Australia's National
Science Agency

Next Generation Graduates Program Guide

Tackle real world challenges with foundational skills in artificial intelligence and emerging technologies. Become a career-ready specialist in your field.

The Next Generation of Graduates

The Next Generation Graduates Program is leading the charge in upskilling Australia's workforce in Artificial Intelligence (AI), quantum and emerging technologies. With 500 generous scholarships available nation-wide, the program is paving the way for the future tech specialists and translators to revolutionise the industry.

The program provides postgraduate students from any project background the unique opportunity to collaborate with universities, industry specialists and CSIRO to solve the world's greatest problems.

We train students from varying degrees with the skills in AI, emerging technologies and quantum to be prepared for the real- world challenges upon entering their career. The overarching program objective is student led: develop a comprehensive research project with real world implications.

Students will engage with a national cohort of peers from diverse academic backgrounds. Cohort driven learning and approaches enhance critical thinking, develop interdisciplinary skills and encourages collaborative solutions.

The programs endeavour to equip our students with design thinking and skill sets that are key to boosting breakthrough innovation.

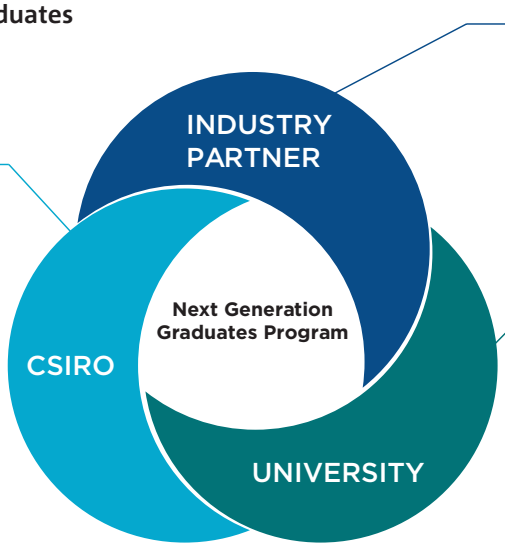
Australia's leading digital research network

CSIRO's Data61 is the data and digital specialist arm of Australia's national science agency, CSIRO. We are home to one of the largest collections of research and development expertise in AI and data science in the world, and host cutting-edge facilities including the Mixed Reality Lab, Robotics Innovation Centre and AI4Cyber Enclave. Our research expertise includes AI, robotics, cybersecurity, modelling, quantum, and analytics.

We are solving Australia's greatest data-driven challenges through innovative science and technology.

We are at the forefront of digital science and innovation, leading both in developing new research as well as working across disciplines and sectors to apply technologies and drive impact.

What does the Next Generation Graduates Program offer to students?



- International technology network
- Innovation courses and workshops
- Cohort learning experience
- Generous stipends and allowances

- Exposure to real-world challenges
- Practical work experience
- Access to data, technology, equipment and expertise
- Generous scholarship top-up

- Academic supervision
- Cutting-edge research opportunities
- Development of critical thinking skills

Join our interdisciplinary community

Eligibility

Applicants must be domestic students as per the *'Higher Education Support Act'*. Domestic students include:

a. Australian citizens

b. Australian permanent residents

c. a person entitled to stay in Australia, or to enter and stay in Australia, without any limitation as to time

d. a New Zealand citizen.

Scholarships are available for students at Honours and all postgraduate levels across Australia. See www.csiro.au/nextgen-scholarships for participating universities and available projects.

Scholarships are offered as primary scholarships (not available as top-up).

Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) scholarship holders must enrol in a full-time degree.

Commonwealth supported students enrolled in Honours and Coursework Masters programs are also eligible to apply for Next Generation Graduates Program scholarships.

Diversity drives innovation

We welcome applicants from all backgrounds, including those without a traditional science, technology, engineering and mathematics (STEM) background.

We help our students to unlock their full potential and shape the future of AI and emerging technologies.

Our program is designed to bring together a community of innovative and creative thinkers from diverse disciplines, creating a collaborative and inclusive environment for learning and discovery.

Key requirements

Scholarship holders must undertake industry placements with industry partner(s) of the program within which the student enrols.

Students must register and complete their CSIRO Next Generation Graduates Coursework within the **first 18 months** of receipt of a scholarship.

Students who receive a scholarship are expected to undertake their training in Australia and endeavour to remain in Australia for 2 years following completion of their degree.

Key dates

Funded Next Generation Graduate Programs will continue to recruit students throughout the year until all available places have been filled. PhD must enrol and commence **no later than 31 December 2025**.

