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## Statistics on Engineers in Canada

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Science and Technology Economic Analysis Division  
Industrial Competitiveness Branch  
Industry, Science and Technology Canada

November 1990

(La version française est disponible sur demande)

## Foreword

Highly trained technical personnel are central to ensuring the competitiveness of a nation's industrial effort. In Canada, the engineering profession has had a proud history of developing and implementing innovative solutions to the unique problems of Canadian geography and climate while maintaining world-class industrial capabilities.

As a result, the Canadian consulting engineering industry is ranked among the most developed in the world and is highly competitive on both domestic and international markets. Approximately 50 percent of all engineering in Canada is carried out by private consulting firms, and some of these have established enviable international reputations. These include Lavalin and the SNC Group, two Canadian companies that are among the largest consulting engineering firms in the world. Moreover, consulting engineering is one of the few service sectors in which Canada has a positive trade balance.

Recently, however, numerous concerns have been expressed about the adequacy of the present and future supply of Canadian engineers. For example, according to a study prepared for Employment and Immigration Canada and the Canadian Engineering Manpower Board, Canada faces shortages of 25 000 engineers in 1995 and 55 000 by the year 2000.

As part of its mission to assist Canadian industry, Industry, Science and Technology Canada collects and analyzes statistics on engineering university enrolment, engineering degrees and faculty, and engineers in the work force. Since our industrial future will to a significant extent depend on a continuing supply of engineers, this factbook is being published in the hope that the statistics will inform policy discussion on the steps necessary to ensure that Canada maintains an adequate supply of engineers.

## Acknowledgments

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The data have been obtained from a number of rather extensive databases, and every effort was made to provide accurate interpretations of the results. The author assumes full responsibility for any misrepresentation, misinterpretation or error.



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## Engineering in Canadian universities

An adequate supply of engineers is essential to a country's economic development. In Canada, engineering schools in universities are the primary source of engineers.

This chapter presents an historical overview of engineering in Canadian universities. Enrolment, full-time and part-time, is examined over the past 15 years, the presentation of the past being essential for any consideration of the future.

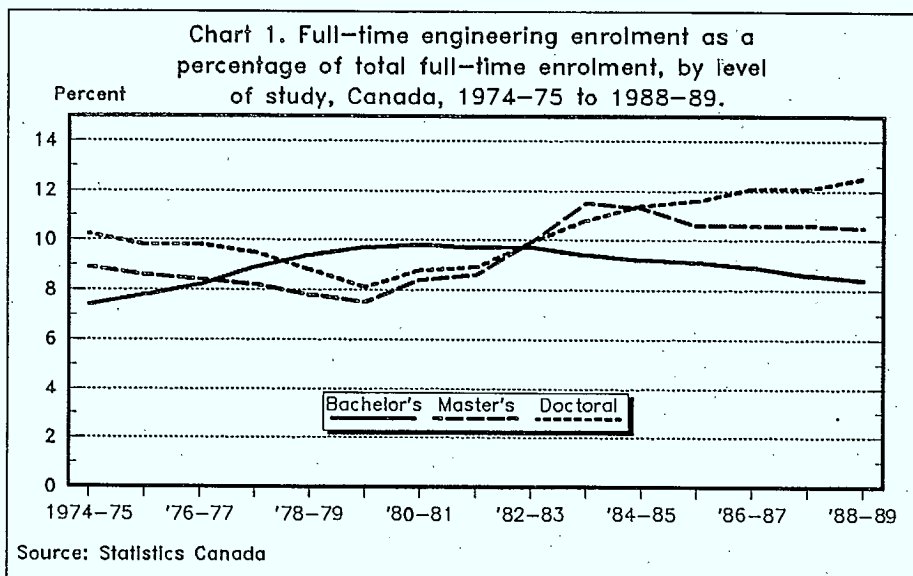
Enrolment trends are eventually reflected in degrees awarded. This is not sufficient, however, for an examination of engineering. Historically, engineering has had high dropout rates. Secondly, the enrolment data provide a *snapshot* view and do not lend themselves to input/output models. Degree data are therefore presented independently of enrolment data, as an overview of the universities' output (degree data are calendar year accumulative).

