



Research Strategy 2025

WORLD-LEADING RESEARCH; WORLD-CHANGING IMPACT

ABRIDGED VERSION



Acknowledgement of Country

We acknowledge the traditional custodians of the land upon which this University is situated, the Wallumattagal Clan of the Dharug people, whose cultures and customs have nurtured, and continue to nurture, this land since the Dreamtime. We pay our respects to the Dharug people and the Wallumattagal Clan.

We also wish to acknowledge the Elders of the Dharug Nation – past, present and future – and pay our respects to them. We further wish to honour and pay our respects to the ancestors and spirits of this land. We humbly ask that all members of the Macquarie University community are granted with the capacity to wingara – to think, to learn and to walk safely upon this pemul (this land). The University continues to develop respectful and reciprocal relationships with all Indigenous people in Australia and with other Indigenous people throughout the world.

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Vice-Chancellor's endorsement



It is with great pleasure that I commend to you the refreshed strategic research framework *Research Strategy 2025: World-Leading Research; World-Changing Impact*. Five years on from the initial framework launched in 2015, I would like to congratulate the Deputy Vice-Chancellor (Research) and his team for their agility and proactive approach to ensuring that research undertaken at Macquarie leverages the changing internal and external research environments.

The original strategic research framework set out ambitious goals, many of which we have achieved. The refreshed

framework continues elements of *Our University: A Framing of Futures*, which calls for an accelerating and impactful performance in discovery. It also activates elements of the University's *Operating Plan 2020–2024*, which prioritises a focused investment in research. Our success in achieving the ambitions of the Operating Plan and the *Research Strategy 2025* will further cement Macquarie's reputation on the global stage as a university of substance, excellence and integrity.

Macquarie University is well positioned to progress its positive impact globally, and the *Research Strategy 2025* will serve as a guide for continued excellence in research. I look forward to the next five years and our continued ascendance as an open, engaged and audacious research community.

Professor S Bruce Dowton

MBBS MD FACMG FRACP FAICD FRSN
VICE-CHANCELLOR AND PRESIDENT



The University's long-range strategic framework

Our University: A Framing of Futures

Purpose

Macquarie is a university of service and engagement:

- we serve and engage our students and staff through transformative learning and life experiences
- we serve and engage the world through discovery, dissemination of knowledge and ideas, innovation and deep partnerships.

Vision

We aspire to be:

- a destination of choice for students and staff who share our values
- deeply connected with our stakeholders and partners, and known for this globally
- ranked among the highest performing research universities of Australia and, for key disciplines, to be recognised globally for our pre-eminence
- known across Australia and beyond as custodians of a remarkable university campus that blends the vibrancy of a cosmopolitan university village with a setting of Australian natural bushland.

Values

As custodians of Macquarie University, we value:

- Scholarship
We believe learning, enquiry and discovery improves lives.
- Integrity
We conduct ourselves ethically, equitably, and for mutual benefit.
- Empowerment
We make our community a source of strength and creativity.

Through our actions, as staff and students, we live these values and it is against them that we hold ourselves accountable.

Strategic priorities

We are determined and focused on:

- a culture of transformative learning in a research-enriched environment
- an accelerating and impactful performance in discovery
- aligning the nature and size of the University for the future
- creating an innovation nexus where Macquarie and our partners contribute solutions to the world and develop lasting relationships
- emboldening Macquarie University's recognition and international presence
- developing a vibrant and sustainable campus, clearly at the centre of a rapidly changing neighbourhood in the international, cosmopolitan city of Sydney
- improving those aspects of our support services to realise this aspiration and vision.

The University's Operating Plan 2020–2024

Objectives

The Operating Plan commits the University's community to achieving its objectives in six key areas of focus:

1. Students first
2. Coursework suite and delivery
3. Focused investment in research
4. Our people
5. Ways of working
6. Digital transformation

Focused investment in research

The Operating Plan calls on us to prioritise investment in defined areas of strategic research and research training, and accelerate growth and diversification in sources of external income to support our research mission.

