



Women in Engineering Standing Technical Committee
of the
World Federation of Engineering Organizations
Committee Member Progress Report

This report is a compilation of WIE Committee member report on addressing the goals and objectives for each of the WIE Committee's four themes as submitted from the following countries.

S/N	ORGANISATION/COUNTRY	SUBMITTED BY	DATE SUBMITTED
1	Institution of Civil Engineers (ICE), UK	Dawn Bonfield	29th August, 2023
2	Federation Of Myanmar Engineering Societies	Dr. Khin Sandar Tun	14 th September, 2023
3	Chinese Institute of Engineers, Taiwan	Wen-Jean Hsueh	15 th September, 2023
4	Engineers Canada	Jeanette M. Southwood	2 nd October, 2023



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This report is submitted by each WiE Committee Member to report on progress in addressing the goals and objectives for each of the WiE Committee's three themes

Committee Member Name	Dawn Bonfield
Organization or Country	Institution of Civil Engineers (ICE), UK
Date Submitted	29 August 2023
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Summary

This report is a short summary of some of the work that has been ongoing during 2023 in the UK to address the need to increase gender (and other) diversity in engineering. It comprises mostly of a review of statistics which have been recently compiled in the UK as evidence of the extent of the problem and the need for further work. One of the major achievements of 2023 is the agreement by the Institution of Civil Engineers to allow a member network for women engineers, which is something that has been resisted until now for the whole of the Institutions history.

Accomplishments

Please list accomplishments in addressing the goals and objectives of each theme.

Please see the WFEO WiE Themes document or the WiE website for the list of goals and objectives for each theme.

Theme 1: Engineering Workforce Capacity building- to increase diversity and inclusivity in the future skills pipeline

Many activities take place during the year, delivered by a very large number of engineers and company representatives in the UK, to increase gender diversity within the profession, in addition to a number of activities run by the Institution of Civil Engineers, and their STEM Ambassador programme. <https://www.ice.org.uk/what-is-civil-engineering/education-resources>

My own personal outreach activities relate to work to establish a Girl Guide badge for engineering, of which there is not one in the UK, as well as a number of career stands at large events dedicated to encouraging young girls to consider careers in engineering. The one shown below took place at the Royal International Air Tattoo in July 2023.

I also continue to be an advocate and key participant for events taking part during International Women in Engineering Day (INWED), which I established in 2014, and this year saw the tenth year of activities, which get bigger year on year.



Theme 2: Engineering Workforce Capacity building- to encourage female engineering retention and leadership

Again, a large number of events take place during the year, and of notable importance this year is the agreement from ICE for the formation of a Women's Member Network, which we have been calling for at least 8 years, and has not had agreement before now. A survey of members took place and the vast majority voted for it. This is now in the process of becoming established.

Theme 3: Collection of Engineering Strategic Indicators

A number of UK indicators and statistics are given in the Resources section, related to gender and other types of diversity within UK engineering, and these can be deleted if too large for this report.

Women Engineers	Percentage of Total (%)
Professionally Registered	6%

Working in Engineering Establishments (March 2022 data)*:

- Women make up 16.5% of all engineers, compared to 10.5% reported in 2010, representing a 6% increase in the proportion of women in the engineering workforce.
- The actual number of women working in engineering roles increased from 562,000 in 2010 to 936,000 in 2021
- There was an overall expansion of the engineering workforce from 5.3 million in 2010 to 5.6 million in 2021.
- The increase in the number of women in engineering roles continued to rise even when the total number of people working in engineering fell in 2020 and 2021 during the Covid-19 pandemic.

*<https://www.wes.org.uk/about/what-we-do/resources/statistics/>

Undergraduates: Published in March 2023, the report '[Engineering in higher education](#)' explores the number, characteristics and outcomes of engineering and technology students in higher education (HE) in the UK. Based on the 2020/21 data from the Higher Education Statistics Agency (HESA), the report also compares the data for engineering and technology students alongside that of students studying on HE courses overall.

The report also breaks down the numbers and characteristics of students within 7 principal specialisms of engineering (which are available as standalone inserts):

Course	% of Female Undergraduates	% of Female Postgraduates
Overall (for all disciplines)	18.5%	26.2%
Mechanical Engineering	11.6%	13.8%

Electrical and Electronic	13.5%	25.9%
General	20.6%	25.9%
Civil	21.6%	32%
Aeronautical and Aerospace	13.9%	17.2%
Chemical, Processing & Energy	29.1%	29.1%
Production & Manufacturing	11.4%	16.6%

This data will be used for global benchmarking, so please include references for your data.
Engineering Council <https://www.engineeringuk.com/research-policy/educational-pathways-into-engineering/higher-education/>

In addition to the statistics listed above, please include any other statistics you feel are appropriate and any relevant notes to your statistics in the body of this section. Likewise, include any historical data or relevant statistical reports.

2.4 Theme 4: Working in Partnership to address the Sustainable Development Goals, with a particular emphasis on Goal 5, Gender Equality, and its relationship to the other Goals.

- Within UK Higher Education I am involved in a project coordinated by the Royal Academy of Engineering to embed the Sustainable Development Goals into Higher Education, which includes Goal 5.
- I also contributed to the UNESCO Engineering Report on Sustainable Development in Engineering in 2021, by writing two chapters on Women in Engineering, and Diversity in Engineering, and have continued to publicise this report and its recommendations.
- In November 2022 I attended the COP27 meeting in Egypt, and represented WFEO and WIE at the Women and Gender Constituency (WGC) meetings.
- In July 2023 I attended the Commonwealth High Level meeting on Gender, Climate Change and Health, contributing to built environment policy recommendations that could be added to the final ten recommendations taken to the high level meeting.



2.5 Engineering & Technological Innovations (Special recognition will be given to members with Innovative Reports.

Much work is done in the UK, by various organisations, to address workplace culture, and a report and survey published in 2023 to look at the inclusive culture of the engineering workplace draws the following findings:



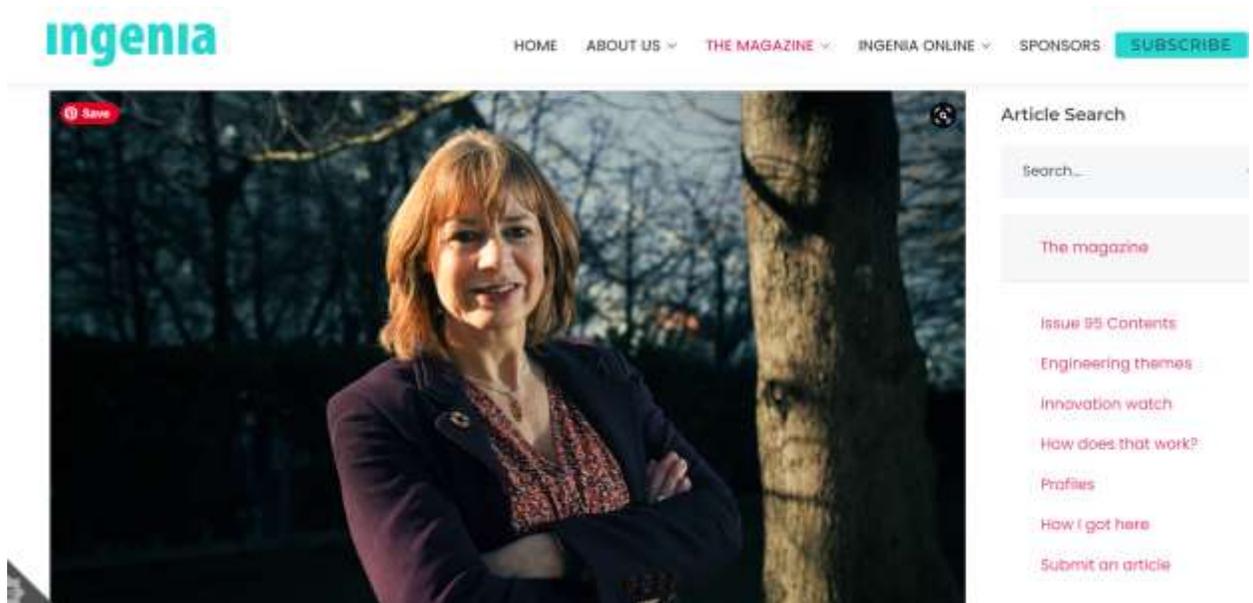
1. Three-quarters of engineers responded that inclusion in the profession has improved since 2017, with engineers who identified as transgender seeing the most improvements. The effect of company policy in creating inclusive cultures was most felt in large companies, and less so in medium and small companies.
2. Engineers tend to describe the culture of the profession in terms of productivity and creativity with a focus on words like ‘solutions orientated’, ‘innovative’ and ‘collaborative’, all of which describe a culture that allows inclusivity to flourish.
3. Despite this, some see the profession as ‘slow to change’, ‘siloes’ and ‘hierarchical’, with women more likely to use these negative descriptors than men.
4. The behaviours valued within the profession tend to align with the descriptors of the culture of engineering, backing up the image of a culture concerned with production, through problemsolving, collaboration, and delivering to time and budget.
5. However, while ‘creativity’ was a descriptor of engineering, it was reportedly less valued as a behaviour within the profession along with ‘speaking up’ and ‘taking a stand’, which may impact, or be impacted by, the existent culture of inclusion in the profession.
6. The engineering community generally feels that the culture is inclusive, however, those who are underrepresented within the profession are less likely to view the culture in this way.
7. Masculine and macho culture persist in the profession in the form of offensive ‘banter’ and ‘mickey-taking’, which engineers are expected to be resilient to. However, there is a split, with this culture more present in ‘on-site’ locations, less so in an office environment.
8. Underrepresented groups continue to report experiences of bullying, harassment and other forms of discrimination in the workplace. The rates are higher for those from multiple underrepresented backgrounds.
9. Engineers reported having a good work–life balance, that they could be authentic at work, and could be open with colleagues about their lives. However, many engineers, particularly those from underrepresented groups, responded indicating they feel isolated.

<https://raeng.org.uk/media/jurcggcm/inclusive-cultures-in-engineering-2023.pdf>

Other Accomplishments

In March 2023 I took part in the World Engineering Day conference in Madrid and spoke at the Women in Engineering session about Gender and Sustainable cities.

I was also featured in a Royal Academy of Engineering journal article, here, where I speak about WFEO. <https://www.ingenia.org.uk/ingenia/issue-95/aiming-for-inclusive-outcomes>



In September 2022 I became a Fellow of the Royal Academy of Engineering
<https://raeng.org.uk/about-us/fellowship/new-fellows-2022/dawn-bonfield-mbe-freng>



I attended COP27 in Egypt in November 2022 on behalf of WFEO Women in Engineering.



3.

Announcements

Please list any announcements of upcoming programs, news from your organization, or other information valuable to the WFEO WiE Committee.

I would personally love to continue as a member of the WFEO Women in Engineering Committee, and will take over as President of the Commonwealth Engineers' Council in October 2023, which I hope will bring some additional strength to our work to encourage gender diversity in engineering.

Resources

A full set of current statistics related to diversity in engineering in UK can be found below, supplied directly by the Royal Academy of Engineering:

GCSEs (UK qualification at age 16)

- Around a third of the cohort take the triple science route (individual GCSEs in Biology, Chemistry and Physics). There is gender parity across the subjects.
- Computer science has low levels of participation and has remained fairly constant for the past five years at around 70-75,000 entries. Female representation is poor, at around 20%.
- Design and Technology entries continue to decline (since 2006). Female representation is at around 30%.

A levels (UK qualification at age 18)

- Mathematics is the most popular A level with around 85-90,000 entries each year.
- Physics entries have remained fairly constant at around 35-40,000 entries for the past ten years.
- Participation in Computer Science has been steadily climbing from a very low base at its introduction in 2014. Current entries are around 15,000.
- Girls are under-represented in the key academic STEM subjects that lead to engineering. In 2021:
 - A level Physics~ 23% Female (9,200)
 - A level Computing ~ 15% Female (2,400)
 - A level Mathematics ~ 40% Female (36,000)
- Black and Minority Ethnic groups are generally well represented in STEM subjects that lead to engineering, at around 30-40% of the cohort in 2021.
- Students from lower socio-economic groups are not very well represented, typically at around 5% of STEM A level cohorts in 2021 (compared with around 22% of the total cohort eligible).

Apprenticeships

- Engineering and manufacturing apprenticeship starts have been falling for the past five years (currently ~ 50,000). Construction apprenticeships starts have remained flat (currently 26,000) and ICT apprenticeships have been fluctuating over the same period (currently 23,000).
- Level 2 apprenticeships are slowly in decline across engineering and related apprenticeships.
- Level 3 apprenticeships are dominant in Eng and Manufacturing. Higher apprenticeships are roughly equal to advance apprenticeships in ICT.
- Women are under-represented in engineering and related apprenticeships. In 2021:
 - Engineering and Manufacturing Technologies ~ 10%
 - Construction and Built Environment ~ 7%
 - Information and Communication Technologies ~ 30%
- Black and Minority Ethnic Groups are under-represented in engineering and related apprenticeships:
 - Engineering and Manufacturing Technologies ~ 10%
 - Construction and Built Environment ~ 6%
 - Information and Communication Technologies ~ 24%

Higher Education

- There has been a small increase in the number of engineering first degree students over the past ten years, although this largely reflects demographic increases to HE more generally.
- Women are under-represented in undergraduate engineering higher education. In 2021, around 7,100 first degree entrants students were women, representing around 18% of the entrants.
- Black and Minority Ethnic Groups are well represented in undergraduate engineering higher education, at around 34% of an annual cohort in 2021.
- Women are under-represented in postgraduate engineering higher education, but with increased proportions: Around ~26% in Postgraduate Taught, and 28% in Postgraduate Research.

Workforce

- There were around 5.7 million people working in engineering roles in the UK in 2021 (as defined by the Engineering Footprint). A further 3.1 million people work in non-engineering roles across engineering sectors.
- Women are under-represented in UK engineering, currently at 16.5% of the engineering workforce in 2020.
- Black and Minority Ethnic Groups are under-represented in UK engineering, at around 11.4% of the engineering workforce in 2020 (against the proportion in the total working population of around 30% - based on 2021 census).

Key findings

GCSEs (England, Wales and Northern Ireland)

- Typically, the annual cohort taking GCSE exams is around 630,000 (depending on demographic changes). Around two thirds of the annual GCSE cohort takes the double science GCSE qualification ~400,000 entries. The remaining third of the cohort takes the triple science (individual biology, chemistry, physics) route.
- There was an increase in entries in triple science GCSE since 2017 following a change in qualifications, but it has since remained relatively flat. There is gender parity across the subjects.
- Since the re-introduction of computer science as a GCSE in 2014, there has been a slow and steady increase in entries, although this appears to have plateaued at around 75,000. However, female students consistently represent around only 20% of entries (~16k in 2022) to computer science GCSE.
- (Note, with a typical annual cohort of ~ 600k, just 12% of students undertake a computing-based GCSE at age 16; although some non-GCSE vocational IT qualifications are also taken – albeit again at relatively low numbers of entries).
- There is an ongoing chronic decline in Design and Technology entries (since 2006), with greater numbers of female students dropping the subject. The decline is exacerbated by significant teacher shortages, and schools dropping the subject all together. This matters as D&T is the one, design-based, creative-technical subject where students have practical, hands-on learning.

A levels (England, Wales and Northern Ireland)

- Mathematics is now the most popular A level with around 90,000 student entries each year and has good (though not equal) representation of female students (at around 40%).
 - In England, just under half of the maths A level cohort are White British, with around a third of students from minority ethnic groups. The proportion of students from Minority Ethnic groups has been growing over the past 5 years.
 - Around 20% of students have unknown ethnicity – this is most likely independent school students, as independent schools are not required to submit pupil characteristics data.
- Further mathematics has much smaller entries at around 15,000, with around 25% female students. Ethnicity data is similar to mathematics A level, but with higher proportion of unknown ethnicity.
- There is a significant differential in entries and gender representation across the sciences:
 - Biology is the most popular (~65,000 entries) with ~65% female.
 - followed by chemistry (~55,000 entries) with ~55% female.
 - then physics (~38,000 entries) with ~23% female.
- It is important to note that the ~23% of female students studying physics at A level equates to around 8,500 individuals. Given that the number of female students in any typical annual cohort is around 300,000, this means that around just 2-3% of female students progress to study physics at A level.