Scholarship highlights

DEGREE TYPE	PhD	MASTER OF PHILOSOPHY	MASTERS (RTP QUALIFIED PROGRAM)[1]	HONOURS AND COURSEWORK MASTERS[2]
Research Duration	3.5 years[3]	2 years	1 year	1 year
Partner placement	6 months	3 months	20 days	6 days
Stipend rate (p.a.)[4]	$42,483	$42,483	$30,000	$10,000
Training (p.a.)	$5,000[5]	$5,000	$5,000	$5,000
Travel (total)	$5,000	$5,000	N/A	N/A
Thesis allowance (total)	$840	$420	N/A	N/A
Cost of Living Payment (total)	$5,000[6]	$2,000	N/A	N/A

1. Masters Programs at AQF9 where the second-year research component qualifies for an RTP.
2. 1 EFTSL research project similar to Honours that is part of a coursework Masters degree.
3. PhD must enrol and commence no later than 31 December 2025.
4. A 2% indexation will be applied to MPhil and PhD stipends each financial year. The current figure is based on the 2024-25 financial year rate.
5. PhD Training allowance is $5,000 per year for three years.
6. Paid in parts; $2,000 at enrolment and $3,000 when PhD is confirmed.

How to apply

Explore the currently recruiting opportunities and find information on how to apply on our website www.csiro.au/nextgen-scholarships

Why Next Gen?

The Next Generation Graduates Programs build on these guiding principles:

Create cohorts of students

The program is rolled out in student cohorts, allowing an immersion of ideas. The cohorts will be mentored by carefully selected specialists in the field.

Consolidated learning via a direct connection industry experts and placements at partner institutions provides experience with stakeholders in the practical delivery of research.

Students will experience fundamental principles of problem solving in a high-performance environment to develop leadership and agility of application through skills-sharing and live workshops.

Build a common foundation

Through a range of collaborative learning opportunities, we establish a common foundation for all students.

Students are presented with live workshops, video-on-demand from key specialists, guided-learning activities and support from early-career researchers and leaders in their field.

The program brings together students from diverse skill sets, facilitating collaboration between university projects, acquisition of cross-cutting skills, and peer-to-peer learning.

Work on areas of national interest

The Australian Government has identified a number of critical technologies that are in the national interest[1]. Projects have been designed to provide students with the opportunity to progress priority areas for Australia.

Building cohorts and common foundations across industries

1 Department of Industry, Science and Resources. https://www.industry.gov.au/publications/list-critical-technologies-national-interest

Coursework overview

The purpose of NGGP Coursework is to build collaborative, interdisciplinary, industry-focused cohorts of individuals who are aware of where they sit within the ecosystem of technology development. It will provide students with unique opportunities to engage with a broad range of topics, themes, and research domains.

By surveying diverse topics including deep learning, probabilistic machine learning, ethics, human centred design and innovation this learning opportunity stands out for its holistic approach to problem-solving with technology. It emphasises the integration of different streams of knowledge to tackle real world challenges – while taking into account the engineering, social-technical, and theoretical complexities involved.

The coursework is structured around these four modules of study:

- Data Centric Engineering (Foundational)
- Ethical Technology: Designing with Purpose (Foundational)
- Foundations of Deep Tech (Advanced)
- Advanced AI/ET (Advanced)