The Operating Plan commits our research community to achieve by 2024:

- improved ratings in the Australian Research Council's Excellence in Research for Australia (ERA) and Engagement and Impact (EI) assessments
- a sustainable ranking in the top 200 universities worldwide
- a step change in the diversification of sources of research income
- enhanced support for large-scale, cross-faculty multidisciplinary research focused on strategically important areas
- improvement in the accessibility and quality of shared research facilities and infrastructure
- increased external support for our higher degree research (HDR) training program.

Foreword

Deputy Vice-Chancellor (Research)



Macquarie University has an enviable reputation for research excellence and innovation. By connecting our ideas and expertise across all faculties, Macquarie's researchers continue to lead or contribute to world-leading research with world-changing impact. Since embarking on the development of the *Strategic Research Framework: 2015–2024* in 2013, our commitment to

world-leading research with world-changing impact has supported the achievement of:

- a 76 per cent increase in Higher Education Research Data Collection (HERDC) research income
- an 89 per cent increase in higher degree research (HDR) completions
- a 36 per cent increase in peer-review publications
- 100 per cent of our research rated as performing at or above world standard at the two-digit level in Excellence in Research for Australia (ERA) 2018
- a ranking in the top 200 global universities.

The year 2020 began a decade of new opportunity to build on this success and reaffirm our commitment to excellence. It has also signalled a moment in time when research, crucial to the economic recovery and future prosperity of Australia, is under threat from restrictions and reduced funding.

Since launching the *Strategic Research Framework: 2015–2024* in 2015, there have been numerous changes in both the internal and external environments that have impacted the higher education sector and research. The refreshed strategic research framework *Research Strategy 2025: World-Leading Research; World-Changing Impact* has been undertaken at this midway point to reflect current circumstances, take into account the University's trajectory since 2015, build in greater flexibility and agility within the overarching objectives of the framework, and align the framework with the ambitions of the University's *Operating Plan 2020–2024*.

Of course, no commentary on change would be complete without reference to the impact COVID-19-related restrictions have had on our researchers and their research. 2020 was a testing year for each one of us, personally and professionally. Our research projects have been paused or modified and, in some cases, discontinued permanently. COVID-19 has introduced uncertainty into the way we operate and the scope we have to plan for our future. The adjusted research targets, to be achieved by 2024, reflect this uncertainty and the impact COVID-19 is predicted to have on Australian universities. Ultimately, in 2025 we will need to assess our research performance between 2015 and 2024 against the contemporaneous profile of the University and the Australian higher education sector.

The refreshed *Research Strategy 2025* remains structured around three main elements, all focused on supporting excellent research at scale to deliver maximum benefit to Australia:

1. **Our five future-shaping research priorities:** Healthy People, Resilient Societies, Prosperous Economies, Secure Planet and Innovative Technologies.
2. **Our four key research objectives:** Accelerate world-leading research performance, Prepare world-ready higher degree research candidates, Engage as a world-recognised research collaborator of choice, and Deliver research with world-changing impact.
3. **Targets that are measurable and achievable.**

As a university, we have an important responsibility to add value to society with rigorous research at scale, inspired by a quest for deep understanding of disciplinary fundamentals. Macquarie offers a positive research experience, constructively promoting good research, and effectively and efficiently ensuring responsible conduct in a way that is proportional to risks and sensitivities. Continuing to seize opportunities to collaborate with industries, governments, communities, professions and academic colleagues around the world is paramount to our success. As we continue to attract the best and brightest, and develop the next generation of talented researchers and world-ready leaders, Macquarie will embrace focused opportunities in 'nation building' cross-disciplinary and applied research that align with government priorities, and build on the tremendous depth of fundamental research and disciplinary expertise that underpin much of our discovery.

An approach that serves as a point of differentiation for Macquarie, and is exemplified by our 'You to the Power of Us' brand, is our firm belief in the value of consilience – the principle that evidence from independent, unrelated sources can 'converge' on strong conclusions. In an academic research setting, this approach blends research from STEMM (science, technology, engineering, mathematics and medicine) and HASS (humanities, arts and social sciences), drawing on multiple fields of knowledge to develop holistic solutions to global challenges. The importance of supporting cross-disciplinary research featured in the *Strategic Research Framework: 2015–2024*, and many of you will be familiar with my call to the Macquarie University research community to 'hunt in packs'. The notion of consilience is again at the heart of our strategy as a key element of the new FOCI (Focus, Opportunity, Consilience, Impact) criteria, moving us from success to significance.

