia and Herston in Brisbane, and Gatton in South-East Queensland – UQ is committed to developing state-of-the-art learning spaces that are in-step with industry demands and expectations.

UQ has established research expertise across a range of disciplines, aligned with the following strategic impact areas:

- healthy aging
- feeding the world
- resilient environments
- technology for tomorrow
- transforming societies

Global connectivity is at the heart of UQ's vision to create knowledge leadership for a better world. By forging strategic partnerships with the world's leading research institutions, and nurturing people-to-people links with industry, government, and community bodies, our relationships are finding solutions to the biggest challenges of our time. From renewable energy technologies and sustainable mining practices, to disease control and child psychology, our international collaborations are working towards a cleaner, healthier, and happier future.

Find out more about how UQ is partnering for change at www.global-engagement.uq.edu.au.



52,300+
students



13,300+
PhD graduates

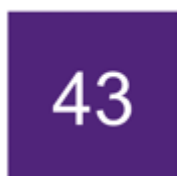


257,000+
graduates



6,600+
staff

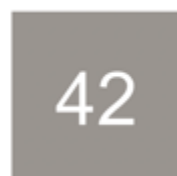
Global rankings



Performance
Ranking of
Scientific
Papers



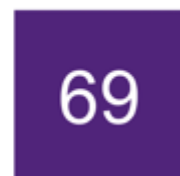
QS World
University
Rankings



U.S. News
Best Global
Universities



Academic
Ranking
of World
Universities



Times Higher
Education
World University
Ranking

UQ capabilities in bioeconomy and biotechnology

From agriculture and biotechnology to science and sustainability, UQ research has impact – right across the world, every day.

UQ continually builds on its global reputation in key areas of national and international significance through interdisciplinary collaboration with more than 400 international industry partners.

UQ is ranked
7th globally
and 1st in
Australia for
biotechnology*

Recognised expertise in biotechnology and the bioeconomy

- Advanced materials
- Drug design
- Agriculture nanotechnology
- Genomics of development and disease
- Plant breeding and biosecurity
- Beef genetics and genomics
- Industrial biotechnology
- Precision nanomedicine
- Biomass conversion
- Prediction agriculture
- Infectious disease
- Solar biotechnology
- Microfluidics
- Stem cell ageing and regenerative engineering
- Combating antibiotic resistant bacteria
- Commercialisation
- Drug delivery
- Molecular and cellular biosciences
- Translational research.

UQ researchers are harnessing the sun's energy through photosynthesis to find innovative replacements for finite fossil fuels.



* according to the 2018 Academic Ranking of World Universities (ARWU)

Bioeconomy teaching, learning and research

A leader in environment-related research, UQ is ranked among the world's top 10 for ecology, biotechnology and water resources by the Academic Ranking of World Universities (ARWU), and is among the top 25 global institutions for mineral and mining engineering, environmental sciences, and biology and biochemistry by the QS World University Rankings. The University's diverse Biotechnology Program is also at the frontier of emerging research, and has been ranked seventh in the world and first in Australia according to the Academic Ranking of World Universities (ARWU). Relevant research is performed in a number of schools, centres and institutes:

[Advanced Water Management Centre \(AWMC\) \(awmc.uq.edu.au\)](http://awmc.uq.edu.au)

AWMC is an internationally recognised Centre of Excellence in innovative water technology and management. An award-winning multidisciplinary team and research portfolio covers the breadth of the urban industrial water cycle, achieving sustainable outcomes for the global water industry. The AWMC has an outstanding track record of successful research, development and application projects currently worth almost A\$10 million per annum, many in close collaboration with industry and research collaborators. We are partnered with more than 100 different utilities, industry groups, research institutions and educational facilities around Australia and the world.