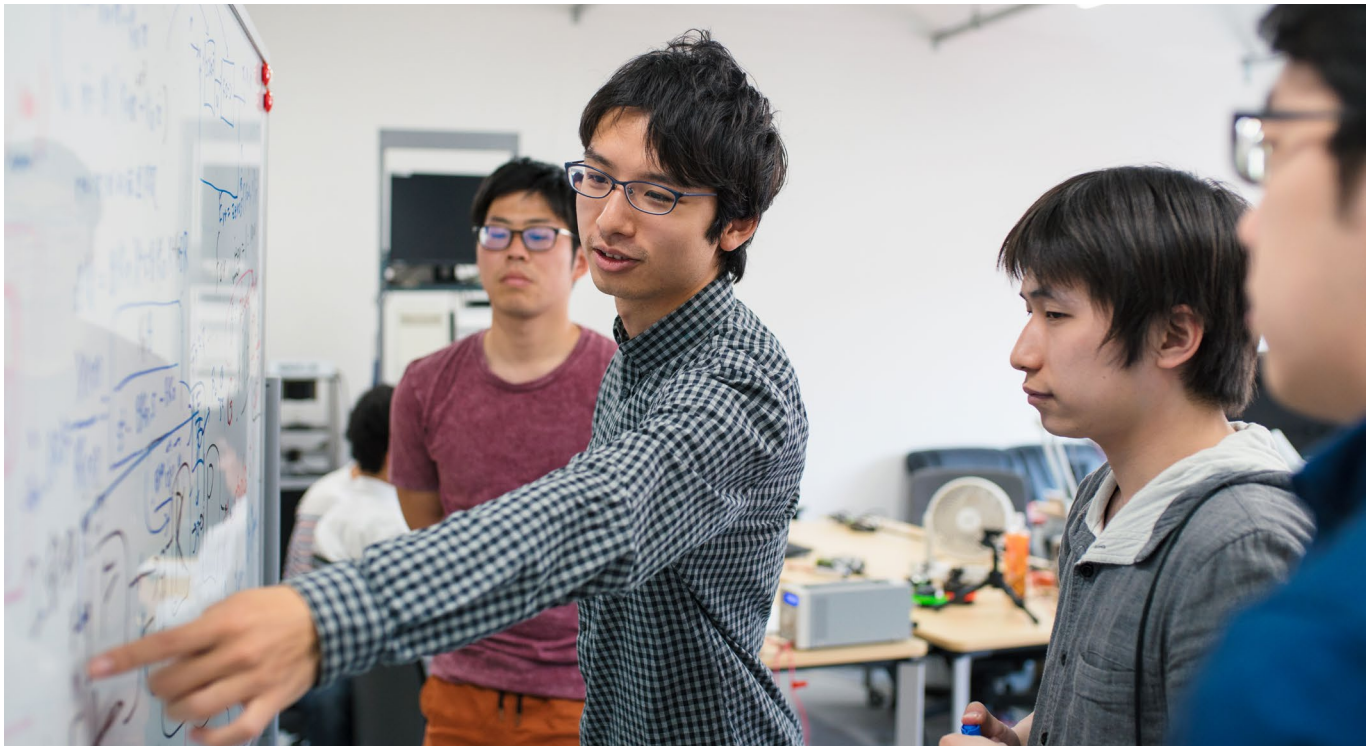
The coursework component is divided into two segments. The two Foundational units are designed to provide foundational thinking around responsible and human centred technology development in a multidisciplinary context.

The Advanced modules cover more technical content, with a particular aim of increasing confidence for those who do not come from a computer science background.

Teaching for each module will combine recorded lectures, supporting activities, and hands-on workshops. Lectures will be motivated by real world problems in the AI and emerging technologies space.

Workshops have been designed to bridge content between units and provide an environment where students can practice and analyse solutions to real-world scenarios.

Lecture, activity and workshop materials will be available to students online via a Learning Management System.



Pre-requisite knowledge and experience

Practical programming skills are crucial for solving real world problems in research and industry using AI and many other emerging technologies. In these contexts, both data and underlying theoretical principles need to be translated into computer executable code to automate large scale and complex analytics. As such, the coursework and the future of the student's candidature require a beginner level of proficiency in programming, with a preference for the Python programming language.

While a beginner level of programming proficiency is desired, applicants without prior programming experience are encouraged to apply. There are numerous online resources available to learn programming, enabling participants to develop the necessary skills to succeed in the course.

These resources include but are not limited to LearnPython.org[2], Learn Python the Hard Way[3], Dive Into Python[4], the Interactive Python Book[5].

In general, a beginner python programmer should:

- Be knowledgeable of the programming concepts including syntax, variables, data types, operations, functions. Particularly familiar with data types such as integers, strings and lists, including how to perform operations between them.
- Handle script execution, operations, formatting, loops, and conduct code interpretation.
- Write simple programs that perform operations using if-else and loops.
- Basic understanding on the use of libraries and modules.
- Awareness of best practices, including writing clear and understandable code.
- Ability to debug code by printing the value of variables at varying points in code execution.

Time commitments

The curriculum and activities have been designed to provide a flexible and interactive experience. Course content is hybrid delivery, accessible online, and complemented by live synchronous sessions facilitated through Teams or in person on CSIRO sites.

Candidates come together as a program cohort

2 http://learnpython.org
3 https://learnpythonthehardway.org/book/
4 http://getpython3.com/diveintopython3/
5 https://runestone.academy/runestone/books/published/thinkcspy/index.html

Coursework modules

While undertaking the following four modules, participants will complete an independent, in-depth project about their own research and industry context. This task is designed to encourage proactive networking with key stakeholders and assist the development of the research proposal.

