



ANNUAL REPORT 2021

About us

The Australian Council of Engineering Deans (ACED) has formally been in operation for more than 20 years, with the stated mission *“To create economic and social impact by advancing engineering education, research and scholarship on behalf of Australian universities.”*

ACED does this in the national and international interest, which for education and research includes assuring the public that engineering graduates will conduct their work in the public interest with due regard for human safety and the sustainability of the environment.

ACED is an incorporated association whose members are the Australian public universities that provide undergraduate and postgraduate degree programs and research in engineering.

The Council elects a President for a two-year period. The President is supported by the Executive Committee, whose members are elected by the Council.

The Council meets in full twice a year (Autumn and Spring).

ACED has strong links with the Australasian Association of Engineering Education (AaeE) whose members are primarily engineering academics in Australian and New Zealand universities. ACED sponsors the annual AaeE award for Excellence in Teaching.

ACED invites a representative of the New Zealand Council of Engineering Deans to attend Council meetings. ACED supports and encourages members to become members of the Global Engineering Deans Council (GEDC)

ACED also has strong links with Engineers Australia (EA). Representatives of the EA Accreditation Centre attend all ACED meetings to inform and discuss with members developments in the national engineering program accreditation system as well as matters of importance arising within the International Engineering Association (IEA) that has oversight of the international engineering education Accords of which EA is a member.

ACED Governance

Executive Committee (at Dec 2021)

President:	Professor Vishnu Pareek
Deputy President:	Vacant
Past President:	Professor Ian Burnett
Members:	Professor Elizabeth Croft
	Professor Vicki Chen
	Professor Friso de Boer
	Ms Julia Lamborn (representing the ADTL Group)
	Professor Andrew Bradley (representing the ADR Group)

Professor Scott Smith (representing ADI Group)
Assoc Professor Anne Gardner (representing the AaeE)
Ms Bernadette Foley (representing Engineers Australia)
Executive Officer: Em Professor Doug Hargreaves AM
Consultant: Em Prof Robin King

ACED Objectives:

- **Promotion:** To provide a forum for Australian leaders of engineering education to discuss matters of mutual concern and national importance, thereby contributing to matters such as raising general community awareness on the need for and value of high-quality engineering education, research training in the higher education sector.
- **Engagement:** To further the interests of engineering education and research in the higher education through engagement and outreach with relevant national and international bodies, particularly EA, AaeE and NZCED.
- **Policy:** To develop positions and make statements on relevant issues in response to government inquiries and concerns of professional and industry bodies, and to the media and the general community.
- **Projects:** To initiate and conduct reviews and projects consistent with its mission. This would include monitoring the state of engineering education and scholarship, benchmarking programs and resources and the quality of outcomes.
- **Leadership:** To support the development of leaders of engineering education and research within the faculties and schools.

ACED Meetings 2021

The Council met via Zoom (AGM on 30 March and Ordinary meetings on 30 March and 6 October).

ACED Project “Engineering 2035”

ACED initiated a major project during 2019 to investigate what knowledge skills and attributes will be required by graduate engineers in the 2035, and how the education system should be developed accordingly.

The Stage 1 report “**Engineering Futures 2035, a scoping study**” and a two-page Summary are available on the ACED website.

In response to the recommendations from the Stage 1 report, three task forces were set up.

Mr Rob Lawrence was commissioned to consider the promotion of engineering to various stakeholders. His report “**The promotion of future opportunities and possibilities for engineering graduates**” is available on the ACED website.

Em Prof Caroline Crosthwaite’s report “**Engineering Education Programs, Priorities & Pedagogies**” is available on the ACED website.

Hon Assoc Prof Carl Reidsema's report "**A survey of Australian Engineering Academic attitudes and capabilities for educational change**" is available on the ACED website.

Chair of the Steering Committee Em Prof Peter Lee prepared a "**Call to Action**" document. This was presented to all ACED members on 29 March. The document was generally well supported but a number of extra points were recommended to be added or amplified.

A professional writer was engaged to merge the four reports mentioned above into a document that can be used to influence various government, industry, professional bodies and educational institutions to implement the outcomes of this study.

The Australasian Association for Engineering Education (AaeE) initiated four projects (with some funding assistance from ACED) during 2021. (1) "Identifying current best practice and support mechanisms for project-based learning at Australian universities". (2) "Engineering educator capability and capacity: How do we accelerate implementation of best practice to meet the 2035 vision for engineering education". (3) "Evaluating experience of students with disabilities engaging in WIL to better support diverse students" (4) "Integrated inclusion: developing best practice for engineering education and the profession"

Assoc Prof Carl Reidsema and Prof Roger Hadgraft proposed that a project "Develop and Manage the Implementation of the Engineering 2035 Review recommendations". Phase 1 of the proposal was accepted and funded by ACED and is expected to be completed by the end of March 2022.