- Across the sciences, there is similar distribution of ethnic groups:
 - Biology (White British ~ 48%, Minority Ethnic ~ 35%, Unknown ~ 17%)
 - Chemistry (White British ~ 42%, Minority Ethnic ~ 40%, Unknown ~ 20%)
 - Physics (White British ~ 50%, Minority Ethnic ~ 30%, Unknown ~ 20%)
- Across the sciences, the proportion of students from Minority Ethnic groups has been steadily increasing over the past 5 years.
- Entries to A level computing have been increasing since the re-launch of the subject in 2014. However, the number of entries has only recently broken 15,000 in 2022.
 - Of these, just 2,300 female students were entered for the subject, representing 15% of the cohort.
 - The proportion of White British students has dropped substantially over the past 5 years, from 64% in 2018 to 51% in 2022. This is largely due to significant increase in entries from Asian students, which has doubled from ~1000 to ~2000 over the period.
- Design and Technology A level has been continuously falling, albeit at a slow rate. Current entries are around ~10k. Female representation is around 30%. The proportion of students from Minority Ethnic groups is around 20%, White British ~60% with a further 20% unknown ethnicity.
- Representation of students from lower socio-economic backgrounds, as measured by eligibility for Free School Meals, is consistently around 5-6% for all STEM subjects. This is against the typical proportion of the cohort of students eligible for Free School Meals of around 22%.

Apprenticeships (England only)

- Apprenticeship starts in Engineering and Manufacturing Technologies are currently at around 50,000.
 - The number of starts have been falling since 2016 due to various factors.
 - Female representation is at around 10%.
 - Ethnic minority representation is also at 10%, with ethnic minorities representing around 30% of the current working population.
- Apprenticeship starts in Construction and Built Environment are around 25,000.
 - female apprenticeship starts are around 7%.
 - Ethnic minority representation is at 6%.
- Apprenticeship starts in ICT are around 23,000.
 - Female representation is around 30%
 - ethnic minority representation is at 24%.
- Science and mathematics apprenticeships are essentially non-existent, typically recording fewer than 300 starts each year.

- There are decreasing numbers of Level 2 (GCSE equivalent) apprenticeship starts across engineering and related subject areas:
 - They have all but disappeared from the ICT subject areas.
 - Although they still represent about 50% of starts in Construction.
- Level 3 (A level equivalent) is the dominant skill level for engineering and for ICT apprenticeships.
- Higher apprenticeship starts (levels 4+) are still relatively small for engineering and manufacturing at 3,500-4,000 each year, compared with ~24,000 undergraduate degree starts each year.
 - However, higher apprenticeships are increasingly popular in ICT.
- The number of 16-18 age group apprentices has been shrinking across engineering-related subject areas over recent years.
 - The 19-24 and 25+ age groups dominate, representing around two thirds of apprentice starts in Engineering and Manufacturing Technologies
 - 19-24 and 25+ groups represent 80% of ICT apprentices
 - This suggests that apprenticeships are not being used to bring young people into the sector, but rather to upskill existing workers.

Higher Education

- In 2021, there were around 69,000 entrants (all domiciles) to engineering and technology higher education programmes:
 - 38,600 First degree
 - 3,850 other undergraduate
 - 22,700 postgraduate taught
 - 4725 postgraduate research
- 18% of engineering and technology first degree students were women (7,135) compared to 57% of women across all HE undergraduates (across all domiciles).
- For undergraduate first degrees, engineering and technology has a higher proportion of UK domiciled Ethnic Minority students (33.9%) compared with higher education overall (27.9%)
 - This is largely due to Asian students, who are disproportionately over-represented (at 18%) compared to across HE overall (12.7%)
 - Other groups remain largely representative against the total HE cohort.

Workforce

- There were around 5.6 million people working in engineering roles in 2021. Engineering roles are defined by the 'engineering footprint' an agreed set of occupations identified by the Royal Academy of Engineering, Engineering Council and EngineeringUK.
- 16.5% of the engineering workforce are women. However, there are differences across the economy:

- Women represent 12.5% of the engineering workforce within engineering sectors (e.g. engineering roles in manufacturing, construction etc.)
- Women represent 24.5% of the engineering workforce outside engineering (e.g. engineering roles in finance, healthcare, retail, education etc.).
- There are also differences in the type of engineering occupations:
 - Women represent 15% of the workforce undertaking '*core*' engineering occupations such as civil engineers, IT engineers etc.
 - Women represent 19% of the workforce undertaking '*related*' engineering occupations such as web design and development, planning and built environment roles etc.
 - Women are less well represented in technician roles,
- Minority Ethnic groups represent around 10% of the engineering workforce, against approximately 30% in the working population.

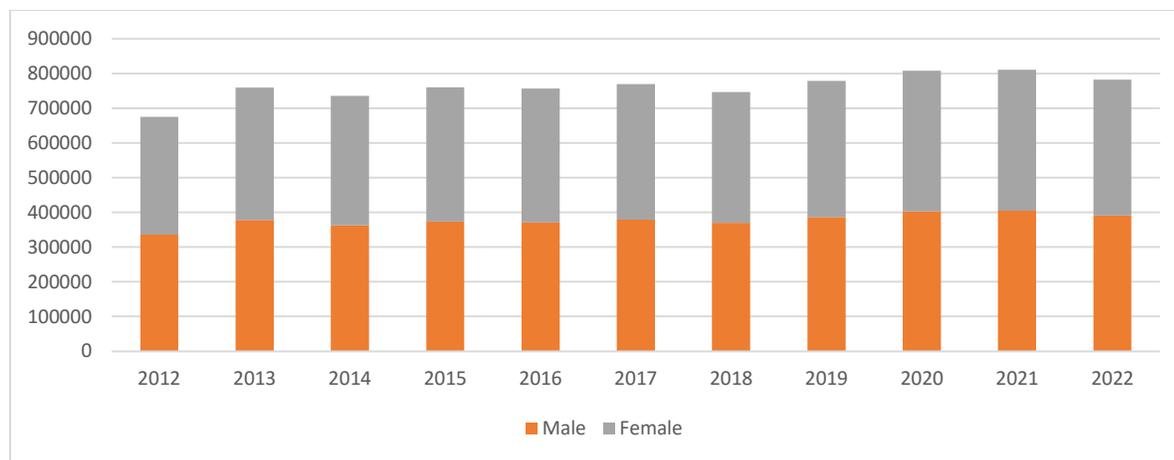
TABLES

STEM GCSEs

The following graphs show trends in STEM GCSEs. The data cover exam entries across England, Wales and Northern Ireland. Scotland uses a different qualification system and is not included.

Mathematics GCSE is a useful indicator for the size of the student cohort in any one year, although it should also be noted that these data will also include students re-sitting GCSE mathematics in post-16 education and adult learners etc.

Figure 1: Mathematics GCSE entries, 2012-2022, all UK¹



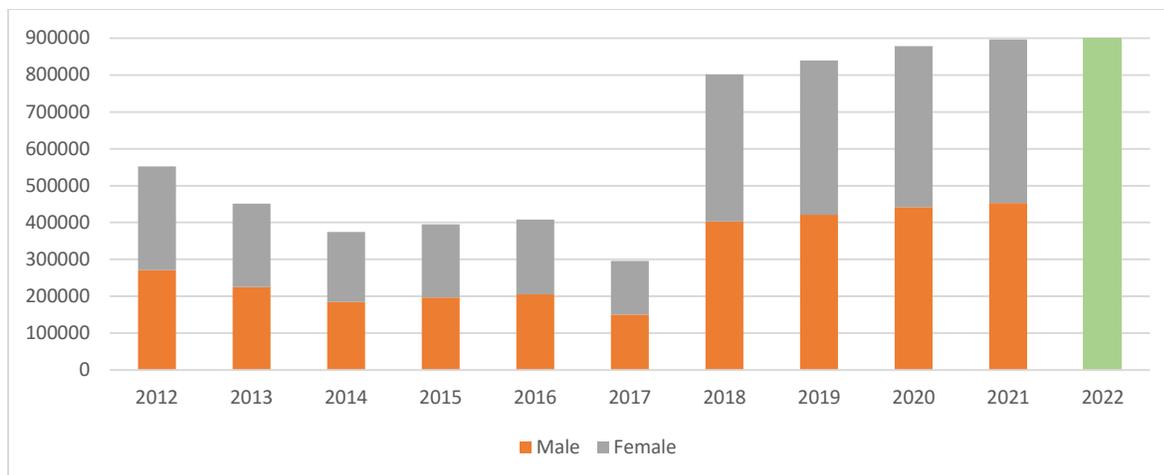
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	3362	3784	3631	3736	3709	3797	3700	3870	4029	4053	7827
	53	14	68	03	14	24	68	12	01	99	
Female	3395	3817	3732	3876	3863	3903	3771	3918	4060	4057	83
	36	56	35	27	82	10	01	46	50	36	
% Female	50%	50%	51%	51%	51%	51%	50%	50%	50%	50%	

For the ‘general’ Science GCSE in figure 2, the science double award was introduced in 2018. The double award is in effect two GCSEs, and so entries double from 2017 to 2018 and the data are significantly higher than mathematics GCSE. A simple rule of thumb from 2018 (although not perfectly accurate) is to divide by two, to get a better understanding of individual student entries for this GCSE. Also please note that for all other 2022 data, the gender split is not available. As such the total cohort data is provided.

Figure 2: Science (2014-17) and Science double award (2018-22) GCSE entries, all UK²

¹ www.jcq.org.uk

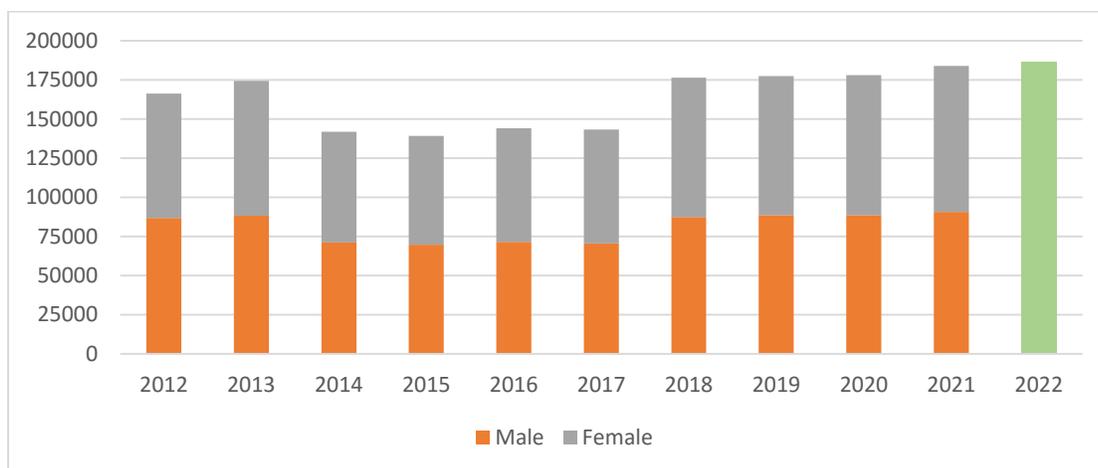
² www.jcq.org.uk



Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	2707 47	2252 22	1847 14	1971 25	2055 89	1503 32	4032 02	4213 26	4420 10	4532 36	9040 12
Female	2817 57	2262 11	1902 47	1983 59	2029 80	1455 57	3978 78	4179 32	4362 68	4429 02	
% Female	51%	50%	51%	50%	50%	49%	50%	50%	50%	49%	

Note change of scale for the following graphs.

Figure 3: Biology GCSE entries 2012-2022, all UK³

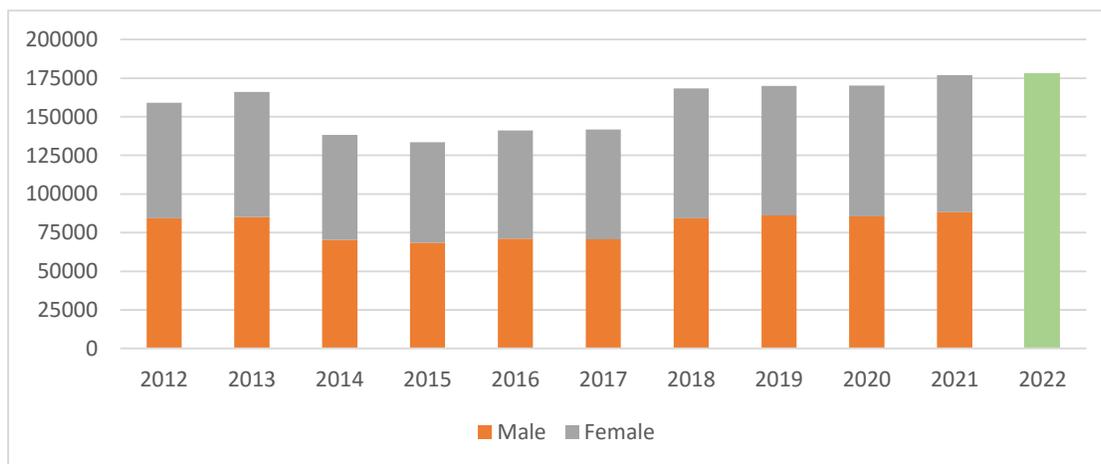


Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	8664 7	8806 3	7098 8	6965 7	7157 6	7049 7	8731 1	8856 8	8848 9	9066 4	18644 5
Female	7952 1	8636 5	7091 2	6954 2	7257 2	7284 3	8901 4	8888 6	8959 9	9334 4	

³ www.icq.org.uk

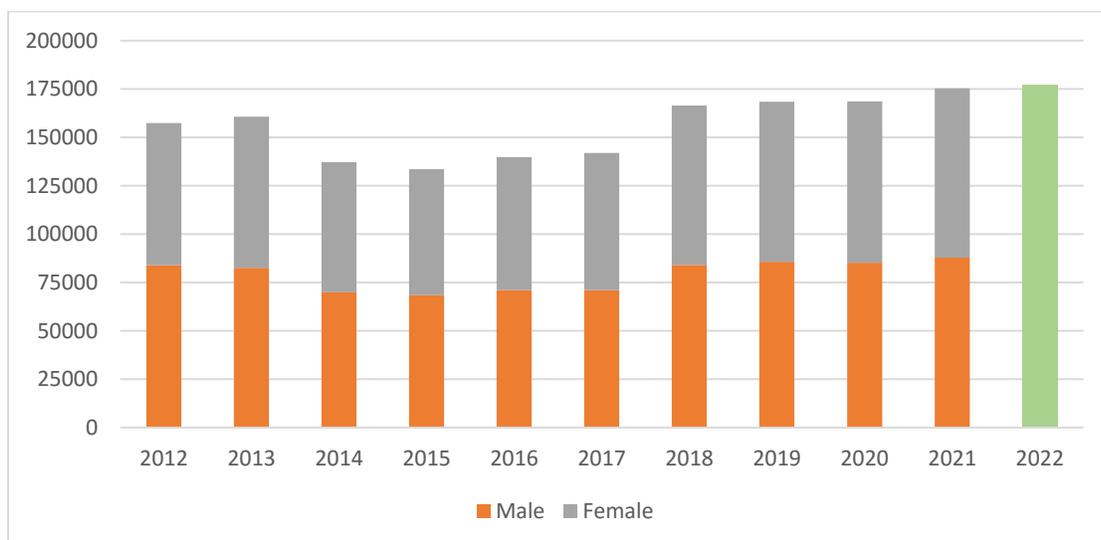
% Female	48%	50%	50%	50%	50%	51%	50%	50%	50%	50%	51%
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Figure 4: Chemistry GCSE entries 2012-2022, all UK⁴



Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	8437	8508	7030	6839	7111	7072	8429	8615	8558	8815	17792
Female	7475	8100	6793	6522	7012	7114	8398	8388	8467	8879	5
% Female	47%	49%	49%	49%	50%	50%	50%	49%	50%	50%	

Figure 5: Physics GCSE entries 2012-2022, all UK⁵

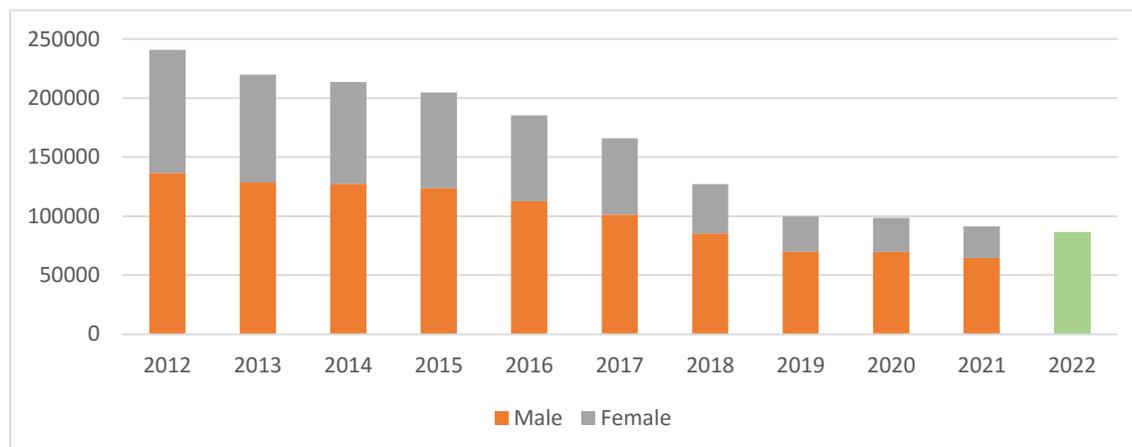


⁴ www.jcq.org.uk

⁵ www.jcq.org.uk

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	83976	82580	69933	68389	71006	71003	84106	85784	85229	87857	177137
Female	73401	78155	67294	65221	68799	70974	82356	82546	83334	87514	
% Female	47%	49%	49%	49%	49%	50%	49%	49%	49%	50%	