The examination of the supply of engineers from Canadian universities would not be complete without an examination of the people responsible for the training of engineers - the engineering faculty.

### Full-time enrolment

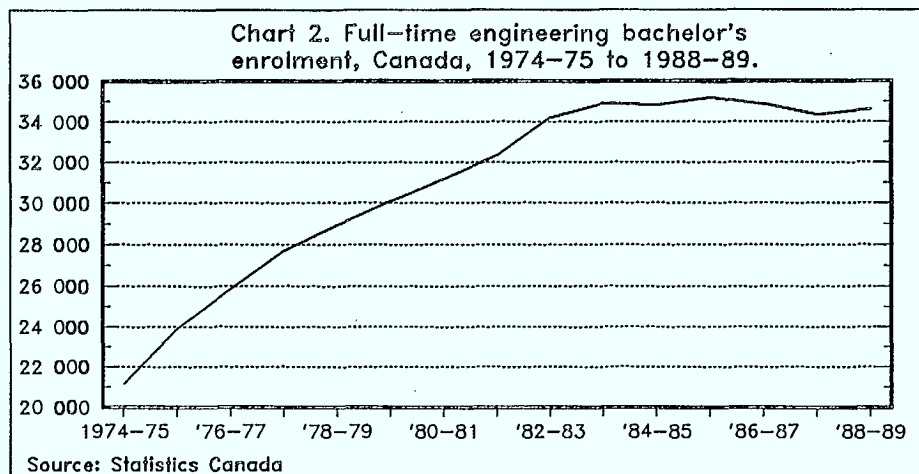
#### *Field of study*

- In 1988-89, engineering accounted for 8.4% of the total full-time enrolment at the bachelor's level, 10.5% at the master's level, and 12.5% at the doctoral level. This was an increase of one percentage point at the bachelor's level and about two percentage points at the graduate level over the 1974-75 level (Chart 1).

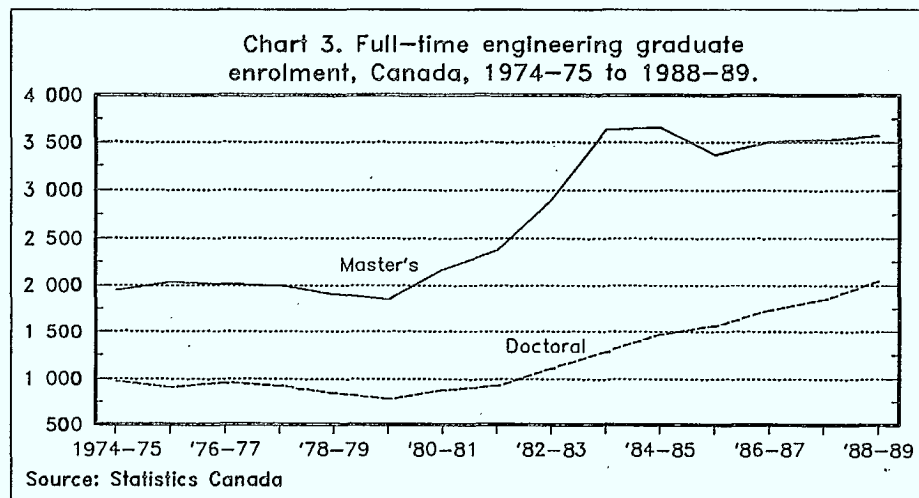


### Level of study

- Engineering enrolment rose at both the undergraduate and graduate levels. Bachelor's enrolment grew from 21 181 in 1974-75 to 34 628 in 1988-89, an increase of 63.5%. The discipline attracted more and more students at the bachelor's level every year until 1985-86, when it peaked at 35 171. Following two consecutive years of decline, enrolment grew slightly in 1988-89 as a result of an increase in female enrolment (Chart 2, Table 1).