ACED Representation on other bodies

ACED participates in the reference group for the *Design and Technologies* school curriculum implementation, convened by the Australian Curriculum, Assessment and Reporting Authority (ACARA). Together with *Digital Technologies*, this curriculum strand forms the compulsory *Technologies* learning area for school years F-10. *Design and Technologies* introduces and develops engineering concepts and practice. During 2021 ACED contributed input to the curriculum reviews of the *Design and Technologies* learning area, principally to update engineering-related content and provide stronger and more accurate connections with other parts of the school curriculum. The revised national curriculum is expected to be published by ACARA in April 2022.

ACED worked osely with Engineers Australia, and during 2021 had several discussions with EA officers on engineer shortages, and the contributions that the universities can make to increasing supply (see below).

The President and Executive Officer ACED represent ACED on the *Tripartite Committee*, together with representatives of the Academy of Technology and Engineering (ATSE) and Engineers Australia (EA). No meetings were held in 2021.

Publications and presentations at national and international conferences

At the AaeE2021 conference, Assoc Prof Carl Reidsema with Prof Roger Hadgraft and Professor Sally Male facilitated a workshop “Engineering Futures 2035: Implementing the Vision”

The Steering Committee for the Engineer 2035 project authored a paper that has been accepted for publication as a book chapter. P. Lee, I. Burnett, C. Crosthwaite, B. Foley, D. Hargreaves, R. King (corresponding author), J. Lamborn, C. Reidsema, M. Symes, and J. Wilson (2022), *Preparing Engineers for 2035: transforming Australia’s engineering education for emerging roles and expectations*. Chapter 2 of *Lecture Notes Educational Technology, Christina Hong and Will Ma (Eds): Applied Degree Education and the Future of Learning, Springer*. To appear in April 2022.

ACED submissions to national reviews

ACED responds to requests to make submissions to the Australian Government’s consultation processes on matters that relate to engineering education and research. These responses are normally then published on the ACED website.

During 2021, ACED submitted a response to the Australian Government’s ***University Research Commercialisation*** consultation paper. The ACED response stressed the importance of the engineering profession’s contribution to innovation and commercialisation and welcomed recent initiatives in areas of advanced manufacturing, energy, space, defence, minerals, health and finance. ACED made positive responses to most of the specific questions posed, and stressed the importance of incentives for increasing the range of engagement with industry.

During 2021, ACED submitted a response to the Australian Government’s consultation paper on ***Growing industry internships for research PhD students through the Research Training Program***. The ACED response was broadly supportive, but urged greater flexibility in ensuring optimum end-user engagement, and inclusion of international HDR candidates who, through their projects, and post-graduation work in Australia, contribute to the development of Australian industry and the economy.

ACED Financial Report (from Auditor’s report)

Opening Balance (1 Jan 2021)	\$ 128,121
Income (members’ dues + interest)	\$ 139,520
Total Expenditure	\$ 156,573
Retained surplus (31 Dec 2021)	\$ 111,068
Total Current Assets (all 4 accounts)	\$ 110,550
Total Current Liabilities	\$ (518)
Nett Assets	\$ 111,068

ACED Website

The ACED website was modernised and updated and made live in December 2021.

ACED Statistics

ACED compiles an annual report on higher education student enrolments and graduations in engineering and related matters, from the most recent data published and collected by the Australian Higher Education Statistics Unit.

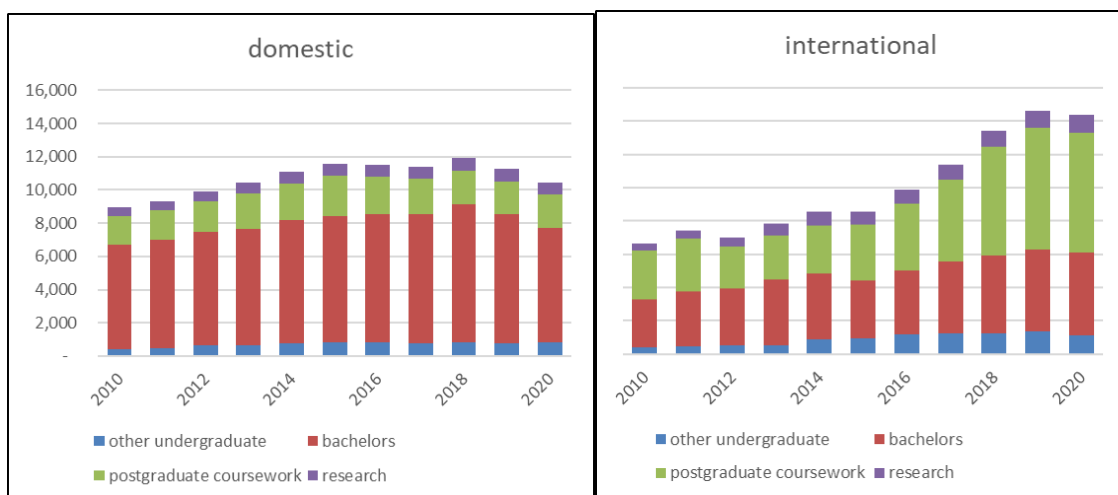
During 2021, ACED members contributed their 2016-19 graduation data to gain a more accurate picture of the distribution of professional engineering graduates amongst the branches of engineering than is possible from national higher education datasets. The detailed analysis is on the website, with 2019 summarised distributions for domestic and international graduations:

areas of engineering	domestic	international
civil & environmental	33.9%	31.4%
mechanical & manufacturing	18.8%	23.4%
electrical & electronics	18.3%	22.7%
chemical, mining, materials	10.1%	11.9%
mechatronics & robotics	7.2%	4.2%
software	3.8%	2.0%
biomedical	3.4%	1.2%
aerospace	3.2%	2.3%
other	1.3%	0.9%

The Australian Government collections of student data for 2020 were not published until Feb 2022. This has delayed compilation of the Annual Statistics report. From the 2020 data, the early impacts of the COVID pandemic are evident.

