ACED AUSTRALIAN COUNCIL OF ENGINEERING DEANS

Australian Engineering Education Facts - Update

October 2018

An update on the status and trends in Australia's higher education system for engineering

Introduction

Last year ACED published a summary of national data on engineering, up to 2015[1]. This Update extends these data (where available) to 2017, and emphasises recent trends.

System Size

Currently 35 public universities, several TAFE Institutes, and a small number of private colleges provide higher education (HEd) qualifications in engineering[2] at levels 6-10 of the *Australian Qualifications Framework* (AQF).

In 2017, across all awards and providers, engineering had 115,231 enrolled students, about 7.6% of the total national higher education enrolments. International students constitute 43% of these engineering enrolments. Domestic enrolments in engineering declined from 68,026 in 2015 to 66,458 in 2017.

There were approximately 4,200 full-time equivalent academic staff (18% women) in the university engineering faculties and schools. Approximately 1,700 of these staff were in 'research-only' positions. The total 'engineering teaching load' in 2017 was 75,284 equivalent full-time students, taking into account students' study patterns.

Coursework Programs

Graduate numbers from each of the principal award categories, for 2015, 2016 and 2017, were:

award level	2015		2016		2017	
	Dom	Int	Dom	Int	Dom	Int
Masters	1,543	3,205	1,567	3,864	1,590	4,765
Other PG	848	160	643	137	458	134
Bach (4-yr)	7,219	3,239	7,192	4,010	7,741	4,301
Bach (3-yr)	524	251	544	303		
Ass Deg/AD	570	129	543	127	493	165
TOTALS	**10,704**	**6,984**	**10,489**	**8,441**	**10,282**	**9,365**

Commencing student numbers for the same years were:

award level	2015		2016		2017	
	Dom	Int	Dom	Int	Dom	Int
Masters	2,091	5,473	2,023	6,764	1,931	8,101
Other PG	844	177	682	153	599	169
Bachelors	14,896	6,510	14,390	7,094	13,672	7,482
Ass Deg/AD	1,178	196	1,136	236	1,031	244
TOTALS	**19,009**	**12,356**	**18,231**	**14,247**	**17,233**	**15,996**

The commencing enrolments data show:

- **continuing declines in domestic** commencing enrolments for all award levels' In 2017, engineering took only 4.8% of national commencing bachelors degree students, the lowest proportion on record ;
- **continuing growth in international** enrolments into masters degrees, particularly into new, accredited, 'entry-to-practice' programs (see below), as well as into bachelors degrees .

The participation of women in engineering coursework programs has not increased substantially over the past three years. Nevertheless, the 16.8% figure for 2017 domestic commencements into bachelors degrees is the highest on record:

	2015		2016		2017	
	Dom	Int	Dom	Int	Dom	Int
Postgrad	19.2%	20.5%	16.9%	21.0%	18.0%	20.3%
Bachelors	15.3%	21.0%	15.7%	19.2%	16.8%	20.2%

Women constitute relatively higher proportions of the graduate cohorts, due to their superior average academic performance, and lower attrition rates (see below).

The numbers of Indigenous students and graduates in engineering is very small: 50 Indigenous students graduated with a higher education qualification in 2017. There were 462 indigenous students enrolled engineering in 2017, promising more graduations in future years.

The **basis of admission of domestic students** into Bachelor degrees has diversified. Since 2011, the proportion entering on the basis of their schooling has decreased, while more have prior higher education studies, such as a diploma (AQF level 5). Such admissions profiles differ widely between institutions, reflecting their location and history.

Basis of Admission	2011	2015	2016
secondary school	64.9%	58.3%	57.9%
VET/TAFE	7.4%	6.5%	7.3%
higher education	18.5%	22.5%	23.1%
other	9.0%	12.7%	11.7%

The 2016 data for **annual retention rates** of domestic students in Bachelors degree programs include students transferring to another institution. For engineering, the following Table shows that more commencing students do not progress to the following study year (or graduate), than those from later study years. The effective annual attrition rate for full-time students is about 6%.

stage/group	domestic, male		domestic, females	
	full-time	part-time	full-time	part-time
commencing	92.5%	73.7%	95.8%	76.2%
all students	93.2%	76.4%	96.3%	77.3%

Overall, about 75% of students commencing a bachelor degree in engineering will graduate from it, or will graduate in another field of education. Approximately, 8% graduate

[1] http://aced.edu.au/downloads/ACED%20Factsheet%20-%20summary%20stats.pdf

[2] The data are for the field of education *Engineering and Related Technologies*. This includes civil aviation and surveying, areas that have small student enrolments. Student and staffing data are from the Commonwealth Department of Education & Training.

from a different institution than that at which they first enrolled. Most full-time students graduate within two years of the nominal program duration. Others may take up to a decade, including part-time study and study breaks.