The *Research Strategy 2025* has maintained great respect for the principle of academic freedom and scholarship. It strives to provide a clear vision with durable strategic direction without constraining the creative and dynamic nature of cutting-edge research, development, innovation and impact in a changing environment.

I look forward to working closely with the Pro Vice-Chancellors (Graduate Research, Research Innovation, Research Integrity and Development, and Research Performance) and with the Executive Director, Research Services, as they bring their deep expertise to the challenges facing us. I am also excited to work with the new Deputy Deans (Research and Innovation) and the Associate Deans (Research Training and Performance) to advance the research missions of the faculties. I will continue close collaboration with my colleagues in the University's Executive to achieve the aspirations so boldly presented in *Our University: A Framing of Futures* and now to deliver the programs underway as part of the University's *Operating Plan 2020–2024*. Lastly, but most importantly, I look forward to engaging with each and every one of you: the staff in the portfolios who make research at a university possible, and the staff in the faculties – our community of researchers and research support staff – working at the forefront of research excellence, as we strive to make Macquarie University a leading light for research globally.

Professor Sakkie Pretorius

DEPUTY VICE-CHANCELLOR (RESEARCH)

10-year strategic research framework at a glance

The *Research Strategy 2025* refreshes and builds on the achievements of the first five years of the *Strategic Research Framework: 2015–2024*. The foundations of the framework (the future-shaping research priorities and the key objectives) remain stable as intended, but some elements (research themes, research streams and supporting strategies) have been updated to reflect internal and external changes.

Internally, the University's Operating Plan had a transformative influence, particularly on the supporting strategies and the introduction of the FOCI (Focus, Opportunity, Consilience, Impact) criteria that will guide focused investment in research. The FOCI is a set of decision-making criteria that will be applied to requests

for discretionary investment of internal funding in research opportunities. A sharpened focus on accountability for outcomes will also be activated to ensure quality, productivity and advancement of Macquarie's research mission.

Externally, COVID-19 and related restrictions are causing unprecedented uncertainty for research and the higher education sector more broadly. While we have adjusted the high-level 2024 research targets, when it comes time to assess our performance in early 2025, we will do so within the context of the profile of the University and the Australian higher education sector at that time.

Research Strategy 2025 World-Leading Research; World-Changing Impact



2020 half-time scorecard

76%
growth in HERDC research income

36%
increase in publications

195
global ranking (THE, 2021)

89%
increase in HDR completions

100%
ERA rating at 3 and above (2-digit)

200
global ranking (QS, 2022)

The Macquarie University context: Past, present and future

Macquarie University has always sought to be innovative and distinctive, and its continued ascendant differentiation has been supported by *Our University: A Framing of Futures*, which identifies seven strategic priorities, with the second strategic priority calling for ‘an accelerating and impactful performance in discovery’.

The *Research Strategy 2025* is closely aligned with the supporting frameworks that direct our aspirations across corporate and global engagement, Indigenous research, learning and teaching, and gender equity:

- *Deputy Vice-Chancellor (Engagement) Portfolio Strategic Framework 2019–2023*
- *Global Engagement Strategy 2019–2024*
- *Indigenous Research Plan 2020–2025*
- *Learning and Teaching Strategic Framework 2020–2024*
- *Towards Gender Equity 2.0 2019–2021*

The fundamental interdependence of learning and teaching, and research cannot be overstated. It is an objective of the *Learning and Teaching Strategic Framework 2020–2024* to ‘encourage students to be critical thinkers and build research skills to contribute to the advancement of knowledge and professional practice’.

For Macquarie’s learning and teaching to remain attractive in an increasingly competitive and deregulated sector, our academic programs must continue to be provided in a research-enriched environment. The more we expose our undergraduates to the concepts and practices involved in research – critical thinking, analytical inquiry and effective communication – the better equipped they will be for their chosen careers beyond Macquarie, or as future higher degree research (HDR) candidates, postdoctoral research fellows and research leaders.