- Growth in engineering bachelor's enrolment outpaced overall university enrolment at the bachelor's level, rising by 43.3% during the same period.
- Engineering enrolment at the master's level increased even more rapidly, rising by 82.8% from 1 950 in 1974-75 to 3 565 in 1988-89 (Chart 3, Table 2).



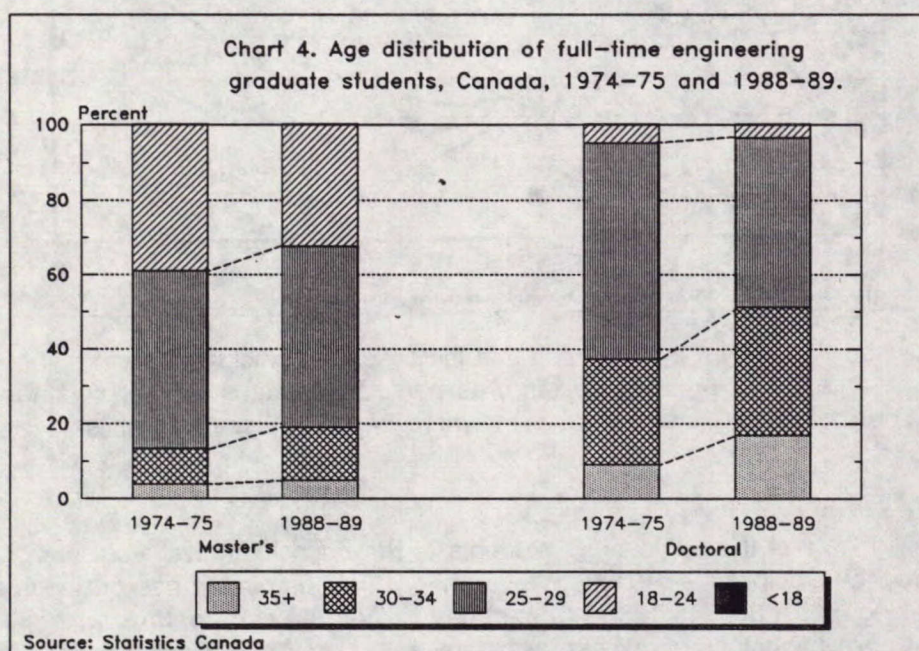
- Engineering's growth was greater compared with total full-time master's enrolment which rose by 55.1% from 21 828 in 1974-75 to 33 866 in 1988-89.



- The most pronounced growth in engineering enrolment, however, was at the doctoral level, which more than doubled over the 15-year period, from 967 students to 2 042 (Chart 3, Table 3).
- Again, engineering outpaced overall doctoral enrolment, which rose by 72.9% from 9 436 in 1974-75 to 16 318 in 1988-89.

### Age

- Historically, around 85% of engineering students at the bachelor's level have been between 18 and 24 years of age.
- At the graduate level, this age cohort has been shrinking. By 1988-89, the 18-24 cohort had shrunk to 32.4% of engineering master's enrolment, compared with 39.0% in 1974-75. The 30-34 age cohort increased its representation from 9.5% to 14.1% (Chart 4).