Data Centric Engineering

The development of AI and emerging technology systems in the real-world requires dealing directly with complex, heterogeneous, multimodal, and disorganised data. The implementation and deployment of these systems involves challenges which can only be tackled in a principled manner by following best practices from an engineering perspective – allowing efficient processing of large and incomplete datasets, deploying robust code, and scaling the processing capabilities in the cloud.

This unit integrates fundamentals from data science and engineering: It introduces basic data structures and data modelling, discusses techniques of data pre-processing, and analyses real-world datasets. Students will be exposed to a range of data intensive applications, and gain experience using practical tools, engage in collaboration activities and live workshops. From an engineering perspective, this unit covers the most significant data-engineering concepts and principles, such as DevOps, site reliability engineering, cloud services, and engineering design patterns.

Ethical Technology: Designing with Purpose

Emerging technologies and AI are already having an impact in the world around us, with governments and large corporations deploying systems which affect us directly. Developing and implementing AI-based solutions to real-world problems involves thinking out of the box, combining innovative ideas and tools while maintaining a user centred design and aligning with ethical frameworks.

This unit provides breadth of knowledge that will allow students to familiarise with moral dilemmas involved in socio technical systems – while keeping track of latest techniques, frameworks and building a viable roadmap for AI and emerging technology projects. Students will be guided by industry specialists and guest speakers to apply these concepts (with other fields of learning) in a debate and a series of live workshops. Student will discuss how their projects are aligned with AI ethical frameworks.

Foundations of Deep Tech

Artificial intelligence and emerging technologies are increasingly prevalent and changing the world we live in. The foundations of current AI innovations date back to the early 1900s: an understanding of this history and the theoretical foundation of AI is crucial to responsible practice in AI development. Familiarity with the scope of technology development in this space is also crucial to building interdisciplinary networks that drive innovation.

This unit provides a historical overview of the development of AI and its theoretical foundations, surveys the scope of application in society, and explores current trends and future directions. Students will explore themes around safety that span technologies, including cybersecurity, data privacy and ethics, before taking a deeper dive into the range of emerging technologies including developments in hardware, blockchain, IoT, robotics, augmented and virtual reality and immersive analytics.

Advanced AI/Emerging Technologies

Machine learning has gained traction as a powerful solution to complex problems using data. This unit covers both probabilistic machine learning, in which quantities of interest are represented as random variables, and deep learning, which uses neural networks to learn from large amounts of data. Probabilistic machine learning provides a framework for quantification of uncertainty – a crucial component for decision making in unstructured and stochastic environments, by developing a strong link between statistics and computer science.

This advanced unit covers the core aspects of probabilistic machine learning, including modelling, inference and decision making, providing an overall understanding of the general framework used in realistic scenarios.

The rise of neural networks as a flexible modelling tool, combined with powerful optimisation routines in high dimensional spaces, has resulted in an explosion of advanced computer vision and natural language processing, revolutionising many domain applications. Deep learning models are present throughout the internet and are responsible for search optimisation, recommender systems, image search and categorisation, language translation, and generative models among many others.

This unit covers the structural components of any computational system which uses deep learning, diving deeper into specific model structures that have recently proved very successful in specific applications, such as convolutional neural networks, recurrent neural networks, and transformers.

Throughout the module, students will engage in several collaboration activities and workshops to explore these ideas with their cohort and subject-matter specialists.

PhD and Master of Philosophy (MPhil) students

PhD and MPhil students will complete up to 11 weeks of learning in total, with online content complemented by some in person opportunities to come together as cohort. The program design is 'flipped' in delivery, allowing students to watch guest lectures and complete activities asynchronously on the online Learning Management System, they then come together for facilitator-led synchronous sessions and workshops to further consolidate learning and to provide opportunities for peer-to-peer learning.

While some assessments (e.g. quizzes) are included, completion of modules will not depend on graded assessment tasks, but on undertaking the learning with genuine engagement and participation along with submission of the single deliverable assessment item. Students must complete the NGGP Coursework to the satisfaction of CSIRO.

Students will complete all four modules within **18 months** of commencement.

Masters and Honours students

Masters and Honours students are required to complete a modified version of the two foundational modules during their candidature. They will engage with components of the module content online and have opportunities to come together for live sessions. The delivery methodology for this cohort is tailored to meet the students' needs and is more industry focused and designed to enhance their professional development and employability skills, and does not include assessment tasks. This prepares the students to transition into organisations where they can apply their skillsets with confidence.

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