Figure 6: Design and Technology GCSE entries 2012-2022, all UK⁶

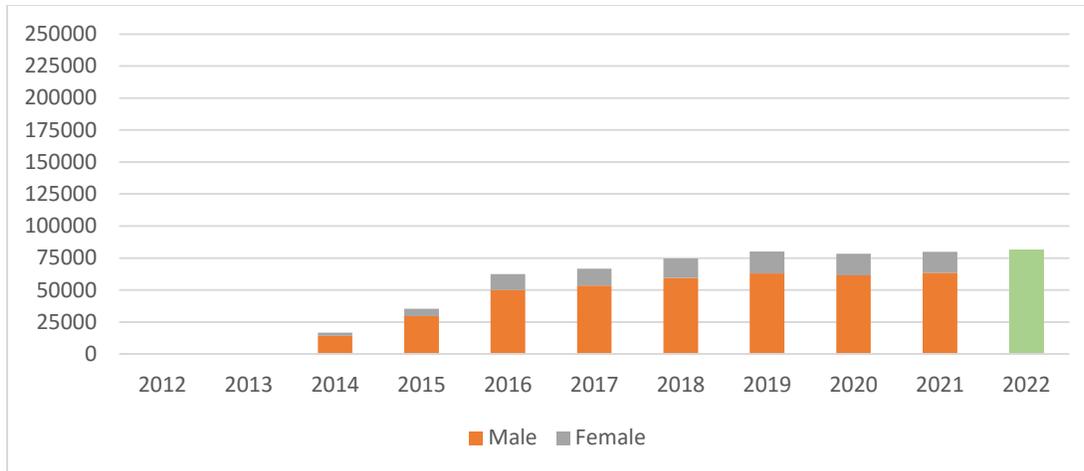


Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	136634	128345	127500	123571	112702	101271	85396	69918	69705	64581	86297
Female	104340	91586	86129	81217	72577	64544	41836	29741	28763	26604	
% Female	43%	42%	40%	40%	39%	39%	33%	30%	29%	29%	

Figure 7: Computing GCSE entries 2012-2022, all UK⁷

⁶ www.jcq.org.uk

⁷ www.jcq.org.uk



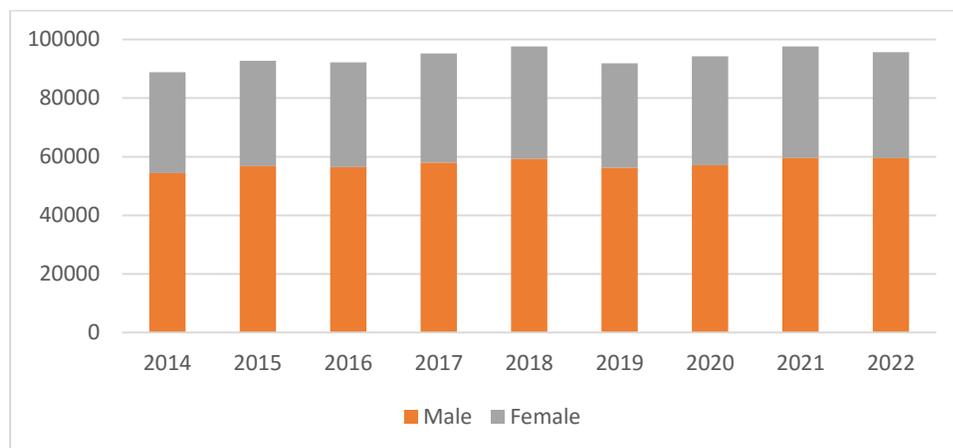
Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male			1420	2973	4992	5351	5957	6286	6154	6341	8112
Female			0	0	1252	1323	1504	1715	1691	1645	0
% Female			15%	16%	20%	20%	20%	21%	22%	21%	

A levels

The following graphs show trends in STEM A levels. The data cover exam entries across England, Wales and Northern Ireland. Scotland uses a different qualification system and is not included.

Ethnicity and socio-economic data is taken from Department for Education and covers England only⁸.

Figure 8: Mathematics A level entries 2012-2022, all UK⁹



Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	54442	56774	56535	58032	59270	56290	57117	59674	59552
Female	34374	35937	35628	37212	38357	35605	37147	38016	36083
% Female	39%	39%	39%	39%	39%	39%	39%	39%	38%

Mathematics	2018	2019	2020	2021	2022
White - White British	39680	36347	39198	38912	36811
Asian or Asian British	11394	11659	13089	13934	14321
Black or Black British	3291	3392	3802	3946	4161
Chinese	1018	1034	985	1051	990
Mixed Dual background	3043	2895	3533	3907	3891
White - Any other background	3472	3415	3900	4065	4450
Any other ethnic group	1576	1585	1673	1780	1998
Unknown ethnicity	18301	17698	17732	17657	16873
Total	81775	78025	83912	85252	83495
White British	49%	47%	47%	46%	44%
Minority Ethnic Groups	29%	31%	32%	34%	36%
Unknown ethnicity	22%	23%	21%	21%	20%

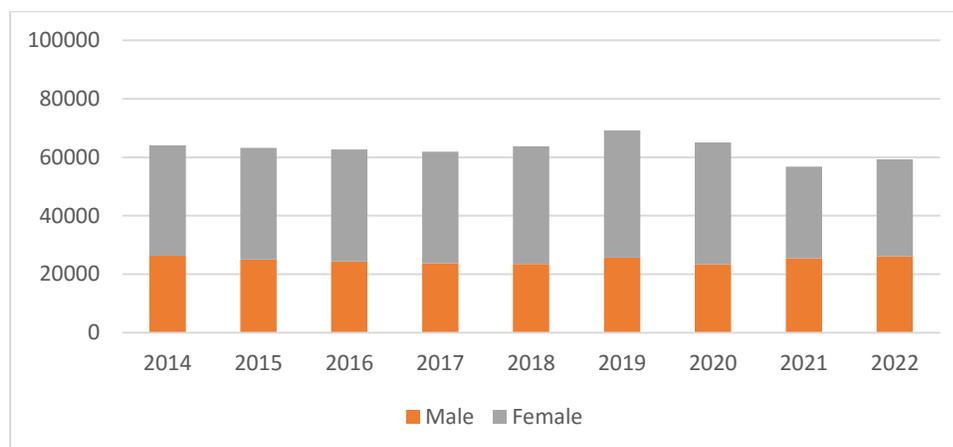
Eligible for FSM	3437	3379	3477	4049	4380
Not eligible for FSM	75301	71538	77372	78467	76936

⁸ A-level-and-other-16-to-18-results_2021-22 (4), Department for Education, www.gov.uk

⁹ www.icq.org.uk

Eligible for FSM	4%	5%	4%	5%	5%
Not eligible for FSM	96%	95%	96%	95%	95%

Figure 9: Biology A level entries 2012-2022, all UK



Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	26346	24955	24371	23703	23495	25641	23426	25416	26093
Female	37724	38320	38279	38205	40324	43555	41694	31389	33170
% Female	59%	61%	61%	62%	63%	63%	64%	55%	56%

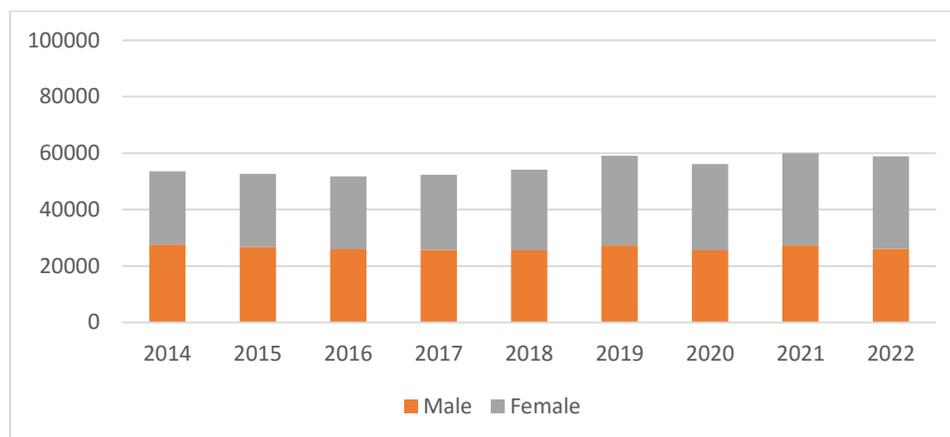
Ethnicity and socio-economic data

Biology	2018	2019	2020	2021	2022
White - White British	27779	29911	27597	28518	29003
Asian or Asian British	8571	10162	9910	10645	11556
Black or Black British	2785	3318	3224	3421	3856
Chinese	408	484	412	447	471
Mixed Dual background	2032	2324	2410	2686	3021
White - Any other background	1809	2279	2215	2371	2734
Any other ethnic group	1123	1259	1243	1394	1700
Unknown ethnicity	9690	9776	9905	10123	10476
Total	54197	59513	56916	59605	62817
White British	51%	50%	48%	48%	46%
Minority Ethnic Groups	31%	33%	34%	35%	37%
Unknown ethnicity	18%	16%	17%	17%	17%

Eligible for FSM	2743	3316	2738	3331	4050
Not eligible for FSM	50543	55158	53059	55264	57698
Eligible for FSM	5%	6%	5%	6%	7%

Not eligible for FSM	95%	94%	95%	94%	93%
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Figure 10: Chemistry A level entries 2012-2022, all UK

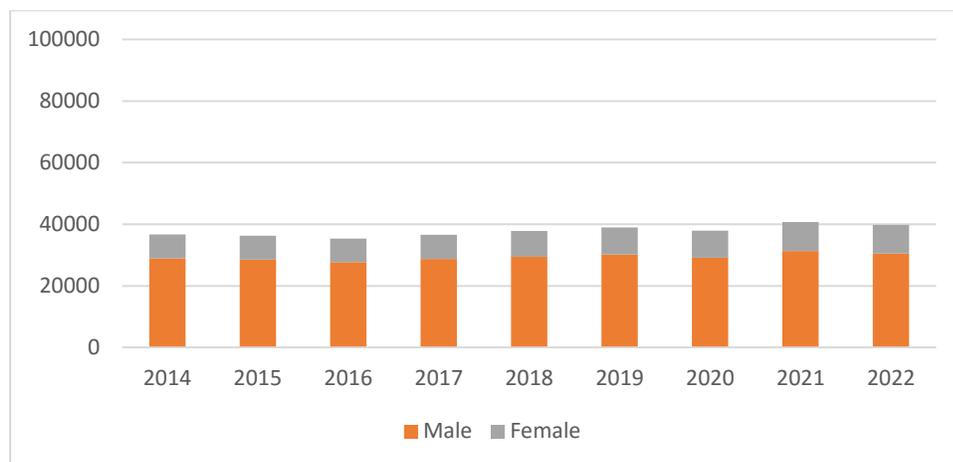


Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	27637	26771	25937	25716	25574	27333	25605	27254	26103
Female	25876	25873	25874	26615	28560	31757	30495	32724	32778
% Female	48%	49%	50%	51%	53%	54%	54%	55%	56%

Chemistry	2018	2019	2020	2021	2022
White - White British	20278	21853	20188	20418	19503
Asian or Asian British	8882	10280	10287	11039	11496
Black or Black British	2657	3030	3054	3265	3524
Chinese	494	573	484	579	518
Mixed Dual background	1725	1966	2125	2306	2460
White - Any other background	1665	2060	1994	2165	2344
Any other ethnic group	1148	1280	1244	1400	1633
Unknown ethnicity	9649	9978	9990	10375	10229
Total	46498	51020	49366	51547	51707
White British	44%	43%	41%	40%	38%
Minority Ethnic Groups	36%	38%	39%	40%	42%
Unknown ethnicity	21%	20%	20%	20%	20%

Eligible for FSM	2404	2869	2430	2908	3446
Not eligible for FSM	42836	46761	45556	47351	47033
Eligible for FSM	5%	6%	5%	6%	7%
Not eligible for FSM	95%	94%	95%	94%	93%

Figure 11: Physics A level entries 2012-2022, all UK

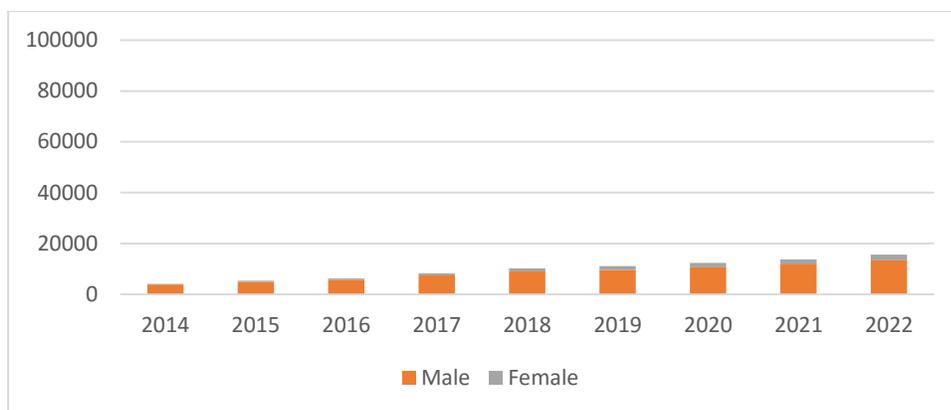


Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	28958	28500	27699	28732	29422	30159	29183	31290	30556
Female	7743	7787	7645	7846	8384	8799	8738	9451	9197
% Female	21%	21%	22%	21%	22%	23%	23%	23%	23%

Physics	2018	2019	2020	2021	2022
White - White British	17608	17835	17109	17724	17071
Asian or Asian British	3381	3791	4264	4906	4979
Black or Black British	1025	1118	1246	1344	1486
Chinese	365	433	388	458	375
Mixed Dual background	1222	1353	1459	1657	1637
White - Any other background	1477	1592	1671	1892	2036
Any other ethnic group	527	581	581	629	672
Unknown ethnicity	7156	7311	7109	7062	6959
Total	32761	34014	33827	35672	35215
White British	54%	52%	51%	50%	48%
Minority Ethnic Groups	24%	26%	28%	31%	32%
Unknown ethnicity	22%	21%	21%	20%	20%

Eligible for FSM	1191	1339	1221	1556	1686
Not eligible for FSM	30345	31384	31356	32948	32591
Eligible for FSM	4%	4%	4%	5%	5%
Not eligible for FSM	96%	96%	96%	95%	95%

Figure 12: Computing A level entries 2012-2022, all UK

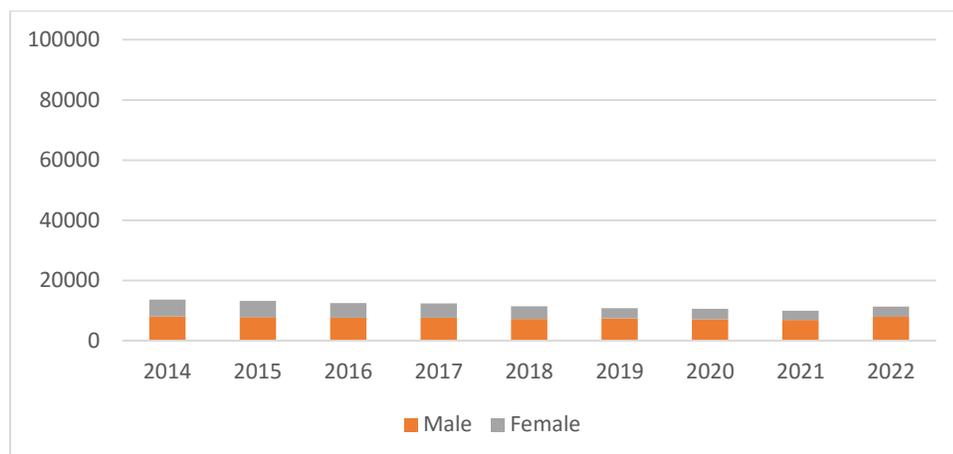


Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	3857	4927	5633	7483	9075	9649	10631	11798	13341
Female	314	456	609	816	1211	1475	1797	2031	2352
% Female	8%	8%	10%	10%	12%	13%	14%	15%	15%

Computer Science	2018	2019	2020	2021	2022
White - White British	5851	6031	6503	6800	7546
Asian or Asian British	1007	1191	1559	1816	2385
Black or Black British	342	355	464	563	744
Chinese	110	132	132	144	176
Mixed Dual background	339	431	500	614	786
White - Any other background	526	608	761	884	1072
Any other ethnic group	113	169	201	216	305
Unknown ethnicity	925	1085	1287	1498	1741
Total	9213	10002	11407	12535	14755
White British	64%	60%	57%	54%	51%
Minority Ethnic Groups	26%	29%	32%	34%	37%
Unknown ethnicity	10%	11%	11%	12%	12%