Graduate employment rates and starting salaries for engineers are consistently higher than those of graduates of other STEM fields. Nearly 80% of the 2016-17 bachelor degree graduates gained full-time employment and ranked 4th on median starting salary at $64,000, with women earning $1,500 more than men. Three years after graduating, 93.9% of the 2015 cohort was in full-time employment with median salary $77,000, some 10% higher than for bachelors graduates from all fields of education.

The coursework awards are matched to the requirements of the engineering profession. Entry-to-practice qualifications have external accreditation by the professional body, *Engineers Australia.* The accreditation standards are set by the practicing profession, and are benchmarked to international agreements[3].

Since 1980, the standard accredited *professional engineering* qualification has been the 4-year degree, and since 2014 has been an AQF level 8, Bachelor (Honours) degree. This remains the principal engineering qualification taken by domestic students.

Most providers also offer entry-to-practice masters degrees that are accredited at the level of professional engineer. Two universities have ceased offering BE(Hons) degrees: most of their domestic students commence university study by taking the engineering major in a 3-year BSc degree, before commencing their masters degree. Universities also run advanced masters coursework degrees for qualified engineers. The masters degree numbers and other data in this report combine figures from both degree types.

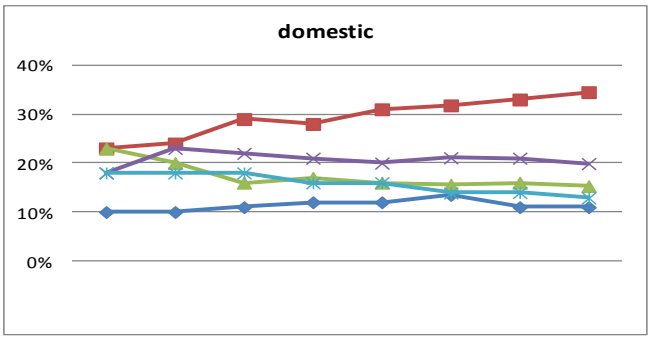
Three-year Bachelors degrees and 2-year Associate Degrees and Advanced Diplomas in engineering may be accredited as qualification levels for the occupations of *engineering technologist* and *engineering associate*, respectively.

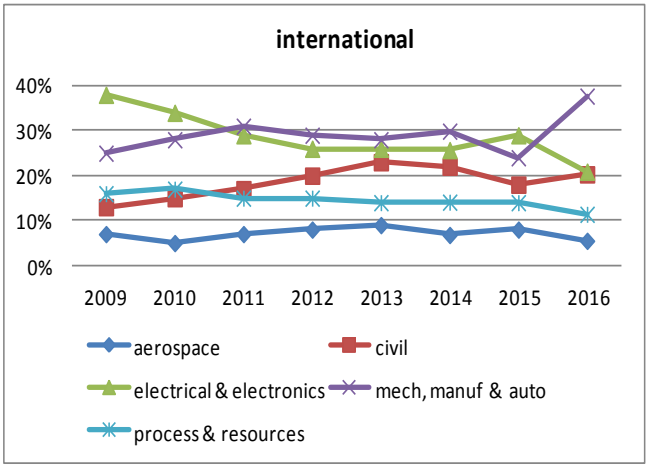
The full-time employment rate for coursework Masters degree graduates completing in 2016-17 was 85%. By 2018, 94.5% of the 2015 graduates were in full-time employment with median salary $100,000. These figures include graduates who would have been in engineering roles before enrolling in their masters degree.

Engineering has distinct areas of practice that are reflected by strongly differentiated degree programs. New branches, such as mechatronics and biomedical engineering, are created from time to time, reflecting technological change, and industrial, economic and social needs.

Amongst five major branches, the following tables for **undergraduate** awards show that civil engineering has become the leading and growing branch for domestic graduations, while mechanical and related areas of engineering are most often taken by international students.

[3] The Washington, Sydney and Dublin Accords, of the International Engineering Alliance. http://www.ieagreements.org/





Higher Degrees by Research (HDR)

The engineering faculties and schools are steadily increasing their production of HDR graduates, primarily from increasing numbers of international students. Engineering represents 15.3% of the national total of HDR graduations.

award	2015		2016		2017	
	Dom	Int	Dom	Int	Dom	Int
PhD	603	656	603	755	636	780
Master	108	121	116	128	105	121
TOTALS	**711**	**777**	**719**	**883**	**741**	**901**

In 2017, women comprised 24.6% and 27.3% of the domestic and international HDR completions respectively. This is encouraging with respect to increasing the numbers of women in the academic and research engineering workforce.

HDR graduates from 2015 increased their full-time employment rates from 72.1% (in 2015) to 89% in 2018, at which time their median salary was $95,500.

These previous Factsheet contains data on research income and outcomes. These will be updated in a future ACED paper when suitable national data is published.

Australian Council of Engineering Deans Inc.

The membership of ACED is a senior academic representative of each of the 35 Australian universities that provide professional engineering degrees accredited by Engineers Australia. ACED's mission is to promote and advance engineering education, research and scholarship on behalf of the Australian higher education system.

More data and trends on engineering enrolments and staffing are on the ACED website: www.aced.edu.au

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