[Australian Institute for Bioengineering and Nanotechnology \(AIBN\) \(aibn.uq.edu.au\)](http://aibn.uq.edu.au)

AIBN has a diverse research focus, including agricultural nanotechnology and advanced biomanufacturing. AIBN researchers are working closely with industry, collaborators across UQ and partners across the globe to develop novel nanotechnology solutions, including the design of smart nanomaterials to substantially improve crop fertilisation, reduce pesticide use and improve water management. AIBN researchers have developed a cost-effective method of converting agricultural waste biomass into commercially valuable chemicals for food production, pharmaceuticals, agriculture and other industries, and are exploring nanotechnology applications that will advance the way we treat and vaccinate livestock while reducing reliance on antibiotics.



A microscopic discovery in spinifex grass has the potential to revolutionise everyday products, like latex and other rubbers, while creating an industry for remote Australian communities

[Australian Institute for Business and Economics \(AIBE\)](http://aibe.uq.edu.au) (aibe.uq.edu.au)

The AIBE delivers strategic economic, financial and business analyses that provides the evidence base needed for effective decision making at corporate and policy levels. AIBE works extensively in the area of disruptive technologies and their adoption, diffusion, regulation and integration. In doing, the Institute works closely with science-driven researchers and innovators to build sustainably competitive strategies through the economics of innovation. Improvement efforts are particularly directed at the bioeconomy, as well as agriculture, health and medical and environmental ecosystems. AIBE's goal is to support and enhance the impact of science-led industries through the transformation and effective translation of quality science to valuable technologies and products. Researchers work extensively both nationally and internationally, including in emerging economies where the focus is on improving the value captured by communities through enterprise-led solutions to coastal ecosystem problems, fisheries, farming and environmental management.

[Centre for Policy Futures](http://policy-futures.centre.uq.edu.au) (policy-futures.centre.uq.edu.au)

The **Centre for Policy Futures** (policy-futures.centre.uq.edu.au) positions UQ to inform policy debate and priorities across Queensland, Australia and the Pacific, with a particular focus on bioeconomy. Of particular relevance to the Global Bioeconomy Alliance is the Centre's focus on Sustainable Development Goals (SDGs). United Nations has recognised the need to end poverty, protect the planet and boost prosperity through its SDGs, and the Centre's researchers are assisting government to design and implement policies to meet these goals, particularly in the areas of health, energy and education. An important sub-theme of sustainability is the built environment, where the Centre's expertise in political economy, policy and governance is aiding the ambitious, evidence-based planning policy necessary to achieve long-term sustainable development.

[Faculty of Science](http://science.uq.edu.au) (science.uq.edu.au)

The **Faculty of Science** hosts two schools that are major contributors to research in industrial biotechnology: the **School of Agriculture and Food Science** (SAFS) (agriculture.uq.edu.au) and the **School of Chemistry and Molecular Biosciences** (SCMB) (scmb.uq.edu.au).

- SAFS enjoys a long-established international reputation for research excellence within the broad fields of agriculture and life sciences, and is ranked fourth in the world and first in Australia for agriculture according to the NTU Performance Ranking of Scientific Papers for World Universities. The School's research is also ranked well above world standard in plant biology, genetics, horticultural production and environmental science, above world standard in soil sciences, crop and pasture production and food sciences, and world standard in animal production.
- SCMB is a diverse and powerful School with unique expertise in the chemical and molecular life sciences. The School's biomolecular research spans small synthetic molecules through to proteins, nucleic acids, viruses and microorganisms, and its materials research encompasses the design and synthesis of molecular devices, functional polymers and nanomaterials. With an annual research income of around \$15 million, SCMB is recognised internationally for its research strengths, output and demonstrated translation of discovery and technology. SCMB also hosts the **Australian Centre for Ecogenomics** (ACE) (ecogenomic.org) and runs UQ's **Biotechnology Program** (scmb.uq.edu.au/study/biotechnology). ACE is a world leader in ecogenomics, employing the sequence-based analysis of microbial communities to understand pivotal biochemical processes that may be harnessed for biofuel production, waste water sanitation and mine tailings remediation. The diverse Biotechnology Program examines the use of microorganisms, plants and animals for discovery, the development of viable products and activities, and the protection of intellectual property associated with biotechnology inventions. The program has well-established links to local industry and is at the frontier of emerging research.