Eligible for FSM	461	525	605	768	996
Not eligible for FSM	8620	9309	10600	11563	13559
Eligible for FSM	5%	5%	5%	6%	7%
Not eligible for FSM	95%	95%	95%	94%	93%

Figure 13: Design and Technology A level entries 2012-2022, all UK



Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Male	8100	7884	7655	7682	7227	7415	7096	6953	8010
Female	5591	5356	4822	4733	4221	3455	3492	3026	3394
% Female	41%	40%	39%	38%	37%	32%	33%	30%	30%

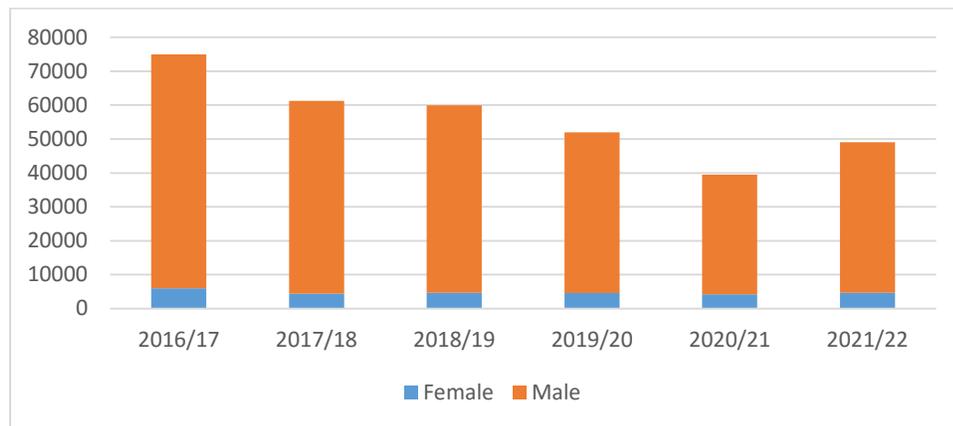
Design & Technology	2018	2019	2020	2021	2022
White - White British	5906	5574	5403	4737	5462
Asian or Asian British	668	658	756	673	793
Black or Black British	231	256	245	241	317
Chinese	71	61	62	50	57
Mixed Dual background	315	298	363	300	380
White - Any other background	363	384	386	394	481
Any other ethnic group	104	98	89	102	124
Unknown ethnicity	1746	1707	1781	1614	1867
Total	9404	9036	9085	8111	9481
White British	63%	62%	59%	58%	58%
Minority Ethnic Groups	19%	19%	21%	22%	23%
Unknown ethnicity	19%	19%	20%	20%	20%

Eligible for FSM	342	347	327	325	456
Not eligible for FSM	8991	8591	8668	7674	8951
Eligible for FSM	4%	4%	4%	4%	5%
Not eligible for FSM	96%	96%	96%	96%	95%

Apprenticeships

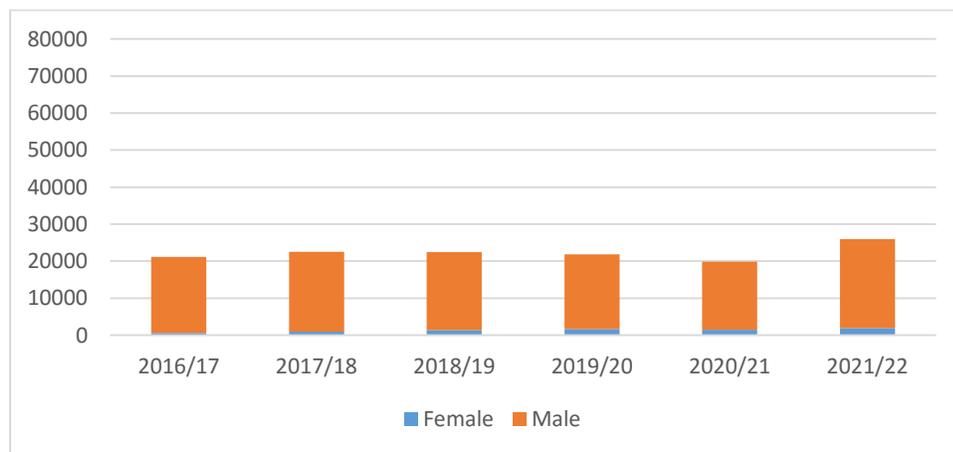
The following graphs show trends in apprenticeship starts for engineering and related sector subject areas (construction and ICT)¹⁰. The data cover apprenticeship starts across England only.

Figure 14: Apprenticeship starts in Engineering and Manufacturing Technologies



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Male	68960	56910	55240	47450	35360	44450
Female	5970	4390	4700	4530	4160	4630
% Female	8%	7%	8%	9%	11%	9%

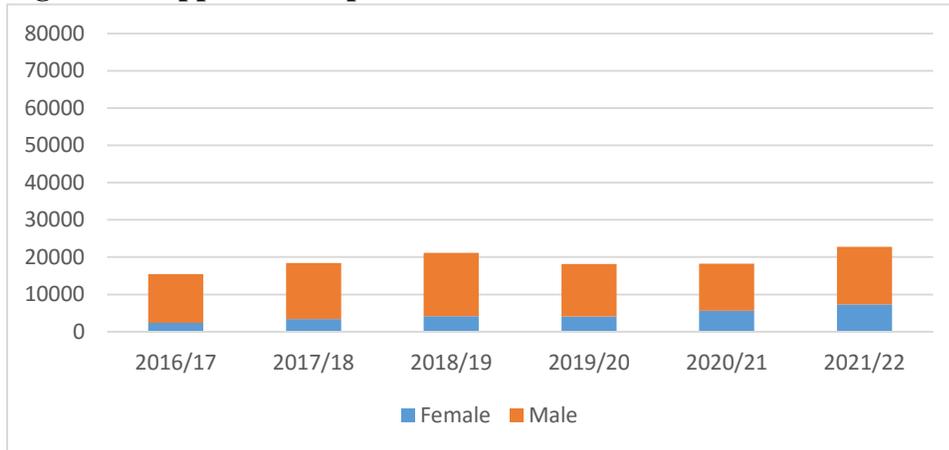
Figure 15: Apprenticeship starts in Construction and Built Environment



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Male	20570	21570	21100	20150	18430	24120
Female	620	950	1340	1660	1440	1880
% Female	3%	4%	6%	8%	7%	7%

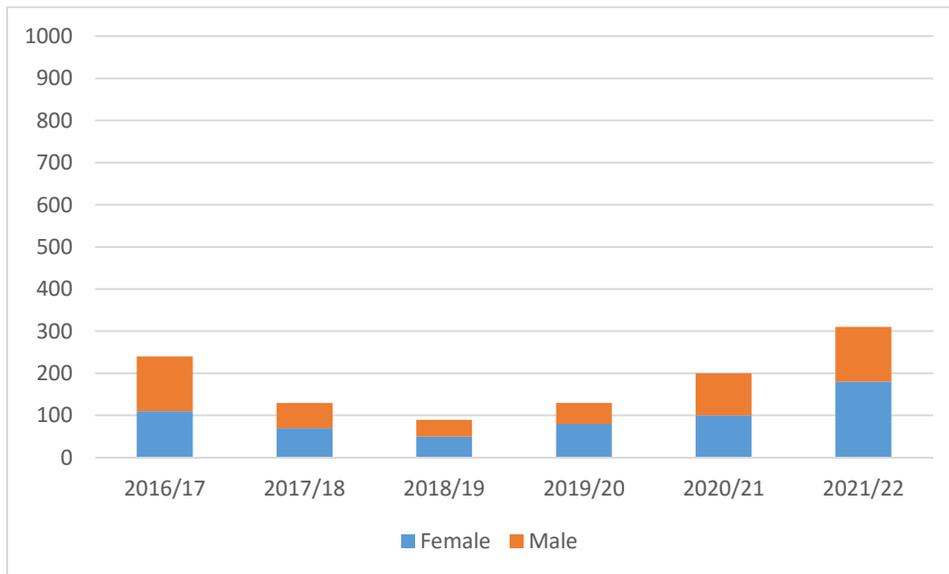
¹⁰ <https://explore-education-statistics.service.gov.uk/find-statistics/apprenticeships-and-traineeships/2021-22>

Figure 16: Apprenticeship starts in ICT



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Male	13000	15010	16980	14050	12690	15460
Female	2390	3370	4170	4070	5590	7300
% Female	16%	18%	20%	22%	31%	32%

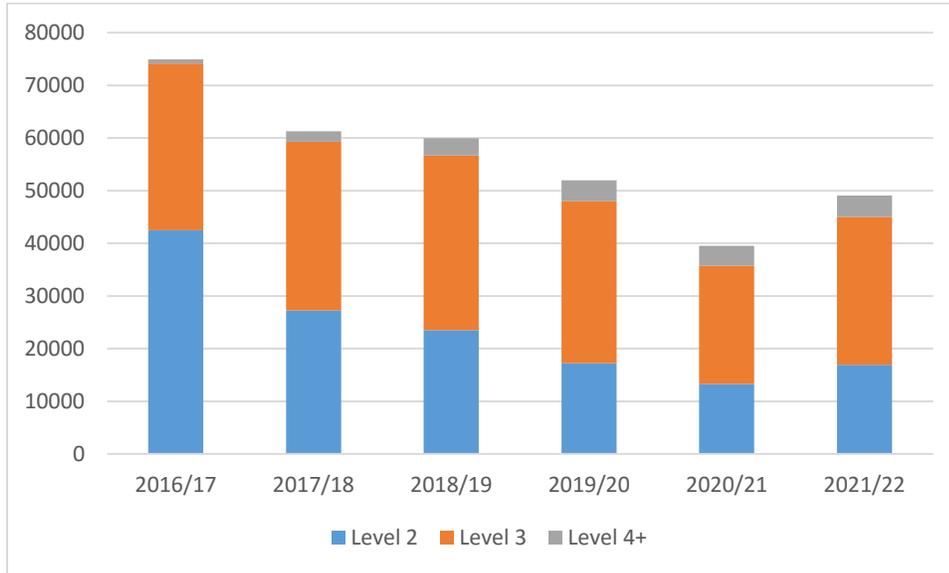
Figure 17: Apprenticeship starts in science and mathematics (note change in scale on axis)



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Male	130	60	40	50	100	130
Female	110	70	50	80	100	180
% Female	46%	54%	56%	62%	50%	58%

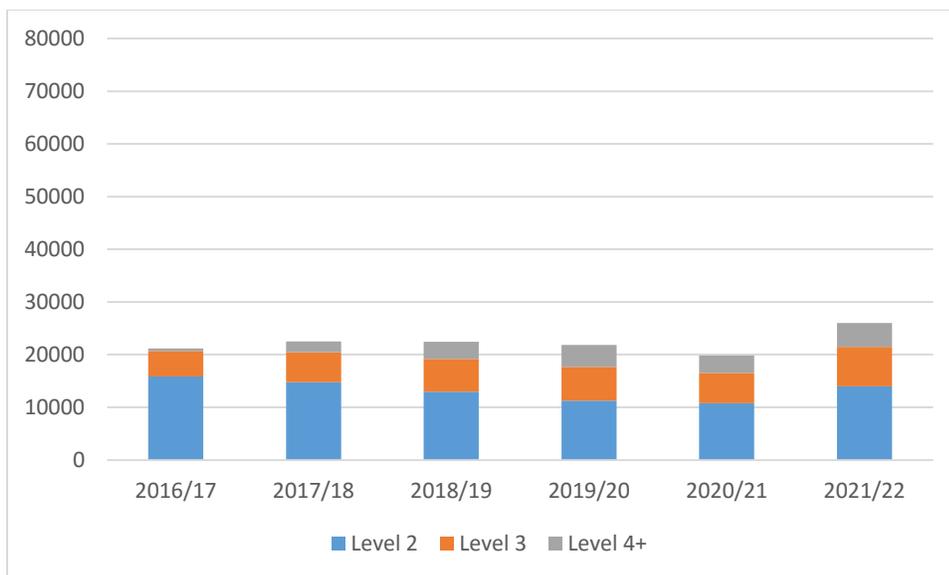
Apprenticeship levels

Figure 18: Different levels of apprenticeship starts in Engineering and Manufacturing Technologies



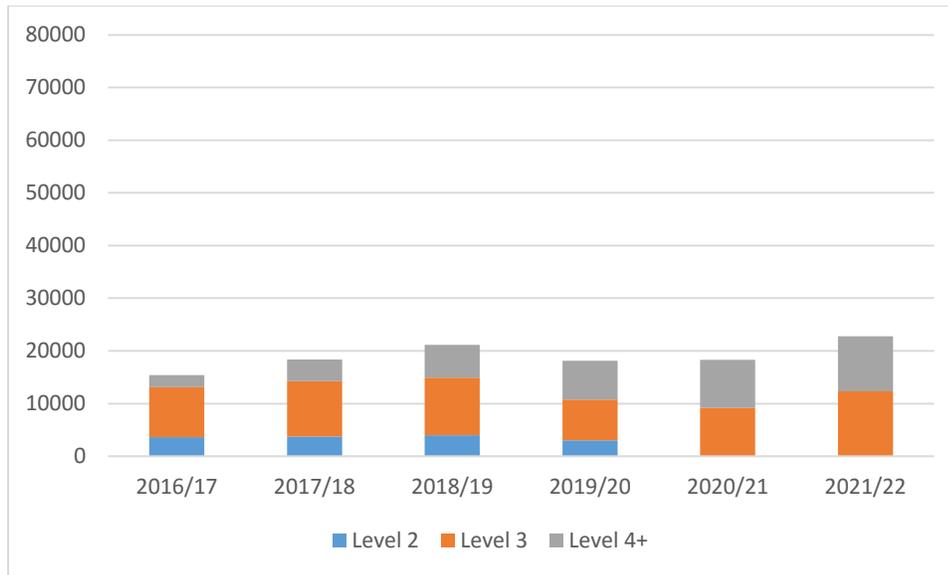
Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Level 2	42490	27250	23530	17240	13290	16930
Level 3	31640	32030	33180	30770	22460	28090
Level 4+	800	2020	3230	3970	3770	4060

Figure 19: Different levels of apprenticeship starts in Construction and Built Environment



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Level 2	15850	14780	12980	11250	10800	13970
Level 3	4860	5700	6200	6400	5740	7500
Level 4+	480	2040	3260	4160	3330	4530

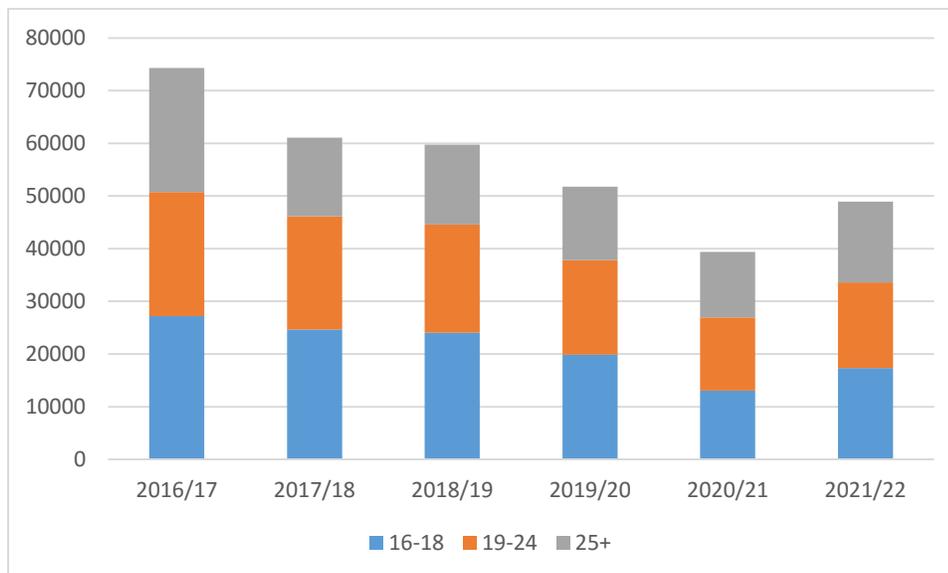
Figure 20: Different levels of apprenticeship starts in ICT



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Level 2	3620	3740	3970	3030	20	60
Level 3	9470	10530	10980	7750	9150	12290
Level 4+	2300	4110	6200	7340	9110	10410