It is within this scaffolding of guiding frameworks that Macquarie has invested in excellence, achieved a step change in performance, and developed a breadth and depth of research excellence that now offer opportunities for focused investment for accelerated performance into the future.

Building on an exceptional foundation

In 2013, the Festival of Ideas was held to kickstart university-wide engagement to inform the development of the *Strategic Research Framework: 2015–2024*. Since that time, Macquarie achieved remarkable progress accelerating its world-leading research with world-changing impact. Below are just a few of our many advances:

- Macquarie’s Higher Education Research Data Collection (HERDC) research income increased by 76 per cent, or more than \$37 million, from \$48.6 million in 2013 to \$85.6 million in 2019.
- Macquarie’s HDR completions increased by 89 per cent, from 297 completions per year to 561. Macquarie continues to lead the sector in HDR completions per academic full-time equivalent (FTE) and, since 2013, has experienced the highest rate of growth in HDR completions across all universities in Australia, completing more than 100 candidates per year. Since 2014, the University completed more HDR candidates annually per academic staff FTE than any other university in the country.
- Macquarie demonstrated innovation in research training, as the first university in Australia to establish the Master of Research program: a two-year research degree as the standard pathway to a PhD.
- Macquarie has more than 30 years of experience in cotutelle and joint PhD study, and the largest cotutelle program in Australia, adding an international dimension to our HDR experience.

- Macquarie’s research publications increased by 36 per cent, from 2798 to 3779 (2019 publications as at December 2020). Around one third of all Macquarie-affiliated research publications are authored or co-authored by our HDR candidates, and there is little difference between the average number of citations per paper between staff-authored research publications and research publications co-authored with HDR candidates (10.88 versus 10.83).
- As assessed by the Australian Research Council’s (ARC) Excellence in Research for Australia (ERA) exercises, the quality of the research undertaken by researchers at Macquarie has improved, with 100 per cent of Macquarie’s research at the two-digit level being rated at or above world standard in ERA 2015 and ERA 2018. This outstanding result for quality was achieved within the context that Macquarie is in the top 12 research comprehensive universities in the country in terms of the breadth of disciplines it submitted in.
- Our 2024 target for the quality of our research, as reflected by ERA ratings, was achieved by 2015. With 100 per cent of our broad fields of research rated at or above world standard, we are well positioned to improve on this result by achieving 100 per cent of our four-digit fields of research rated at or above world standard by 2024.

- In the Australian Government’s inaugural Engagement and Impact (EI) assessment conducted in 2018 and reported in 2019, 100 per cent of Macquarie’s case studies were categorised as achieving effective or highly effective engagement with end-users beyond academia, and 91 per cent were rated as having made a significant contribution beyond academia.
- Macquarie successfully led the Australian Research Council (ARC) Centre of Excellence (CoE) for Core to Crust Fluid Systems and the ARC CoE in Cognition and its Disorders to completion in 2018. Macquarie is a node of the ARC CoE for Nanoscale BioPhotonics, the ARC CoE for Engineered Quantum Systems, and the ARC CoE for All Sky Astrophysics in 3 Dimensions. In 2020 Macquarie commenced as the lead institution of the ARC CoE in Synthetic Biology.
- Macquarie researchers successfully led the National Health and Medical Research Council (NHMRC) funded program grant ‘Creating safe, effective systems of care: The translational challenge’ to completion in 2018, and are currently leading the NHMRC funded program grant ‘Molecular determinants of risk, progression and treatment response in melanoma’ and the NHMRC Partnership Centre for Health System Sustainability.
- Macquarie is a participant in seven Cooperative Research Centres (CRCs) and six CRC Projects. In 2020 we commenced as the lead institution of the SmartCrete CRC – the first Macquarie-led CRC. In 2021 the Digital Finance CRC became the second Cooperative Research Centre to be led by Macquarie.
- Macquarie is a founding member of the Sydney Quantum Academy, a NSW Government-supported consortium established in 2019 to develop and support research excellence in fields related to quantum science and technology.
- In 2019, Macquarie received SAGE (Science in Australia Gender Equity) Athena SWAN (Scientific Women’s Academic Network) Bronze accreditation in recognition of action taken to address gender inequity in the STEMM (science, technology, engineering, mathematics and medicine) disciplines and achieve tangible outcomes across the University.
- In 2020, 11 Macquarie researchers were recognised as among the most influential researchers in their field, including one researcher acknowledged as a global field leader, one lifetime achiever and two early career achievers. Macquarie was named as a leading institution in 11 research fields (*The Australian Research Magazine (2020) – Australia’s Research Field Leaders*).

