ACED AUSTRALIAN COUNCIL OF ENGINEERING DEANS

Australian Engineering Education: Coursework Degrees — May 2019

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

Introduction

In 2017 ACED published a summary of national data on engineering education and research up to 2015[1]. This Update provides the most recent data and trends for Coursework Degrees. A separate Factsheet covers research degrees and research performance.

System Size

Currently 35 public universities (36 ACED members), 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 HEd qualifications (including research degrees) and providers, Engineering had 115,420 enrolled students. This is about 7.6% of the total enrolments. International students constituted 43% of the 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 their study patterns.

In 2019 the ACED providers are offering more than 600 coursework programs at four award levels.

award and type	number of ACED providers	number of programs
Master (advanced/technical)	25	160
Master (engineering managem't)	22	34
***Master (entry-to-practice)**	21	121
***Bach of Engineering (Hons)**	33	269
***Bachelor of Technology**	9	30
***Associate Degree/Adv Diploma**	5	25

*accredited programs (see text)

In this table, 'programs' are awards with distinct titles, such as 'Bachelor of Engineering (Honours) in Civil Engineering'. The 'engineering management' masters awards are predominantly in engineering project management. The 'advanced/technical' masters typically carry the award of Master of Engineering Science. 'Entry-to-practice masters awards are usually titled Master of Engineering.

Amongst the major branches of engineering, Mechanical Engineering has the largest number of programs, followed by Civil Engineering, Electrical & Electronic Engineering and Chemical Engineering. New branches, such as environmental, mechatronics and biomedical engineering, have emerged, reflecting technological change, and industrial, economic and social needs.

Graduations and Commencing Enrolments

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 4.9% 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.

Participation of Women

Participation of women in Engineering coursework degrees has not increased substantially over the past three years, but the 16.9% figure for 2017 domestic commencements into bachelors degrees is the **highest** on record:

	2015		2016		2017	
	Dom	Int	Dom	Int	Dom	Int
Postgrad	18.6%	20.5%	17.4%	21.0%	18.0%	20.1%
Bachelors	15.2%	21.0%	15.7%	19.1%	16.9%	20.3%

[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. In this document 'Engineering' refers to this whole field of education. Student and staffing data are from the Commonwealth Department of Education & Training.

Women constitute relatively higher proportions of the graduating 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 in Engineering in 2017, foreshadowing higher numbers of future graduates.

External Accreditation by Engineers Australia

Coursework programs are matched to the requirements of the engineering profession. 'Entry-to-practice' qualifications have external accreditation by the professional body, *Engineers Australia (EA)*[3]. The accreditation standards are set by the practicing profession, and are benchmarked to those of international agreements[4].

Most Australian engineering students enrol directly into an accredited 4-year Bachelor Honours degree (AQF Level 8) that meets the educational requirements for the *professional engineer* occupation. Most providers offer 'dual', 'double' and 'combined' degree options to increase their students' options.

Most providers also offer 'entry-to-practice' masters degrees that are accredited to this level. Two universities have ceased offering BEng(Hons) degrees: most of their domestic students take the engineering major in a 3-year BSc degree before commencing their masters.

Three-year bachelors degrees and 2-year Associate Degrees and Advanced Diplomas in engineering may be accredited as entry qualifications for the occupations of *engineering technologist* and *engineering associate*, respectively. These qualifications are also frequently used as pathways into professional engineering programs.

Universities also run advanced technical postgraduate programs, and postgraduate engineering management degrees for qualified engineers. These categories are not accredited by EA.

Bachelors Degrees

The **basis of admission of domestic students** into bachelor degrees is diverse. The proportion entering Engineering on the basis of their schooling has decreased over time. In 2017 more than 70% of this sub-cohort had an ATAR greater than 80.00. Admissions profiles differ widely between institutions, reflecting their location and history.

Basis of Admission	2011	2014	2017
secondary school (ATAR)	64.9%	58.3%	61.6%
VET/TAFE	7.4%	6.5%	..6.5%
higher education	18.5%	22.5%	21.7%
other	9.0%	12.7%	10.2%

Published **annual retention rates** of commencing student cohorts now allow for students transferring to another institution. For domestic students commencing Engineering, about 90% re-enrol the following year, including about 4% transferring elsewhere. This is a higher retention rate than the average for all fields of education. International students in Engineering are retained at around 92% with very low transfer rate. Part-time students have lower retention rates than their full-time peers.

The effective **annual attrition rate** for full-time students in Engineering is about 6%.

The **graduation rate** for students commencing bachelor degrees in Engineering is approximately 75%, including transferees to another field of education.

Most Engineering students who study full-time will graduate within two years of the nominal program duration. Others may take up to a decade to graduate, including part-time study and study breaks.

Graduate employment rates and starting salaries for Engineering are consistently higher than those of graduates of other fields. The 2018 national survey data reported that for recent bachelor degree graduates in Engineering:

- more than 83% of those who were available for full-time work were in full-time employment. The comparable figure for all bachelors graduates is 73%;
- the median starting salary of $65,000 for both women and men was third on the rankings of median salary, after medicine and dentistry. This Engineering median compares with $63,000 and $60,000 for men and women graduates of all fields, respectively.

Furthermore, three years after graduating, 93.9% of the 2015 Engineering bachelors cohort were in full-time employment with median salary $77,000, some 10% higher than for bachelors graduates from all fields of education.

Postgraduate Coursework Degrees

Graduation from a postgraduate award in Engineering leads to higher rates of full-time employment and salary than for bachelors graduates. For masters graduates completing in 2016-17 this rate was 85%. Their median salaries are also relatively higher, at $90,000 for men, and $79,100 for women, close to the median for all fields. By 2018, 94.5% of the 2015 graduates were in full-time employment with median salary $100,000. Note that these figures include graduates who would have been in engineering roles before enrolling in their postgraduate degree, and do not differentiate between the masters' degree types.

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 Contact: Prof Doug Hargreaves AM, ACED Executive Officer d.hargreaves@qut.edu.au

[3] The Engineers Australia accreditation website is at https://www.engineersaustralia.org.au/About-Us/Accreditation

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