Apprenticeship age groups

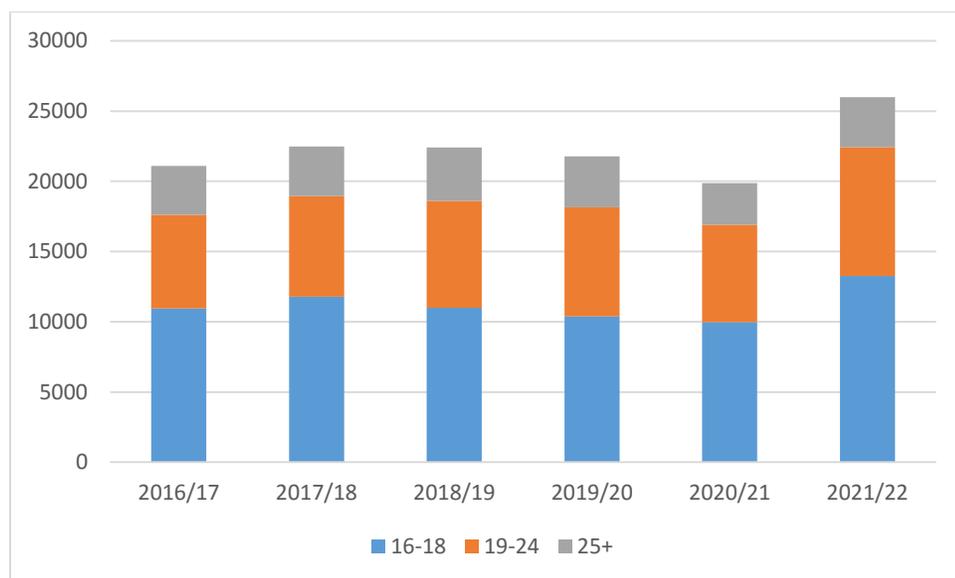
Figure 21: Different age groups starting Engineering and Manufacturing Technologies apprenticeships



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
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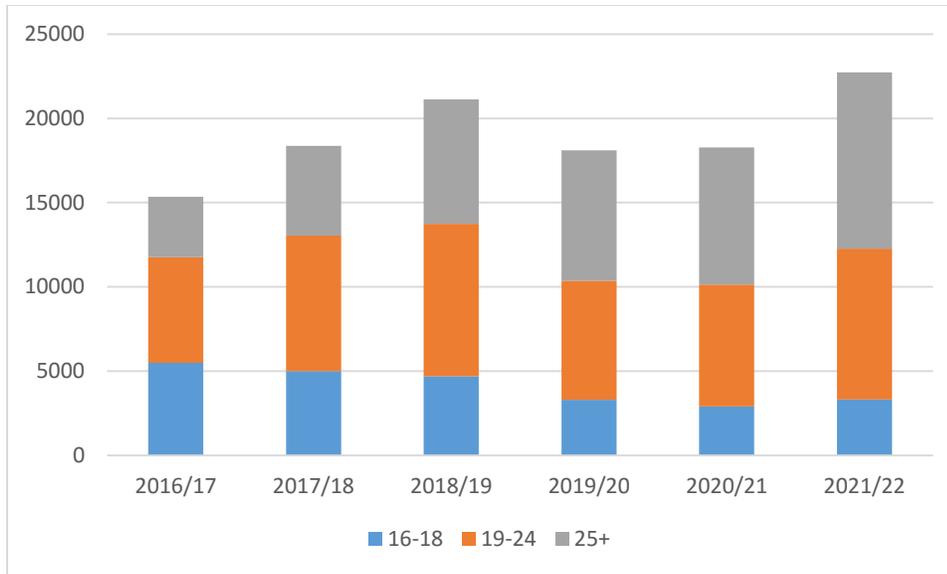
16-18	27190	24650	24030	19890	13040	17320
19-24	23540	21490	20570	17920	13890	16270
25+	23590	14930	15150	13990	12480	15360

Figure 22: Different age groups starting Construction and Built Environment apprenticeships



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
16-18	10950	11790	11000	10390	9970	13260
19-24	6670	7150	7610	7770	6930	9170
25+	3470	3540	3790	3620	2970	3560

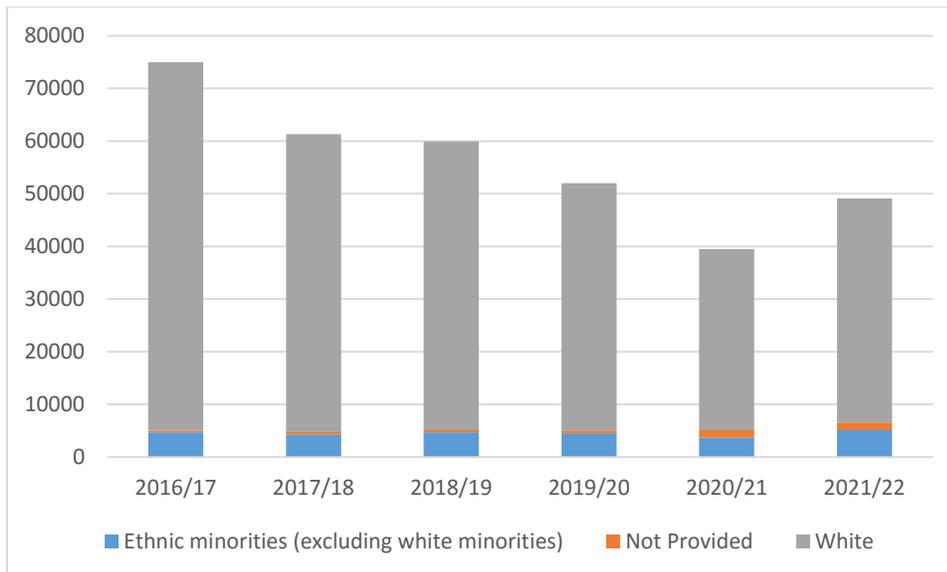
Figure 23: Different age groups starting ICT apprenticeships



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
16-18	5490	5010	4700	3300	2910	3330
19-24	6270	8040	9050	7070	7230	8950
25+	3590	5310	7380	7730	8130	10440

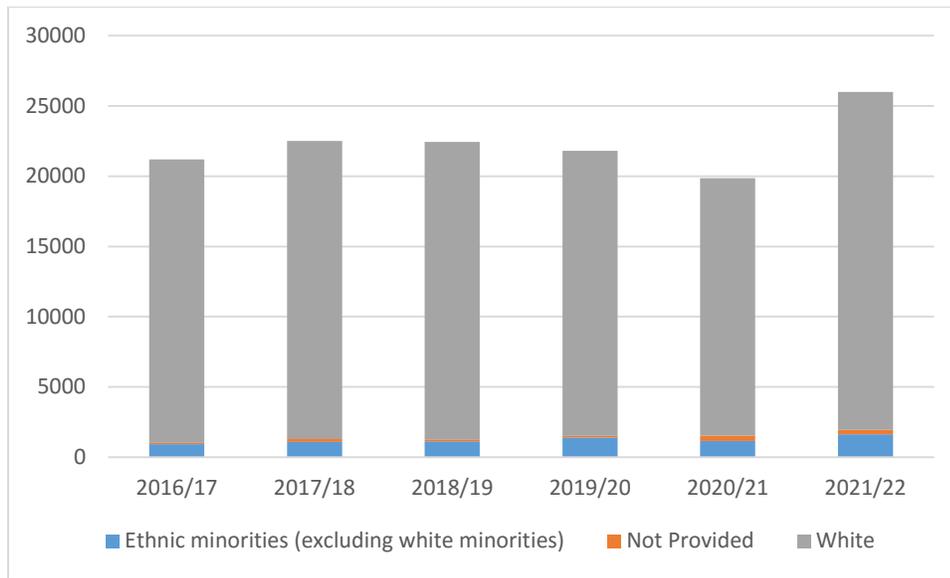
Ethnicity of apprentices

Figure 24: Ethnicity of Engineering and Manufacturing Technology apprenticeship starts



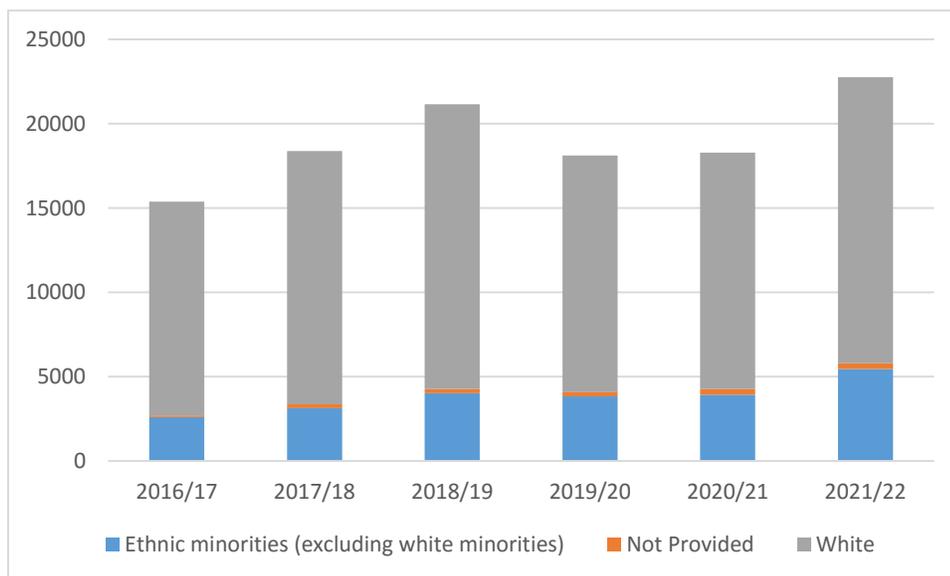
Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Ethnic minorities (excluding white minorities)	4700	4290	4720	4540	3710	5120
Not Provided	340	470	430	520	1450	1480
White	69890	56540	54790	46920	34360	42480
% ethnic minority	6%	7%	8%	9%	9%	10%

Figure 25: Ethnicity of Construction and Built Environment apprenticeship starts



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Ethnic minorities (excluding white minorities)	920	1080	1130	1390	1140	1630
Not Provided	90	210	130	120	390	320
White	20180	21230	21180	20300	18340	24050
% ethnic minority	4%	5%	5%	6%	6%	6%

Figure 26: Ethnicity of ICT apprenticeship starts



Year	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Ethnic minorities (excluding white minorities)	2610	3130	4010	3830	3920	5450

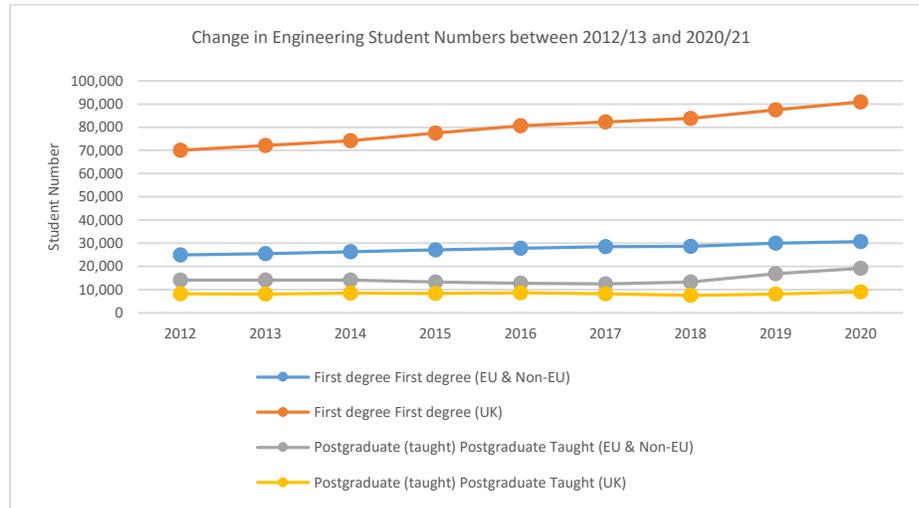
Not Provided	80	220	260	240	340	340
White	12700	15030	16880	14050	14020	16970
% ethnic minority	17%	17%	19%	21%	21%	24%

Higher Education

Undergraduate First degrees

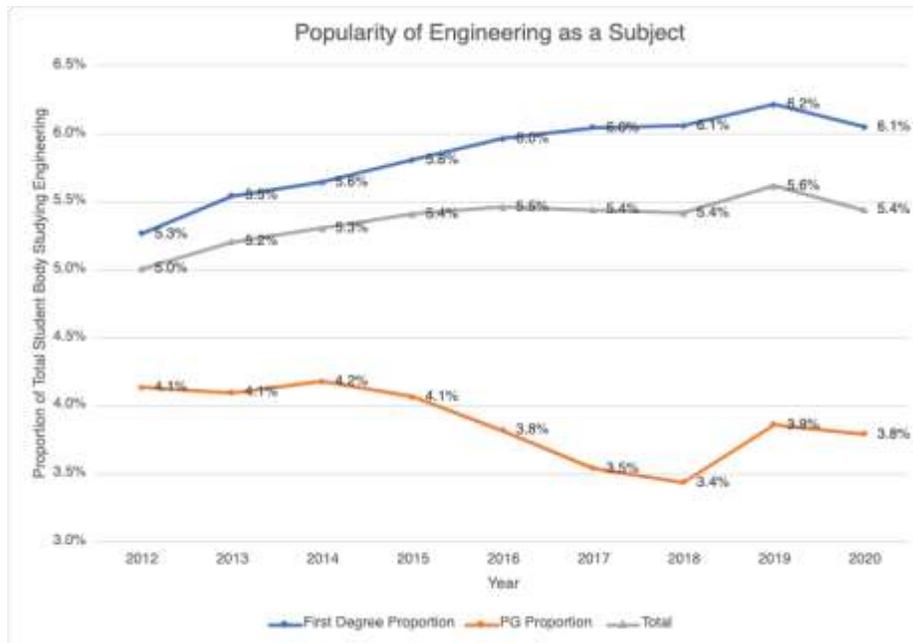
The following charts show trends in student numbers for engineering higher education.

Figure 27: Trend in student numbers in engineering higher education (all students, all years of study)



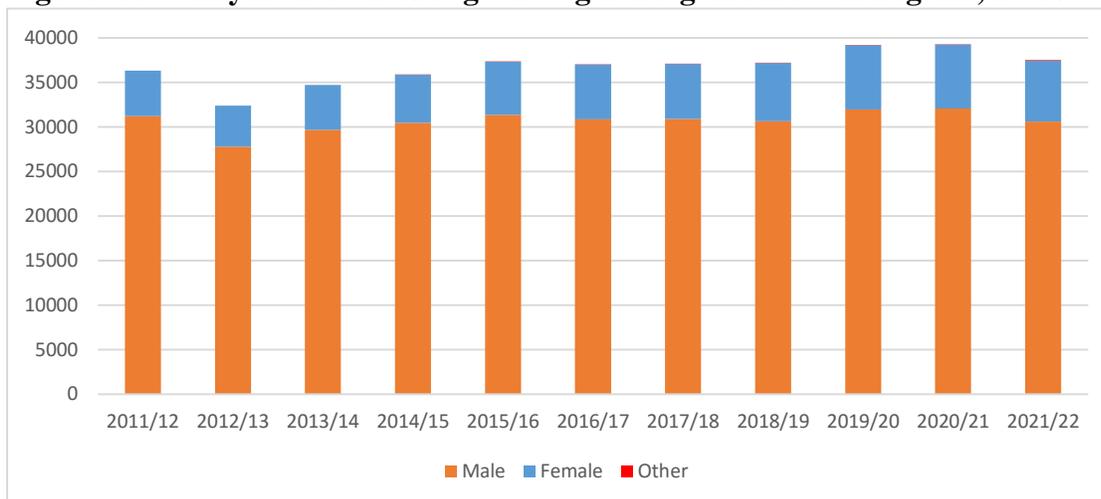
- There has been growth in the number of UK domiciled engineering undergraduate first degree students over the past 10 years.
- There has been minimal increases in non-UK students at first degree level.
- There is a significantly higher proportion of international students for postgraduate taught degrees than UK students.
- While the increases in UK students into engineering appears to be a positive trend, it does not take into account overall demographic population changes and general increased entries to higher education.
- The relative popularity of engineering as a subject in higher education has remained relatively static – with less than 1% increase in the proportion of HE students choosing engineering degrees over the same period.

Figure 28: Proportion of HE students choosing engineering subjects at HE



- The reduction in the popularity of postgraduate study is likely due to increasing numbers of students opting for the integrated 4-year Masters first degree (MEng) over the 3 year BEng. The gender breakdown for first degree, undergraduate study is presented below.