- In 2020, Macquarie entered the top 200 global universities, with a ranking of 195 in the *Times Higher Education World University Rankings, 2021*, based on excellence in teaching, industry income, research, citations and international outlook. Macquarie’s reputation as a world-leading university was consolidated in 2021 with a ranking of 200 in the *QS World University Rankings, 2022*, which measures academic and employer reputation, research (citations), teaching and international outlook.
- In the *QS World University Rankings by Subject, 2021*, three Macquarie University subjects ranked within the top three nationally and two within the top 50 globally. Philosophy ranked two nationally and 23 globally, linguistics ranked three nationally and 27 globally, and ancient history ranked one in Australia. Psychology, education, and accounting and finance all ranked in the top 100 globally. Macquarie is the only Australian university featured in the top 100 globally within the ancient history rankings, and is also the 41st highest-ranked university in the world in arts and humanities (*US News Subjects, 2021*).
- In the *Times Higher Education World University Rankings by Subject, 2021*, Macquarie ranked within the top 200 global universities in the subjects of business and economics, clinical and health, law, life sciences and psychology, with arts and humanities (90) and education (69) ranking in the top 100.
- Our proud tradition of innovation and collaboration over the past five decades, focusing on areas critical to our future, consolidated our position in the top one per cent of universities worldwide in the highly regarded *QS World University Rankings*. By all these measures, Macquarie is on track to become one of Australia’s leading research universities.

Macquarie's strategic advantages

Our location on 126 hectares of park-like freehold land is protected by award-winning sustainability practices. Our campus is situated within the Macquarie Park Innovation District (MPID), a nationally significant research and business precinct specialising in the communications, medical research, pharmaceutical and information technology and telecommunications sectors. This affords us the opportunity to build effective and long-term collaborations with business and industry, including some of the world's leading multinationals. Our proven ability to build unique research concentrations that bring together end-users, suppliers, policymakers, and basic and applied researchers is a competitive advantage we seek to maintain and build on. Effective collaboration and innovation is facilitated by more than 180 large international and 200 small-to-medium businesses with easy access to the campus, the Macquarie University Hospital and the Macquarie University Incubator.

We are the only Australian university with its own hospital. The Macquarie University Hospital and the Faculty of Medicine, Health and Human Sciences work together to conduct research into clinical best practice, offering the unique opportunity to establish Australia's first fully integrated healthcare enterprise: MQ Health. Much of this research is based on the concept of translational research, a process of adapting scientific discoveries to practical improvements in patient care.

Macquarie hosts the Australian Hearing Hub, a facility that unites researchers, educators, clinicians and innovators with expertise in audiology, speech pathology, cognitive and language sciences, psychology, nano-fabrication and engineering sciences. This unique facility is purpose-designed to optimise hearing health and transform life outcomes for people with hearing loss, by collaboration among a community of organisations dedicated to hearing research, innovation, education and practice. With the world-leading company Cochlear and leaders in hearing – such as Hearing Australia, the National Acoustic Laboratories, The Shepherd Centre, and NextSense (previously known as the Royal Institute for Deaf and Blind Children) located on campus – the Australian Hearing Hub is a global leader in hearing-related research.

Macquarie is the only Australian university in the international consortium working on the Synthetic Yeast Genome Project, which unites some of the best minds in biology, engineering, computer science, social sciences and business. Macquarie's work building the world's first synthetic complex organism enabled its acceptance as a founding member into the group of 13 internationally recognised biofoundries known as the Global Biofoundry Alliance (GBA). The new Macquarie-led CoE in Synthetic Biology allows the University to lead large-scale collaborative projects, including the discovery and development of biosensors, bioenergy, biodegradable pesticides, next generation antibiotics and vaccines, personalised medicine and gene therapies.