In 2020, there were nearly 115,000 students enrolled in higher education qualifications in engineering and related technologies, 7,000 fewer than in 2019. ACED member institutions took 97% of the enrolments.

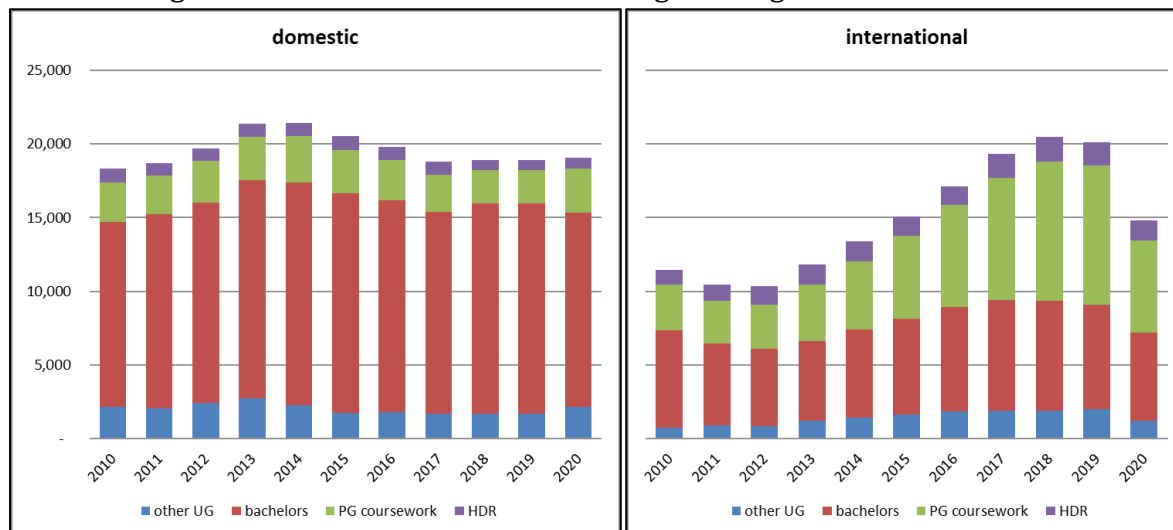
From the graduations charts below, it is evident that both domestic and international graduations have peaked, as a result of earlier trends in commencing enrolments. Women constituted 17.7% of the domestic graduates (an increase of 0.7%) and 20.4% of the international graduates (slightly less than in 2019).



Graduations in Engineering & Related Technologies 2010-20

Graduate outcomes were strong. The national surveys of 2020 graduates from undergraduate engineering awards reported median salary \$70,000 (ranked 5th of 21 areas) and 80.7% in full-time employment (6th of 21), despite ranking overall satisfaction with their program at 72.3% (19th of 21). On the other hand, 90.5% of employers were 'satisfied or better' with engineering graduates, the top ranking (of 10 areas) for the second successive year.

Commencing numbers as shown in the following charts give some cause for concern.



Commencing Enrolments in Engineering and Related Technologies, 2010 - 20

Domestic enrolments of most ACED members' core product, the Bachelor (Hons) degree appear to be trending down with a drop (to 5.3%) of all domestic Bachelor degree enrolments. A positive was the increase in the participation of women to 19.3% of this enrolment cohort, the highest proportion on record. In addition, engineering retained the top position amongst field of engineering for the highest proportion (23.2%) of school leaver enrolments with ATAR of at least 90.00. Domestic Masters and research degrees commencing enrolments have increased slightly.

The impact of the pandemic on commencing international enrolments is clearly evident; overall there were 26% fewer international commencing students than in 2019.

Engineer Shortages and the Supply of Graduates

During 2021, ACED examined the educational and immigration 'pipelines' into Australian engineering occupations, the apparent shortages of engineers as evident from employer data, and projections of future need. These projections suggest that at least 50% increase of local graduates will be required by 2030. The evidence and findings are in two Working Papers on the ACED website.

Current enrolment trends and institutional settings in the student-demand driven system will not, without incentives, deliver the numbers of graduate engineers required to meet these challenges. Recognition by industry and others of the engineer shortage – and what needs to be done about it – led to a high-level industry roundtable,

convened by the G8 Universities, and accompanying mention (of ACED) in the *Financial Review*.

Contact us

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