Figure 29: First year entries to engineering undergraduate first degrees, all domiciles

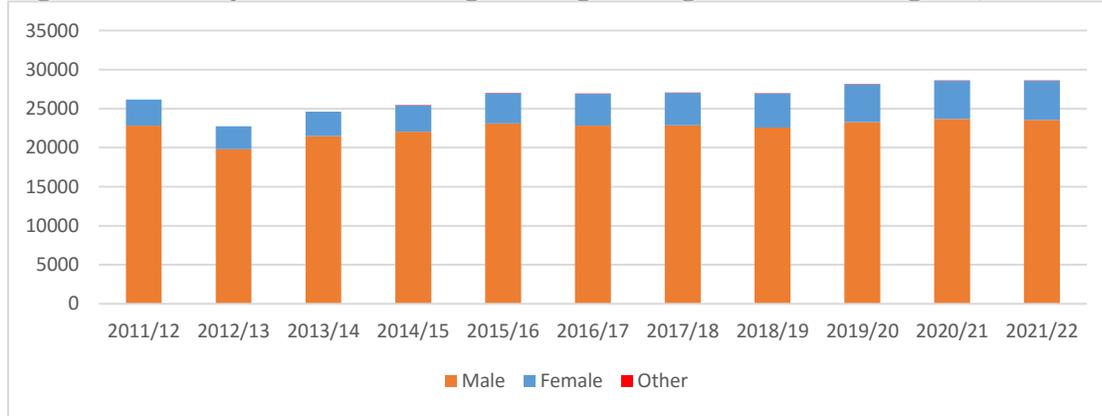


Row Labels	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Female	5105	4590	5045	5410	5950	6165	6210	6545	7190	7135	5500
Male	31195	27780	29670	30435	31360	30830	30865	30620	31965	39175	32115
Other		0	0	5	10	5	10	15	20		
Total	36300	32370	34715	35850	37320	37000	37085	37180	39175	39175	37615
% Female	14%	14%	15%	15%	16%	17%	17%	18%	18%	18%	15%

- There has been slight growth in the proportion of women studying engineering over the past ten years from around 14% in 2012 to 18% in 2021. Across all domiciles (UK, EU and Non-EU) this amounts to 7,135 women studying engineering degrees.

- The 18% compares with 57% of women across all HE undergraduates (across all domiciles).

Figure 30: First year entries to engineering undergraduate first degrees, UK domiciled only



	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Female	3340	2920	3135	3380	3880	4085	4140	4360	4825	4900	4900
Male	22845	19815	21485	22065	23115	22835	22885	22580	23290	23670	23670
Other		0	0	5	5	5	10	10	20	20	20
Total	26185	22735	24620	25450	27000	26925	27035	26950	28135	28600	28600
% Female	13%	13%	13%	13%	14%	15%	15%	16%	17%	17%	17%

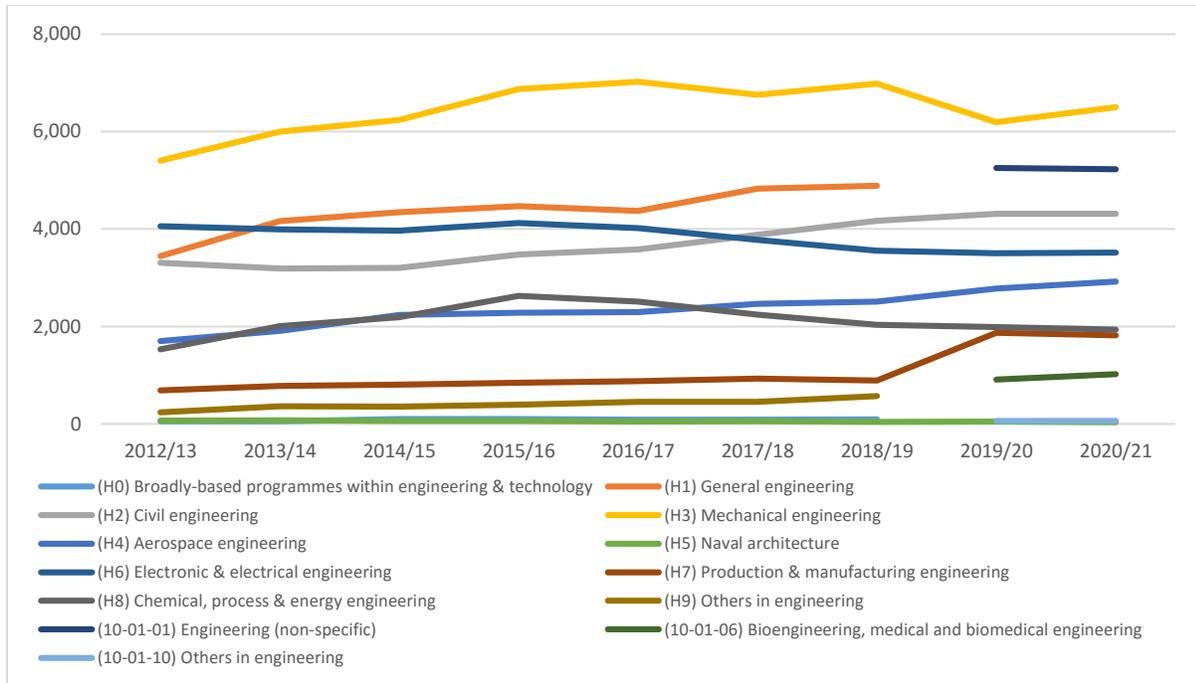
For undergraduate first degrees, engineering and technology has a higher proportion of UK domiciled Ethnic Minority students (33.9%) compared with higher education overall (27.9%)

- This is largely due to Asian students, who are disproportionately over-represented (at 18%) compared to across HE overall (12.7%)
- Other groups remain largely representative against the total HE cohort.

For individual disciplines, mechanical engineering is the most popular subject, followed by general engineering. Electronic engineering

Note a change in data classification between 2018/19 and 2019/20, which has resulted in movement of some of the data, including certain specific disciplines ending in 2018/19 and new classifications starting in 2019/20.

Figure 31: First year entries to engineering undergraduate first degrees by discipline, UK domiciled only

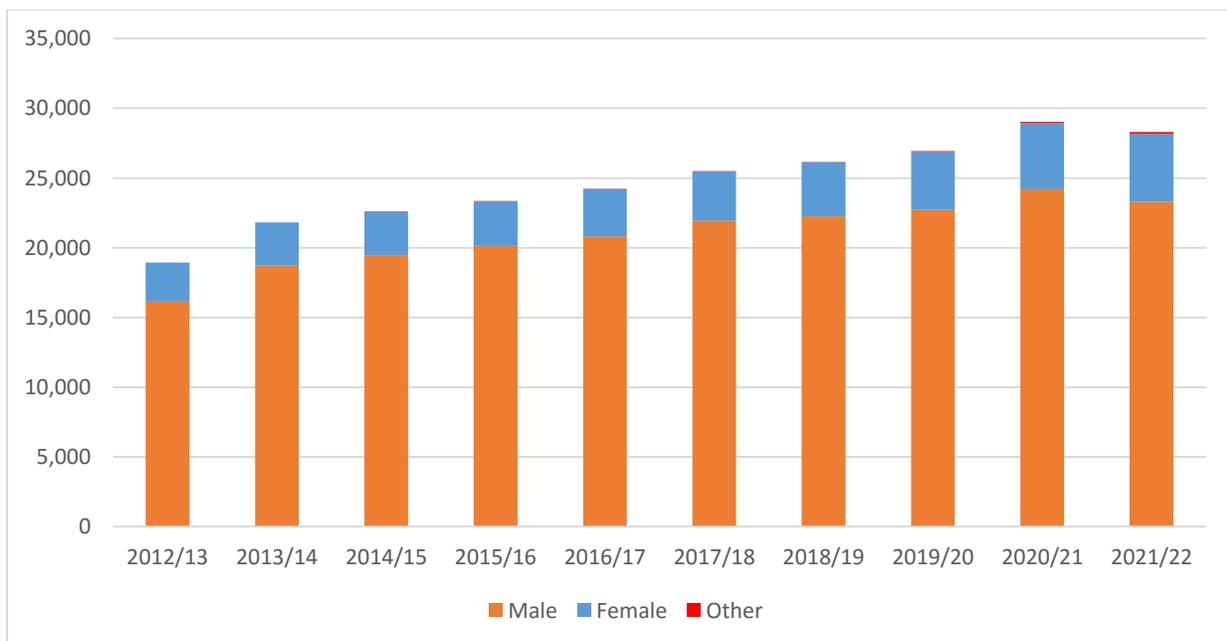


Computing subjects

There has been a steady increase in the number of students taking undergraduate first degrees in computer science subjects.

Over the past four years we have also started to see a very slight increase in women studying computing subjects.

Figure 32: First year entries to computer science undergraduate first degrees, UK domiciled only

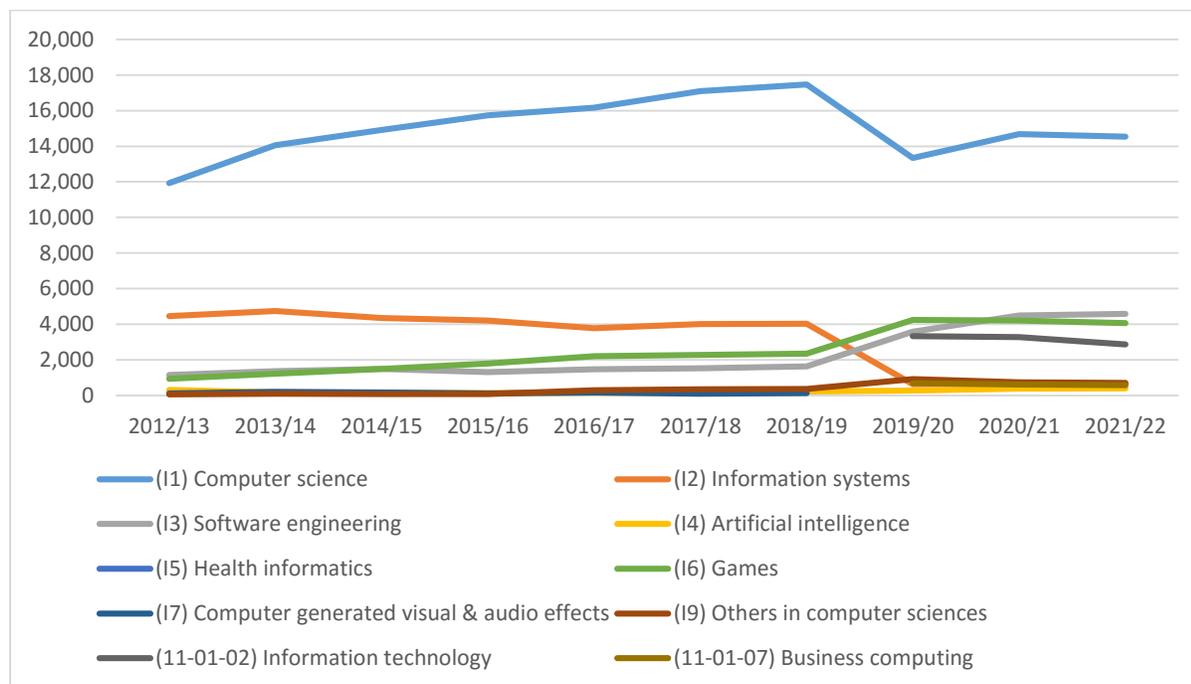


	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2020/ 21	2021/ 22
Female	2,810	3,105	3,125	3,205	3,395	3,540	3,880	4,170	4,755	4,880
Male	16,130	18,705	19,470	20,120	20,810	21,925	22,260	22,715	24,180	23,300
Other	0	0	5	5	10	10	20	45	90	125
Total	18,940	21,810	22,600	23,330	24,215	25,475	26,160	26,930	29,025	28,305
% Female	15%	14%	14%	14%	14%	14%	15%	15%	16%	17%

By specific discipline within computing, computer science remains the most popular degree, followed by information systems.

Note a change in data classification between 2018/19 and 2019/20, which has resulted in significant movement of the data between 2018/19 and 2019/20.

Figure 33: First year entries to computer science undergraduate first degrees by discipline, UK domiciled only



Engineering workforce

The following charts and tables provide data on the UK engineering workforce.

According to the 2021 Census, 62.9% (37.5 million) of the population of England and Wales was of working age (aged 16 to 64 years).

There were around 5.7 million people working in engineering roles in 2021 (shown in figure 34)¹¹. Engineering roles are defined by the ‘engineering footprint’ an agreed set of occupations identified by the Royal Academy of Engineering, Engineering Council and EngineeringUK¹¹.

Figure 34: Number of people working in engineering occupations and all other occupations, UK

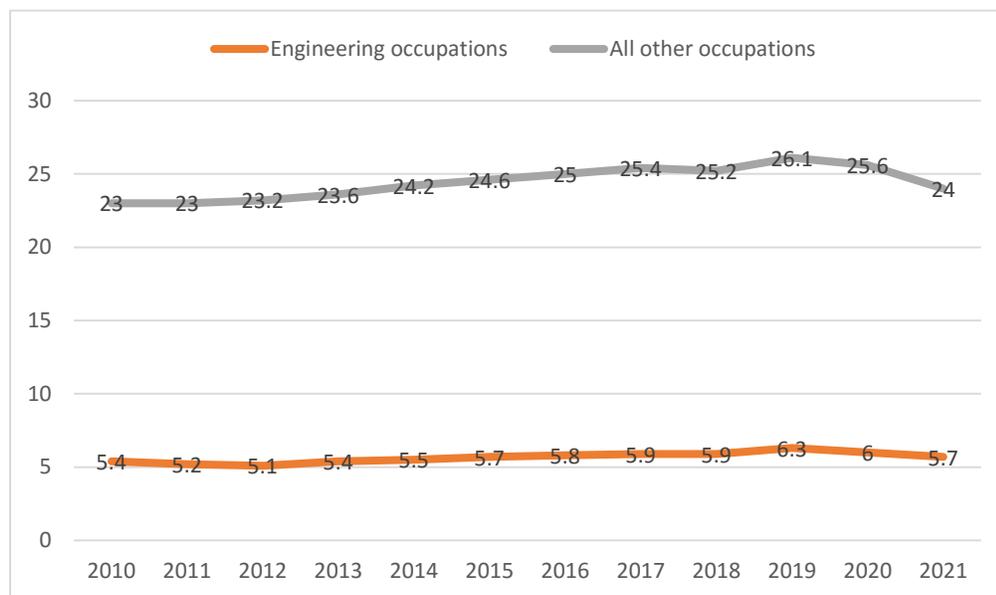
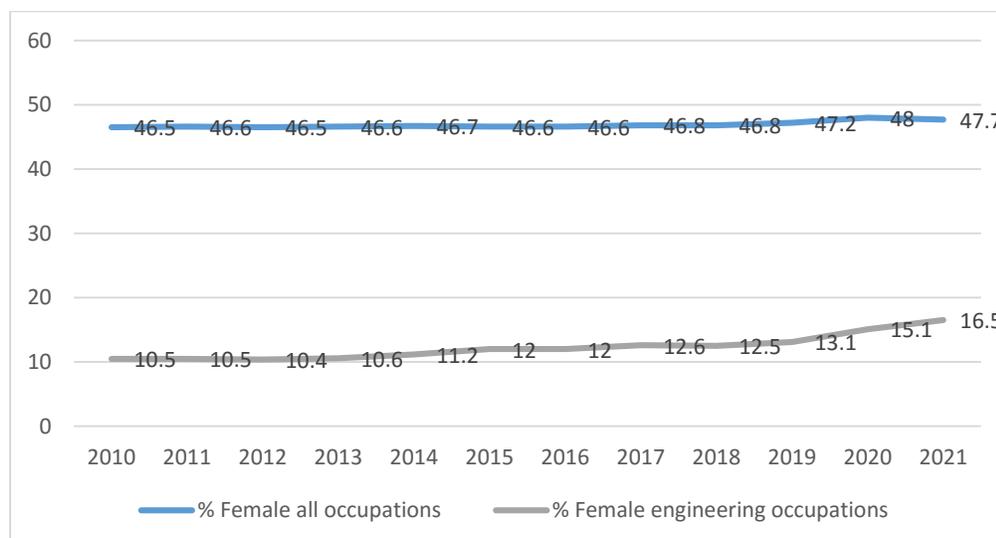


Figure 35: Proportion of women in engineering occupations



¹¹ https://www.engineeringuk.com/media/318305/trends-in-the-engineering-workforce_engineeringuk_2022.pdf

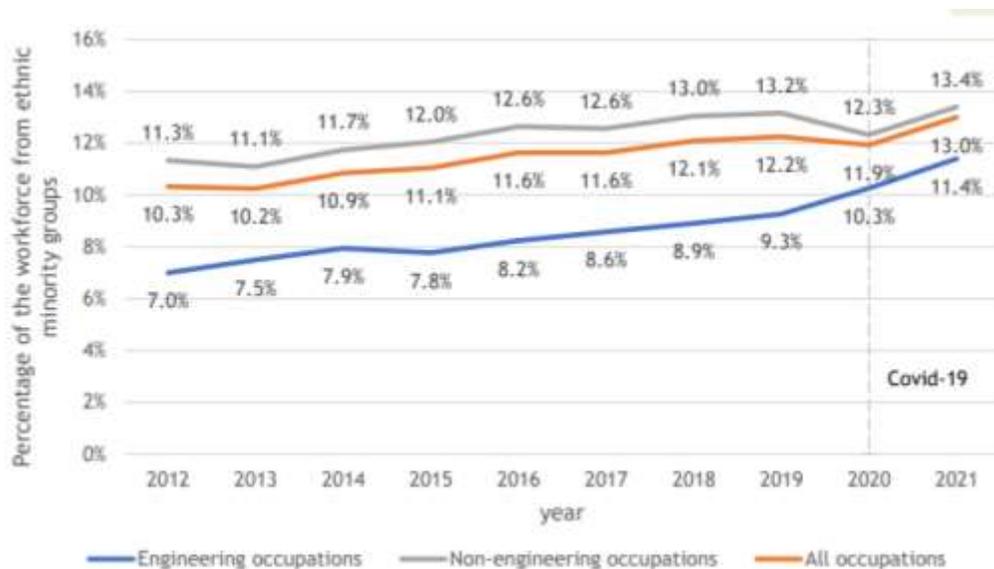
16.5% of the engineering workforce are women. However, there are differences across the economy:

- Women represent 12.5% of the engineering workforce within engineering sectors (e.g. engineering roles in manufacturing, construction etc.)
- Women represent 24.5% of the engineering workforce outside engineering (e.g. engineering roles in finance, healthcare, retail, education etc.).