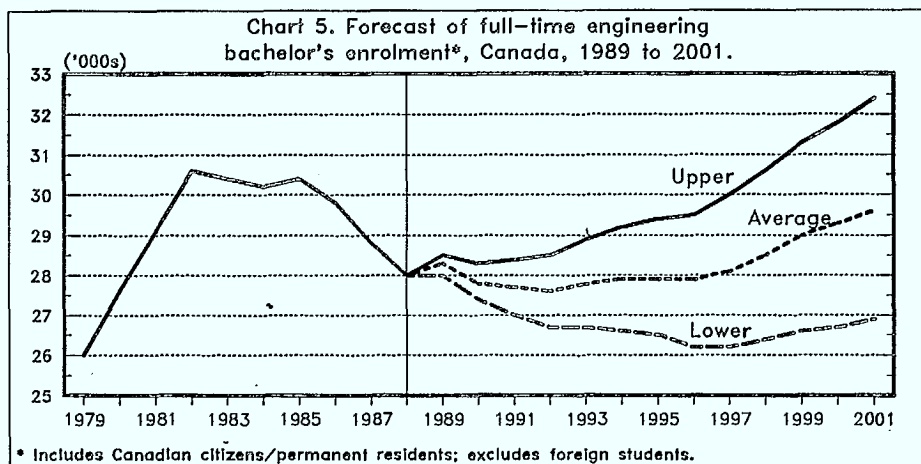


- The most significant shift in age distribution of engineering students was at the doctoral level. In 1974-75, there were 57.9% between 25 and 29 years of age, and in 1988-89, only 45.2%. The 30-34 age cohort expanded from 28.1% in 1974-75 to 34.4% in 1988-89. The representation of students 35 years of age or older almost doubled, from 9.1% of engineering doctoral enrolment in 1974-75 to 16.9% in 1988-89.



### Bachelor's enrolment forecast

- The 18-24 age cohort represented between 80% and 85% of Canadian students in engineering bachelor's programs per annum throughout the time period examined. Using historical participation rates and Canadian population projections, full-time engineering bachelor's enrolment can be forecast to the year 2001.
- A lower limit was generated by freezing the participation rate at the 1988 figure and making the assumption that the rate of increases seen historically until 1988 will cease. Because the 18-24 age cohort is shrinking, a decline would result (Chart 5).

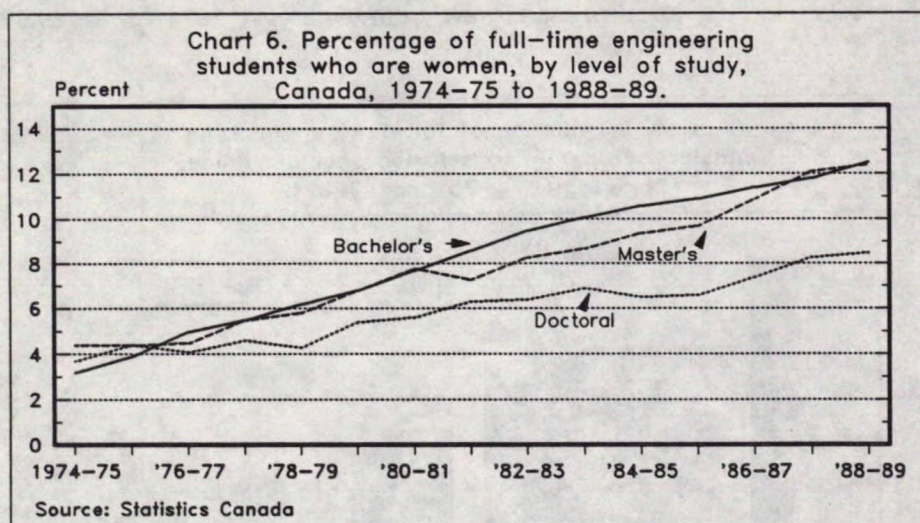


- An upper limit was determined by assuming that increases in participation rates will continue. This assumption will at some point be misleading, as participation rates will not continue to increase indefinitely. The most likely estimate lies somewhere between these two limits.

### Gender

- In 1988-89, still 87.5% of the engineering students at the bachelor's level were men. However, in absolute terms, the discipline is attracting fewer men. Male enrolment has grown from 20 505 in 1974-75, peaking at 31 367 in 1983-84, and has since declined to 30 302 in 1988-89. By contrast, total male bachelor's enrolment, with rare exceptions, has risen annually throughout the past decade.
- The number of women studying engineering at the bachelor's level increased steadily from 676 in 1974-75 to 4 326 in 1988-89. As a result, women's representation in engineering at the bachelor's level rose from 3.2% to 12.5%. While women remain a minority in engineering, by 1988-89, some 51.0% of all bachelor's students were women (Chart 6).
- At the master's level, the increase of women in engineering paralleled their rise at the bachelor's level. The number of women enrolled in masters' programs increased from 86 in 1974-75 to 441 in 1988-89. Consequently, their share of enrolment rose from 4.4% to 12.4%. But again, women's representation in engineering was much lower than total enrolment at the master's level, when in 1988-89, 44.5% of master's students were women (Chart 6).