Finally, Macquarie offers significant internal funding to support research and research training through a wide variety of funding schemes and investment in strategic opportunities. Macquarie invests substantially in supporting its HDR candidates and stimulates research excellence via a range of internal funding schemes that support laureate professors to early career researchers, infrastructure to fellowships, and cutting-edge science to technology transfer. Given the increasingly competitive environment and the scarcity of hard-won resources, it is important that the University's internal research funds are allocated to achieve maximum return in terms of external research income or impact. Decisions about the allocation of internal funds will be guided by principles such as excellence, significance, alignment, consilience, developing our researchers and equity, and will take into account the availability of external funding, the potential for impact, performance, proposed collaborators and end-user engagement.

Research integrity

Macquarie is committed to the highest standards of research integrity. As set out in the Macquarie University Code for the Responsible Conduct of Research (July 2019), the University expects all staff and students, and those who are conducting research on University premises or using university facilities, to observe the highest standards of ethics, responsibility and integrity in the conduct of their research.

The University's research integrity arrangements aim to offer a positive research experience, constructively promote good research, and effectively and efficiently ensure responsible conduct in a way that is proportional to risks and sensitivities.

The Macquarie University Code for the Responsible Conduct of Research – which is underpinned by the Macquarie University Research Code Complaints, Breaches and Investigation Procedure (July 2019), a series of Macquarie University standards and the Australian Code for the Responsible Conduct of Research (2018) – aims to facilitate research by providing researchers with guidelines, resources and training. A key element of the implementation of the Macquarie University Code for the Responsible Conduct of Research will be the centrally coordinated establishment of a suite of activities and online education modules that build awareness and capacity, are discipline-relevant, and present research integrity as a core component of quality research.



Future-shaping research priorities

Our future-shaping research priorities have been identified as cross-disciplinary areas in which we either have, or wish to build, research excellence and scale.

The broad and inclusive future-shaping research priorities offer scope for faculties and individual researchers to continue to pursue their areas of expertise, but in the context of opportunities to contribute to areas aligned with national and global challenges of significance.

The University's commitment to these research priorities is a commitment to impact, to making a difference and to measuring that effect. Macquarie will support and grow the areas articulated in our research themes and streams while maintaining an agile and opportunistic approach to new areas of growth potential. An overview of each follows.

Future-shaping research priority 1: Healthy People

PIONEERING HEALTH, INTEGRATED HEALTHCARE AND LIFELONG LEARNING FOR WELLNESS IN OUR AGEING WORLD

- Pedagogies for health and lifelong learning
- Health and resilience
- Translational health and medical research
- Sensory and cognitive processing
- Hearing, language and literacy



Future-shaping research priority 2: Resilient Societies

UNDERSTANDING CULTURES IN OUR CHANGING WORLD
AND BUILDING ETHICAL, JUST AND INCLUSIVE COMMUNITIES

- Societal transformation
- Culture and communication
- Ethics, governance and justice
- Transformational education experiences
- Indigenous knowledge, contemporary challenges and opportunities



Future-shaping research priority 3: Prosperous Economies

STRENGTHENING ECONOMIC PRODUCTIVITY TO PROMOTE
PROSPERITY IN OUR DIVERSE WORLD

- Role, operation and risks in global financial and economic systems
- Organisation sustainability, productivity and competitiveness