There are also differences in the type of engineering occupations:

- Women represent 15% of the workforce undertaking ‘core’ engineering occupations such as civil engineers, IT engineers etc.
- Women represent 19% of the workforce undertaking ‘related’ engineering occupations such as web design and development, planning and built environment roles etc.
- Women are less well represented in technician roles,

Figure 35: Proportion of Minority Ethnic groups in the engineering workforce



Minority Ethnic groups represent around 11.4% of the engineering workforce, against approximately 30% in the working population.

White British people made up 70.8% of the working age population in England (and 89.3% of the working population in Wales).



Women in Engineering Standing Technical Committee
of the
 World Federation of Engineering Organizations Committee Member Progress Report

This report is submitted by each WiE Committee Member to report on progress in addressing the goals and objectives for each of the WiE Committee's three themes

Committee Member Name	Dr. Khin Sandar Tun
Organization or Country	FEDERATION OF MYANMAR ENGINEERING SOCIETIES
Date Submitted	14/09/2023
Committee Member Email Address	Khinsandartun91@gmail.com

1 Summary

Political change has taken place in Myanmar since February 2021. The Mocha cyclone destroyed a lot of areas in Myanmar especially Rakhine State in May 2023. Floods are occurring in many regions of Myanmar due to heavy rains.

Due to the situation in our country, Fed.MES-WE was only able to hold the meetings via zoom application and our members attended the international conferences via online up to mid of 2022. The delegation of Fed.MES-WE can be arranged to attend the CAFEO40 in October 2022. Although we do the activities of Fed.MES-WE in low profile in Myanmar due to the country's situation, our members will try to participate in upcoming international events in person.

2 Accomplishments

2.1 Engineering Workforce Capacity building- to encourage female engineering retention and leadership

Activities of Women Engineers Chapter (Fed.MES-WE) in 2023 are as follows.

- **INWES Board Meetings**
- **Fed.MES-WE Office Bearers Meeting**
- **WE-AFEO Midterm Meeting (July 5-8-2023)**
- **7th Philippine Women Engineers Summit (August 3-5, 2023)**
- **INWES APNN 2023 & ICWSTEM 2023 (June 29 - July 1, 2023)**
- **INWES AGM & ICWES19 (September 4-6, 2023)**

Some record photos are shown in the figures.



Figure 1. INWES Board Meeting

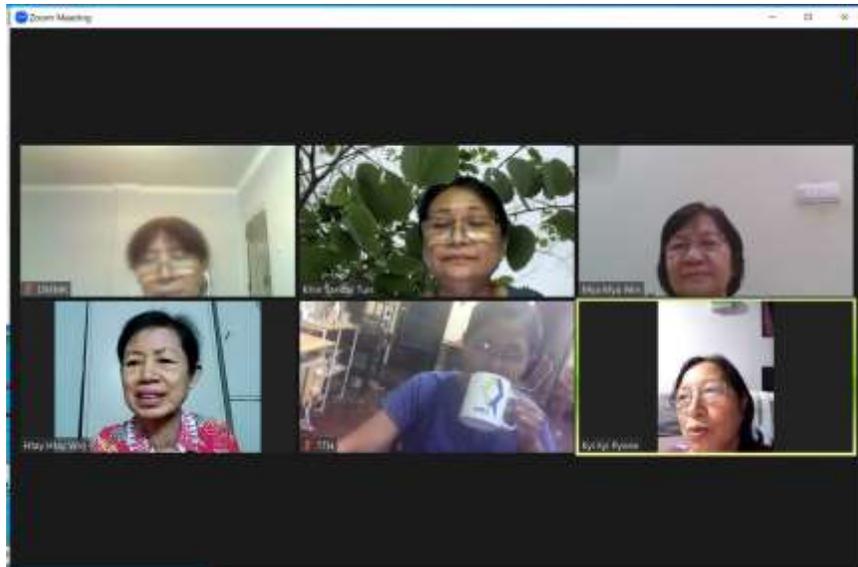


Figure 2. Fed.MES-WE Meeting



Figure 3. WE-AFEO Meeting in CAFE040



Figure 4. 7th Philippine Women Engineers Summit



Figure 4. INWES APNN 2023 & ICWSTEM 2023



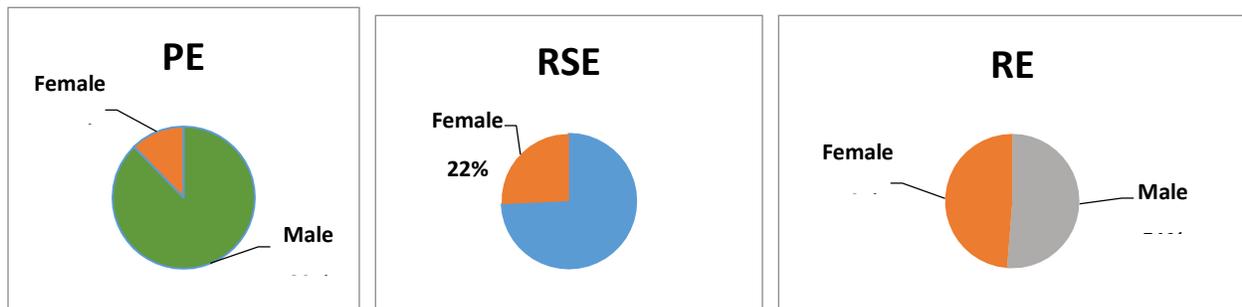
Figure 5. INWES AGM and ICWES19

2.3 Collection of Engineering Strategic Indicators

According to 2022 statistics, the ratios of female and male engineers in Myanmar are as follows.

Percentage of Male and Female Engineers in Professional Area

- Professional Engineer (PE)
- Registered Senior Engineer (RSE)
- Registered Engineer (RE)



3 Announcements

According to our country's situation, the online meetings of Fed.MES-WE will often held and Fed.MES-WE will try to participate in international events and collaboration in person

4 Resources

<https://www.mes.org.mm/women-engineers-chapter>



Women in Engineering Standing Technical Committee
of the
World Federation of Engineering Organizations
Committee Member Progress Report

This report is submitted by each WiE Committee Member to report on progress in addressing the goals and objectives for each of the WiE Committee's three themes

Committee Member Name	Wen-Jean Hsueh
Organization or Country	Chinese Institute of Engineers, Taiwan ROC
Date Submitted	September 15, 2023
Committee Member Email Address	hsuehwj@gmail.com

- **Summary**

In 2022 CIE together with the Society of Taiwan Women in Science and Technology (TWiST), Taiwan Photonics Society, IEEE Taipei Section, and altogether 53 STEM NPOs continued to organize the “Women in Science & Technology Convention, Taiwan – *Toward a Work-Life Integrated Workforce*” (WiST2022) on December 9th. The President of Taiwan, ROC, Dr. Ing-Wen Tsai gave a video opening remark, and the Minister of Science & Technology attended the opening in person. 10 leaders from around the country across various industrial and academic sectors were invited as speakers, 1 of them is male. A round-table world café session with 9 hosts, among them 2 gentlemen, was conducted and resulted in fruitful discussions and idea exchange. More than 500 people registered on line or in person to attend the event. This was the second nation-wide gathering of women in science, engineering, and technology in Taiwan. With the community takes form, we have been planning the third one on October 27th, 2023 (WiST2023), and around March 8th International Women’s Day in 2024 (WiST2024), both inviting speakers on line from around the world.

WiST2021 was really a kickoff of nation-wide attention of women in STEM. WiE Committee of CIE expands to 35 seats with support from the Board and became the largest committee of CIE. The Gender Equality Committee of Executive Yuan, the highest government entity of the nation, finally has a member from the STEM sector in 2022 after 7 years of absence, and therefore opinions from women scientists and engineers can be heard and integrated into government policies of all levels more directly and quickly. Moreover, The Chinese Institute of Engineers finally had a female Fellow in 2022, and one in 2023, both pro-actively participated in the organizations of WiST. Many of the 50+ NPO’s started their own WiE committees and have been following CIE’s footsteps to make SDG-5 an important issue for the development of the organizations.

- **Accomplishments**

- **Theme 1:** Engineering Workforce Capacity building- to increase diversity and inclusivity in the future skills pipeline

Ensuing the theme of WiST2022 “*Toward a Work-Life Integrated Workforce,*” a survey of STEM private sectors is being conducted in 2023 to collect best practices and challenges to overcome in addressing SDG-5 and the diversity, equity, and inclusion issues for ESG. The report is due in 2024.

- **Theme 2:** Engineering Workforce Capacity building- to encourage female engineering retention and leadership

A casual, relaxed but serious route was taken in 2023 to gather female scientists and engineers in a more fashionable, fun, and friendly atmosphere of a party, interacting in a venue with virtual reality surroundings and spectacular contents, preceded by a talk of advices for personal financial management by a professional member of the STEM community. The casual exchange of experiences and knowledge was widely welcomed by participants, feeling motivated to contribute and to support others. A casual group setting is natural in demonstrating people skills and leadership, and to learn from each other.

- **Theme 3:** Collection of Engineering Strategic Indicators

Women Engineers	Percentage of Total (%)
Professionally Registered	30.6 ¹ (thru official examinations) in 2022 4.95, 6.0, 6.16, 6.56% at work 2017-2020 ²
Working in Engineering Establishments	13 ³ (2019)
Undergraduates (2021-2022)	20.10 ⁴ (Engineering, Manufacturing, and Construction) 25.84 ⁴ (STEM)

References for above data:

1. Ministry of Examination, Taiwan ROC, 2022.
2. Public Construction Commission, Taiwan ROC, 2021.
3. Chinese Institute of Engineers, 2019 survey result.
4. Ministry of Education, Taiwan ROC, 2022

2.4 Theme 4: Working in Partnership to address the Sustainable Development Goals, with a particular emphasis on Goal 5, Gender Equality, and its relationship to the other Goals.

In 2022 CIE together with the Society of Taiwan Women in Science and Technology (TWiST), Taiwan Photonics Society, IEEE Taipei Section, and altogether 53 STEM NPOs continued to organize the “Women in Science & Technology Convention, Taiwan – *Toward a Work-Life Integrated Workforce*” (WiST2022) on December 9th. The President of Taiwan, ROC, Dr. Ing-Wen Tsai gave a video opening remark, and the Minister of Science & Technology attended the opening in person. 10 leaders from around the country across various industrial and academic sectors were invited as speakers, 1 of them is male. A round-table world café session with 9 hosts, among them 2 gentlemen, was conducted and resulted in fruitful discussions and idea exchange. More than 500 people registered on line or in person to attend the event. This was the second nation-wide gathering of women in science, engineering, and technology in Taiwan. Many of the 50+ NPO’s started their own WiE committees and have been following CIE’s footsteps to make SDG-5 an important issue for the development of the organizations.

2.5 Engineering & Technological Innovations (Special recognition will be given to members with Innovative Reports.

Yet to be collected and confirmed. However, the Ministry of Science & Technology has embarked a program to encourage academic research in taking into account sex and gender differences which may result in “gendered innovation.”

○ Other Accomplishments

WiST2021 was really a kickoff of nation-wide attention of women in STEM. WiE Committee of CIE expands to 35 seats with support from the Board and became the largest committee of CIE. The Gender Equality Committee of Executive Yuan, the highest government entity of the nation, finally has a member from the STEM sector in 2022 after 7 years of absence, and therefore opinions from women scientists and engineers can be heard and integrated into government policies of all levels more directly and quickly. Moreover, The Chinese Institute of Engineers finally had a female Fellow in 2022, and one in 2023, both pro-actively participated in the organizations of WiST.

3. Announcements

With the community takes form, we have been planning the third one on October 27th, 2023 (WiST2023), and the fourth one around March 8th International Women’s Day in 2024 (WiST2024), both inviting speakers on line from around the world.

2023女科技人大會

–

科技女力國際進行式-前導

“Women in Science & Technology Convention, Taiwan – *International Workshop on STEM Women Empowerment*”(WiST2023) October 27th, 2023 (on-line)
<http://wist2023.twist.org.tw>

4 Resources

性別化創新 Gendered Innovation Website

<https://genderedinnovations.taiwan-gist.net>

女科技人的美麗心世界 Taiwan Women e Press (in Chinese, partially English)

<http://www.twepress.net>

2022女科技人大會 – 邁向工作與生活共榮的新職場

“Women in Science & Technology Convention, Taiwan - *Toward a Work-Life Integrated Workforce*” (WiST2022) December 9th, 2022 (in Chinese)

<http://wist2022.twist.org.tw>

2021女科技人大會 – 科技女力進行式

“Women in Science & Technology Convention, Taiwan - *Advancing Towards a Bright Future*” (WiST2021) December 11th, 2021 (in Chinese)

<http://wist2022.twist.org.tw>



Women in Engineering Standing Technical Committee
of the
 World Federation of Engineering Organizations
 Committee Member Progress Report

This report is submitted by each WiE Committee Member to report on progress in addressing the goals and objectives for each of the WiE Committee's three themes

Committee Member Name	Jeanette M. Southwood, FCAE, FEC, LL.D. (honoris causa), P.Eng., IntPE Vice President, Corporate Affairs and Strategic Partnerships
Organization or Country	Engineers Canada
Date Submitted	To be completed
Committee Member Email Address	Jeanette.Southwood@engineerscanada.ca

- **Summary**

Provide a brief summary of your report.

This report provides an overview of [Engineers Canada](#)'s work from the date of the last country report in February 2022 to the present. Engineers Canada is the national organization of the 12 engineering regulators that license the country's more than 300,000 members of the engineering profession. Together, we work to advance the profession in the public interest. Engineers Canada has fulfilled its commitment to all themes. References and supporting material have been linked directly to the associated sections. This report has been prepared by: Committee Member, Jeanette Southwood, FCAE, FEC, LL.D. (honoris causa), P.Eng., IntPE; Kim Bouffard, BEd, Manager, Belonging and Engagement; and Yasemin Tanaçan-Blacklock, MA, Advisor, Equity and Belonging.

- **Accomplishments**

Please list accomplishments in addressing the goals and objectives of each theme.

Please see the WFEO WiE Themes document or the WiE website for the list of goals and objectives for each theme.

- **Theme 1:** Engineering Workforce Capacity building- to increase diversity and inclusivity in the future skills pipeline

The following are examples of Engineers Canada’s work under Theme 1.

In January 2022, Engineers Canada kicked off its Board-approved 2022-2024 Strategic Plan: ‘[A vision for collaboration](#).’ This plan includes a strategic area of focus called ‘**Champion an equitable, diverse, inclusive, and trustworthy engineering profession**’, which includes our **strategic priority 2.1 (SP2.1), Accelerate 30 by 30**. Engineers Canada’s 30 by 30 initiative has a goal of raising the percentage of female-identifying newly licensed engineers to 30 per cent by the year 2030. Thirty per cent is held as the tipping point for sustainable change—reaching 30 by 30 will help drive cultural change in the engineering profession, supporting even greater involvement of women in the profession.



SP2.1 has six streams: facilitating collaboration and information exchange among Canada’s 12 provincial and territorial engineering regulators; the 30 by 30 annual national conference; engaging employers; reporting on national and regional metrics; developing national resources; and developing a national research strategy for 30 by 30. Although the work under these six streams connects to all four themes described in this report, we are providing brief updates on the streams in this section and in Section 2.2:

- Facilitating collaboration and information exchange among Canada’s 12 provincial and territorial engineering regulators: One example of Engineers Canada’s work in this stream is the monthly 30 by 30 newsletter. All are welcome to subscribe to the newsletter at <https://mailchi.mp/engineerscanada/subscribe-to-30-by-30-newsletter>

- Reporting on national and regional metrics: These are published annually in Engineers Canada’s National Membership Report (<https://engineerscanada.ca/reports/national-membership-report>)
 - 30 by 30 national research strategy: In August 2023, Engineers Canada began seeking proposals from firms and individual consultants for the development of the 30 by 30 national research strategy. The full request for proposals (RFP) is available on our website at <https://engineerscanada.ca/news-and-events/news/engineers-canada-issues-request-for-proposal-for-the-development-of-a-national-research-strategy-for-30-by-30-initiative>. Proposals were due on September 22, 2023. The successful bidder will be selected in October. In addition in August 2023, Engineers Canada presented on equity, diversity, and inclusion, including 30 by 30, at Concordia University’s virtual Women in Engineering – Career Launch Experience (WIE-CLE). WIE-CLE was created by Concordia’s Gina Cody School of Engineering to support women engineering students in building a successful and sustainable career in industry. Employers at the virtual session included: Airbus; Air Canada Vacations; Bombardier; BRP (Bombardier Recreational Products); CAE; Nestlé Health Science; Pratt & Whitney Canada; and VuWall.
- **Theme 2: Engineering Workforce Capacity building-** to encourage female engineering retention and leadership

The following are examples of Engineers Canada’s work under Theme 2.