Plant biotechnology researcher with the School of Agriculture and Food Sciences, Professor Ian Godwin, is undertaking research into the genetics of sorghum



Professor in Biotechnology, School of Chemistry and Molecular Biosciences, Avril Robertson (right) had severe asthma as a child and also experiences anaphylaxis. She attributes the difference therapeutics made to her life, and the desire to improve the health of others, as the reasons she pursued a career in drug discovery and teaching.

[Institute for Molecular Bioscience](http://science.uq.edu.au) (science.uq.edu.au)

The **Institute of Molecular Biosciences** (IMB) (imb.uq.edu.au) hosts the **Solar Biofuels Consortium**, including the **Centre for Solar Biotechnology** (solarbiofuels.org), which focuses on developing next-generation microalgae systems. These systems are designed to tap into the huge energy resource of the sun and capture CO₂ to produce a wide-range of high-value products such as fresh nutritious food, algal products (e.g. nutraceuticals), clean energy and clean water. Microalgae systems also support important eco-services such as water purification and CO₂ sequestration. The Centre was launched in 2016 and includes approximately 30 teams with skills ranging from genome sequencing through to demonstration systems optimisation and accompanying techno-economies and life cycle analysis. Teams also work extensively with industry to maximise research impact. IMB has also launched the **Integrated Bioeconomy Project** (IBP) (imb.uq.edu.au/integrated-bioeconomy-project), which focuses on the integration of advanced technologies to deliver a controlled biosphere – a protected cropping system that can produce 10-times more high-quality food with 10-times less water than conventional field production.

[Sustainable Minerals Institute \(SMI\)](http://smi.uq.edu.au) (smi.uq.edu.au)

SMI is developing the people and the transformative approaches and technologies needed to ensure a sustainable future. The Institute is a world leader in developing knowledge-based solutions to the diverse sustainability challenges facing global mining and resources industries, and works to training the next generation of future-focused industry and community leaders. SMI hosts six interdisciplinary centres, including the **Centre for Mined Land Rehabilitation** (SMI-CMLR), which is dedicated to delivering excellence in environmental research, education and awareness global industry bodies, government departments, non-government organisations and communities.

[Queensland Alliance for Agriculture and Food Innovation \(QAAFI\)](http://qaafi.uq.edu.au) (qaafi.uq.edu.au)

QAAFI is one of the world's leading research providers in tropical and sub-tropical agriculture and food production. The Alliance works across crops, horticulture, animals, and nutrition and food sciences, and is supported by industry and the Queensland Government. The Institute is comprised of four inter-related research centres, with a focus on solving challenges facing tropical and sub-tropical food and agribusiness sectors. QAAFI's vision is sustainable agriculture and food achieved through science and innovation.



Centre for Horticultural Science Director Professor Neena Mitter (right) has been involved in molecular biology and biotechnology in Australia and India for more than 20 years. Her innovations, including BioClay for crop protection and nanovaccines for animal health are ground breaking platform technologies impacting agricultural production and environmental sustainability.

UniQuest (uniquet.com.au)

UniQuest is Australia's leading commercialisation entity, specialising in commercialising the intellectual property of UQ, and benchmarking in the top tier of technology transfer worldwide. More than 100 startup companies have been founded on intellectual property originating from UQ – a milestone unsurpassed by any other Australian university. Among the startups is Nexgen Plants Pty Ltd, which commercialising a novel platform technology that enables virus-resistant plant varieties to be developed for major food, fibre, energy and ornamental crops. The cornerstone of this technology is the discovery that plant viruses produce microRNA. MicroRNA is a new class of small non-coding RNA molecules and in plant viruses, they are involved in modulating the plant defence response to virus attack.

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