Future-shaping research priority 4: Secure Planet

SUSTAINING OUR INTERDEPENDENT WORLD AND EXPLORING
OUR PLACE IN THE UNIVERSE

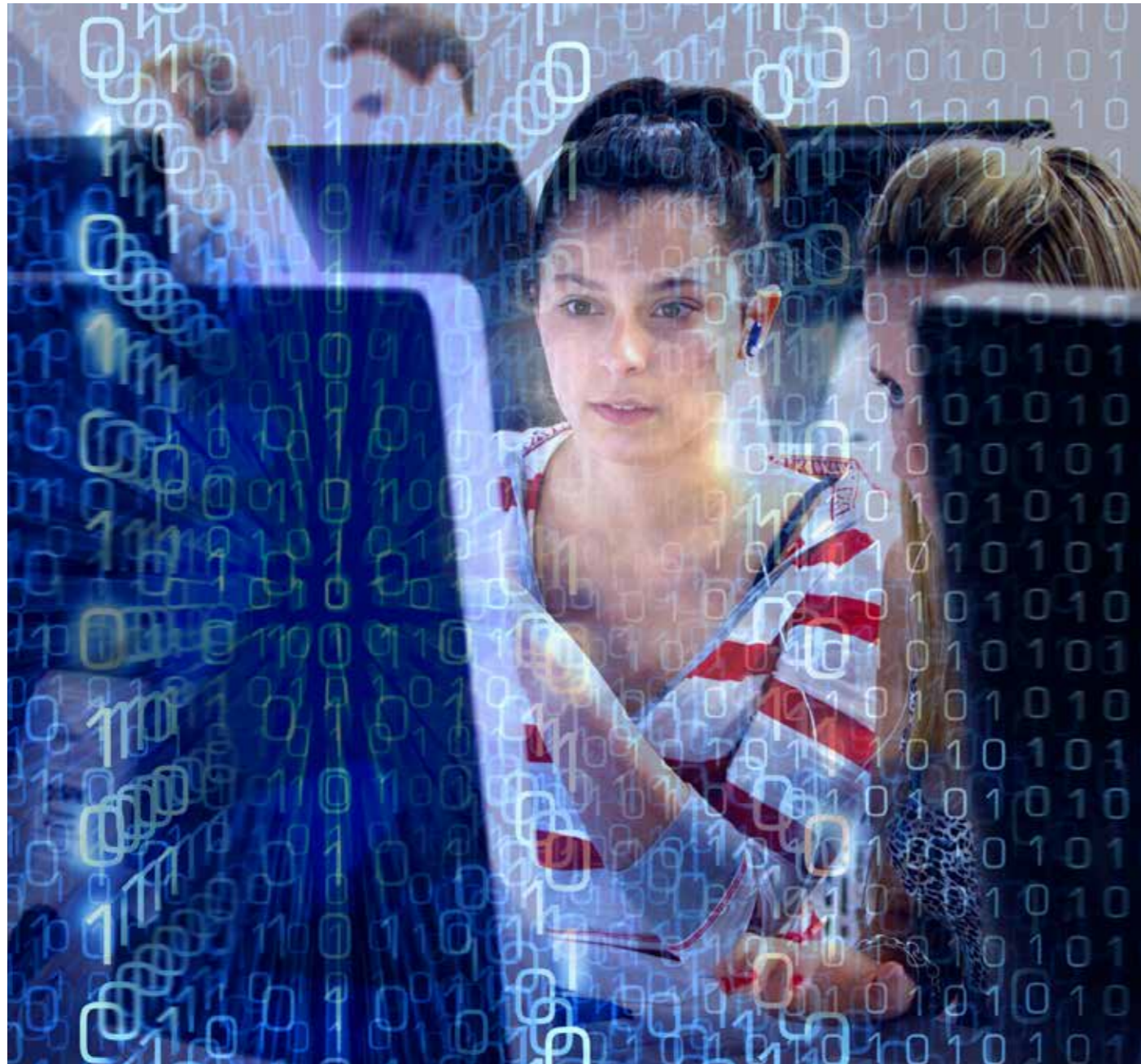
- Nature and the environment
- Exploring planet Earth and beyond



Future-shaping research priority 5: Innovative Technologies

ADVANCING OUR INTERCONNECTED WORLD WITH FRONTIER TECHNOLOGIES, SYSTEMS, DESIGNS AND CREATIVE PRACTICE

- Science and engineering technologies for the 21st Century
- Big data



2024 Research targets

By 2024, 100% of Macquarie University's research will be rated at world-standard or above, and will be on a trajectory to be ranked among the top 150 universities world wide.

Annually, Macquarie University will achieve:

>\$120,000,000

In HERDC research income

>640

Completing higher degree research candidates

>4000

Research publications

FIND OUT MORE
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NSW 2109 Australia
mq.edu.au



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