- April 2022 and May 2023 saw Engineers Canada host its national annual **30 by 30 Conference**. Each annual conference has been and will be held in collaboration with one of Engineers Canada’s provincial or territorial regulators:
 - 2022 – Due to ongoing Covid-related concerns, the 2022 conference was held as a series of virtual sessions held on April 13, 20, and 27 with a theme of “Emerging Leadership” in collaboration with Engineers Canada’s Alberta regulator, the Association of Professional Engineers and Geoscientists of Alberta (APEGA): April 13 featured the Pay Equity Commissioner of Canada; April 20 was an intersectionality workshop; and April 27 includes Equity, Diversity, and Inclusion (EDI) Leaders from across Canada.
 - 2023 - The conference, with the overall theme of “Championing Change in the Workplace”, consisted of three virtual sessions culminating in an in-person Employer Leadership Summit in Halifax, Nova Scotia. The conference was held in collaboration with Engineers Nova Scotia. The final week also included partner-led in-person networking sessions across Canada. Recordings of the three virtual sessions are at: session 1 - [Seeking EDI expertise](#); session 2 - [Guidelines for EDI](#); and session 3 - [Anti-violence in the Workplace](#). The in-person summit was not recorded; however, the agenda is at <https://engineerscanada.ca/event/30-by-30-conference-2023-employer-leadership-summit>.
- Engaging employers: In 2022, Engineers Canada sought proposals for the development of a strategy to engage engineering employers to advance 30 by 30. The full request for proposals (RFP) is available on our website at <https://engineerscanada.ca/news-and->

[events/news/engineers-canada-issues-rfp-for-development-of-employer-engagement-strategy-for-gender-equity-diversity-and-inclusion-in-engineering](#). The strategy is currently entering the consultation phase.

- Developing national resources: Engineers Canada has developed several national resources including:
 - o Changing the culture for engineering employers: <https://engineerscanada.ca/diversity/women-in-engineering/engineering-employers>)
 - o Managing Transitions Guide, a guide to creating safe, open, and inclusive environments to ensure maternity and parental leaves are positive and enjoyable experiences - <https://engineerscanada.ca/reports/managing-transitions>
 - o Guideline for Engineers and Engineering Firms on Workplace Equity for Women - <https://engineerscanada.ca/reports/guideline-for-engineers-and-engineering-firms-on-workplace-equity-for-women>
 - o Supplement: Guideline for Engineers and Engineering Firms on Workplace Equity for Women
- Every year, Engineers Canada recognizes and participates in International Women in Engineering Day (INWED) celebrations in June to raise the profile of women and non-binary people in engineering and to highlight the important contributions that they make in their communities through their engineering work. In 2022, we created videos to profile five incredible engineers from across Canada: [Kerry Black, PhD, P.Eng. and Jasmine McDermott](#), engineering student at the University of Calgary; [Monique Frize, OC, PhD, P.Eng.](#); [Menelika Bekolo, M.Eng., ing.](#); and [Liz Palmera-Nunez, P.Eng.](#)
- In advance of INWED on June 23, 2023, Engineers Canada moderated a virtual panel on “Welcoming Women to the Profession” at the virtual *Canadian Consulting Engineer’s* ADVANCE Women in Engineering summit (<https://www.canadianconsultingengineer.com/women-in-construction/video-hundreds-tune-in-for-inaugural-advance-women-in-engineering-event/1003416886/>).
- Also, in celebration of INWED 2023, events organised by Canada’s engineering regulators included: an [International Women in Engineering Day Panel, Dinner, and Networking event and an online presentation](#) about gender considerations in transportation and the impact of gender-neutral transportation practices on women, both organized by Engineers Geoscientists Manitoba; and a workshop on Activating Allyship: Advocating for Others Workshop (<https://www.egbc.ca/Events/Events/2023/23JUNAAZ>) by Engineers and Geoscientists British Columbia.

2.3 Theme 3: Collection of Engineering Strategic Indicators

Women Engineers	Percentage of Total (%)
Professionally Registered	15% (2022)*
Working in Engineering Establishments	-**
Undergraduates (graduated in 2020)	22.8%***

This data will be used for global benchmarking, so please include references for your data.

References for above data:

* <https://engineerscanada.ca/reports/2023-national-membership-information#-sex-representation-in-engineering>

** Data on Women Engineers Working in Engineering Establishments are not collected in Canada.

*** <https://engineerscanada.ca/reports/canadian-engineers-for-tomorrow-2020#undergraduate-degrees-awarded-to-femaleidentified-students>

In addition to the statistics listed above, please include any other statistics you feel are appropriate and any relevant notes to your statistics in the body of this section. Likewise, include any historical data or relevant statistical reports.

In addition to the statistics listed above, Engineers Canada collected the following quantitative data from each regulator for the period from January 1 to December 31, 2022.

- % Newly licensed (female-identifying)
- % Applying for licensure (female-identifying)
- % Engineers-in-Training (EITs) (female-identifying)
- % Newly registered EITs (female-identifying)
- % Student members (female-identifying)

2.4 **Theme 4:** Working in Partnership to address the Sustainable Development

Goals, with a particular emphasis on Goal 5, Gender Equality, and its relationship to the other Goals.

Engineers Canada worked in partnership with a number of other organizations in 2022 and 2023. Some examples are:

- Engineers Canada is a member of the **Canadian Coalition of Women in Engineering, Science, Trades and Technology (CCWESTT)** board. In 2023, Engineers Canada participated in a virtual panel discussion organized by CCWESTT as part of the 67th session of the **United Nations Commission on the Status of Women**, titled “Gender equity in Science, Technology, Trades, Engineering, and Mathematics (STEM): barriers and evidence-based solutions”. More information is at <https://girlsinscience.ca/Gender-Equity-Panel-CSW67/>. [need new image below] In addition, Engineers Canada supported CCWESTT in the creation of their new three-year strategic plan, launched in [year].



- In 2022 and 2023, Engineers Canada partnered on several **Canadian Federation of Engineering Students (CFES)** meetings and events including the Canadian Engineering Leadership Conference (CELC), the Canadian Engineering Competition (CEC), the Conference on Diversity in Engineering (CDE), and the Conference on Sustainability in Engineering (CSE). In addition ... mentoring program ... More information is at www.cfes.ca.
- Engineers Canada and **Engineers of Tomorrow** have received a grant for a collective impact project to address the issue of the missing 'E' in STEM. Engineers Canada will act as the backbone of collaborating organizations that share a mutual agenda and that will create common messaging and metrics to allow advocates to mutually reinforce their impacts in increasing elementary and high school student [engagement in engineering](#). [Learn more here, along with a presentation of the](#) "Where is the E in STEM?" report. The report recommended a strategic focus on promoting engineering in the K-12 education system to encourage a more diverse group of Canadians to pursue a career in engineering.
- Engineers Canada participates as a thought leader for **DiscoverE's** Persist series. DiscoverE was formerly the National Engineers Week Foundation founded by the National Society of Professional Engineers (NSPE) in the United States. In addition, as mentioned in section 2.1 of this Member Progress Report, Engineers Canada collaborates with DiscoverE on Future City. (<https://exploreengineering.ca/programs/future-city-canada>).
- Engineers Canada is participating in the **Electricity Human Resources Canada (EHRC)** Advisory Committee on Building a Sexual Harassment Free Workplace for Women in Electricity. Engineers Canada is a signatory to the EHRC Leadership Accord on Gender Diversity and a member of this EHRC Advisory Committee. More information about this work is at <https://electricityhr.ca/2021/08/12/electricity-human-resources-canada-project-addresses-sexual-harassment-in-sector-workplaces/>.
- Engineers Canada is a member of the **Engendering Success in STEM (ESS)** research consortium which has a focus on identifying the key interventions that most effectively target the largest obstacles at each step along the continuum from early education to early career for girls and women in engineering. More information about ESS is at <https://successinstem.ca/>.
- Engineers Canada, in partnership with **Girl Guides Canada**, created the Engineering crest (<https://exploreengineering.ca/programs/girl-guides>). The crest program continued throughout 2022 and 2023.



- Engineers Canada collaborates with the **Society of Women Engineers (SWE)**, based out the United States, as well as with the SWE in Canada chapters. With more than 40,000 members around the world, SWE describes itself as the world’s largest advocate and catalyst for change for women in engineering. Engineers Canada promotes SWE events that are available to Canadian participants and speaks at SWE in Canada workshops and events on the topics of gender equity, best practices for workplace diversity, equity, and inclusion, and on our 30 by 30 initiative.
- Engineers Canada is participating and providing input to the **University of Toronto’s Troost Institute for Leadership Education in Engineering (iLead)** research team that is working on the Social Sciences and Humanities Research Council (SSHRC) funded project on engineering career paths. The research focuses on tracking inequity in the workplace experiences of Canadian engineering graduates, including mobility patterns and the nature of workplace environments. More information about iLead projects is at <https://ilead.engineering.utoronto.ca/research/about/#research-labs>.

2.5 Engineering & Technological Innovations (Special recognition will be given to members with Innovative Reports.

In 2022 and throughout 2023, Engineers Canada partnered with Let’s Talk Science, Skills/Compétences Canada, and ChatterHigh on the Let’s Talk Careers Competition, an opportunity for high school students to explore careers through fun and interactive competitions, held twice annually. See <https://engineerscanada.ca/news-and-events/news/engineers-canada-joins-the-lets-talk-careers-competition> and <https://engineerscanada.ca/news-and-events/news/lets-talk-careers-competition-kicks-off-april-17>.

Engineers Canada has partnered with ChatterHigh to create a gamified engineering course that is freely available for both students and teachers on the ChatterHigh platform. The course allows students to explore the exciting and diverse range of opportunities in engineering, what it means to be an engineer, and how engineering impacts society. The gamified course also features a breadth of topics, including equity, diversity, and inclusion (EDI) within engineering. More information about the course is available [here](#).

Engineers Canada launched a new campaign that calls on Canadians to think differently about the value of engineers. Conceived in collaboration with Canada's engineering regulators, the [“Building Tomorrows” campaign](#) challenges Canadians to expand their perceptions of engineers—not just as builders of bridges and buildings—but as builders of solutions that make our world a better place. Check out the centerpiece of the campaign, a 30second post that aired on national, specialty, and conventional television across Canada.

The [Future City Experience](#) 2023 program, "A Waste-Free Future", was very successful, reaching almost 4,000 students, who were supported by close to 200 engineer mentors from diverse backgrounds across the country. This approach fosters inclusion and diversity, helping students see themselves represented in the engineering profession. The program culminated on May 10 with a [virtual Showcase](#) where students presented their cities to a panel of engineers.

1.6 Other Accomplishments

Every year, Canada's federal government invites **submissions to the House of Commons Standing Committee on Finance regarding the pre-budget consultations** in advance of the next budget. Engineers Canada's most recent submission includes: that the government provide ongoing support for equity, diversity, and inclusion initiatives across Canada, including measures to address discrimination, harassment, and enhance workplace inclusivity for women.

In March 2023, Engineers Canada organized its first National Engineering Month (NEM) kick-off event, **Reflecting Back and Looking Forward: Engineering Culture and the Future of the Profession**, which was well-attended by hundreds of participants across the engineering community. Panellists discussed the need for a culture shift within the engineering profession, by addressing some of the challenges and social barriers that exist. The following is a [link](#) to view the recording of the event. The recording is also available [here](#) in French.

As we marked **International Women's Day 2023** on March 8, Engineers Canada was honoured to be included in the Canadian delegation to the 67th Session of the **United Nations Commission on the Status of Women (UNCSW67)** led by Women and Gender Equality Canada (WAGE) and the federal Minister for WAGE and Youth. More information is at this [link](#) and on LinkedIn [here](#).

3. Announcements

Please list any announcements of upcoming programs, news from your organization, or other information valuable to the WFEO WiE Committee.

- Engineers Canada’s 2024 national 30 by 30 Conference will be held on Wednesday, May 22, 2024, in Winnipeg, Manitoba. Every year, Engineers Canada collaborates with a different provincial or territorial engineering regulator to organize the conference. The 2024 conference will be organized in collaboration with Engineers Geoscientists Manitoba.
- In the summer of 2023, Women in Engineering Committee member, Jeanette Southwood, and three other women, all members of the official Canadian delegation to the **United Nations Commission on the Status of Women (UNCSW)** meetings in New York earlier this year, were interviewed by the **Royal Canadian Mint** for the launch of the **Elsie MacGill coin**. Elsie MacGill was the first practising Canadian woman engineer and a passionate advocate for human rights, The Mint’s YouTube link to their video interview of Jeanette is at <https://www.youtube.com/watch?v=qsbxprR4vLY>. When you click on the YouTube link, you will see that there is written content below the video including content about Engineers Canada and our work as well as key messaging from our **Strategic priority 2.1 (SP2.1): Accelerate 30 by 30** work including: that culture and systems need to change, and that the true commitment of those who hold the levers to make change--employers’ Boards and senior leaders in all workplaces--is essential in making change. The theme “Ambition Takes Flight” will be consistent across all of the videos created by the Mint for the launch. In addition, there is currently an Instagram post on the Mint’s Instagram account with more information: <https://www.instagram.com/p/Cvw2bR7tX4-/?igshid=MTc4MmM1YmI2Ng=>. All are welcome to follow Jeanette on Instagram at @engineerscanadavp_ca.sp and Engineers Canada at @engineers_canada and @ingenieurscanada.

4 Resources

Please provide links to any publications, statistics, videos or other resources to be shared with the WFEO WiE Committee.

<https://engineerscanada.ca/>

<https://engineerscanada.ca/sites/default/files/2022-02/engineers-canada-strategic-plan-2019-2021.pdf>

<https://engineerscanada.ca/diversity/women-in-engineering/recruitment>

[Changing the culture for engineering employers](#)

<https://engineerscanada.ca/sites/default/files/2021-05/2022-2024%20%20-%20A%20vision%20for%20collaboration.pdf>

<https://engineerscanada.ca/about/governance/a-vision-for-collaboration#2x1>

[K-12-Guidelines-EN.pdf \(engineerscanada.ca\)](#)

<https://exploreengineering.ca/programs/future-city-canada>

[Registration now open for educators to sign up for Future City Experience | Engineers Canada](#)

<https://engineerscanada.ca/news-and-events/news/engineers-canada-issues-rfp-for-review-of-k-12-stem-education-in-canada>.

<https://engineerscanada.ca/news-and-events/news/register-today-for-the-emerging-professionals-summit>

[Engineering employers and 30 by 30 | Engineers Canada](#)

<https://engineerscanada.ca/news-and-events/news/30-by-30-virtual-conference-2021-sessions-are-now-available>

[Reconciliation in engineering | Engineers Canada](#)

<https://engineerscanada.ca/diversity/women-in-engineering>

<https://engineerscanada.ca/diversity/about-diversity-in-engineering>

<https://successinstem.ca/>

<https://engineerscanada.ca/reports/2021-national-membership-information#-sex-representation-in-engineering>

<https://engineerscanada.ca/publications/canadian-engineers-for-tomorrow-2019#undergraduate-degrees-awarded-to-female-students>

<https://electricityhr.ca/2021/08/12/electricity-human-resources-canada-project-addresses-sexual-harassment-in-sector-workplaces/>

<https://ilead.engineering.utoronto.ca/research/about/#research-labs>

<http://dev.discovere.org/our-programs/persist-series>; <https://engineerscanada.ca/news-and-events/news/the-importance-of-storytelling-in-edi-persist-series-episode-8>

<https://exploreengineering.ca/programs/future-city-canada>

<https://exploreengineering.ca/programs/girl-guides>

<https://www.apega.ca/members/mentoring>

<https://engineerscanada.ca/news-and-events/news/engineers-canada-issues-rfp-for-development-of-employer-engagement-strategy-for-gender-equity-diversity-and-inclusion-in-engineering>

<https://engineerscanada.ca/news-and-events/news/engineers-canada-issues-rfp-to-update-guideline-on-parental-leave-for-engineers-and-geoscientists>

<https://www.newswire.ca/news-releases/kathy-baig-ing-will-preside-over-the-engineers-canada-board-in-2022-2023-844261924.html>

<https://engineerscanada.ca/news-and-events/news/call-for-nominations-edi-leaders-in-engineering-workplaces>

<https://engineerscanada.ca/news-and-events/news/call-for-events-national-engineering-month>

<https://engineerscanada.ca/news-and-events/news/future-city-join-a-live-qa-as-you-design-your-city-on-the-moon>