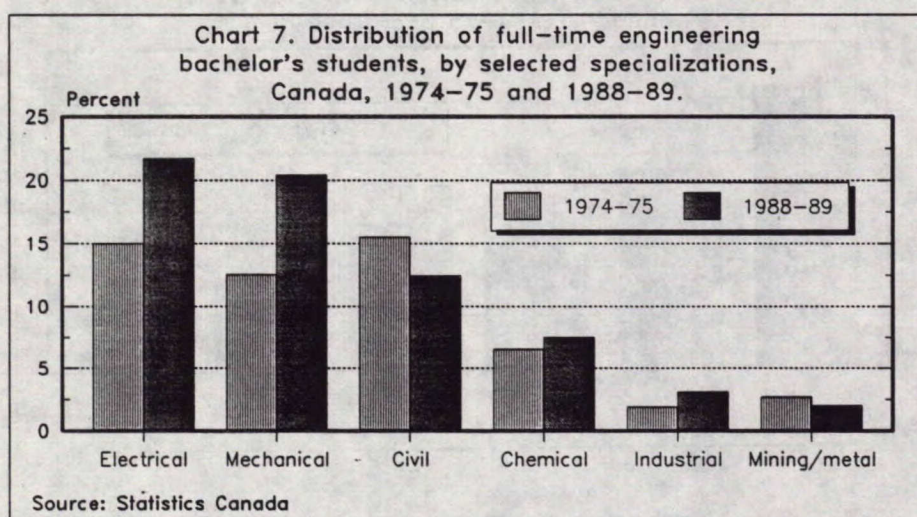




- The representation of women in engineering doctoral enrolment was less than that at the bachelor's and master's levels. As a proportion of doctoral enrolment in engineering, women's share increased from 3.7% to 8.5%, growing from 36 in 1974-75 to 174 in 1988-89. By contrast, one-third of all doctoral students in 1988-89 were women.

### Specialization

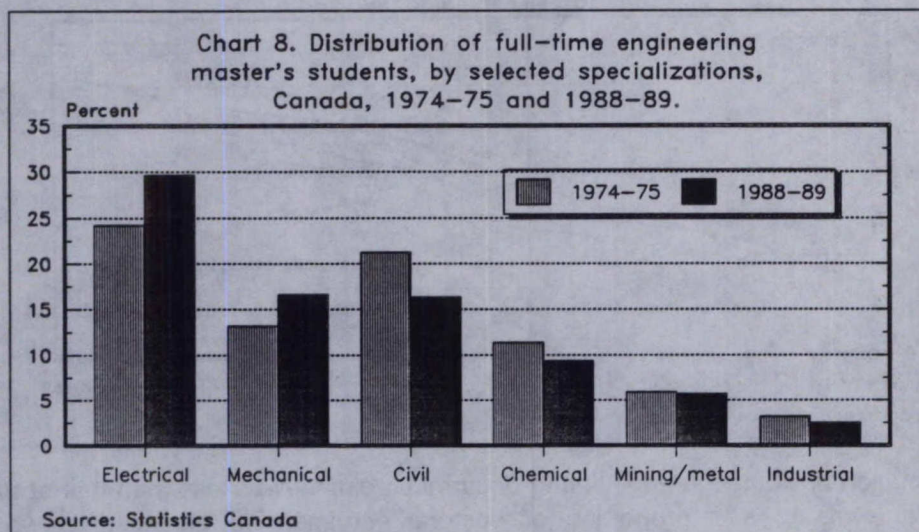
- Over the past 15 years, students of engineering have changed their areas of specialization. Throughout the 1980s, electrical engineering was the most popular specialty at the bachelor's level, whereas before 1979-80, civil engineering was the program engineering students opted for (Chart 7)(see Appendix for list of specializations).



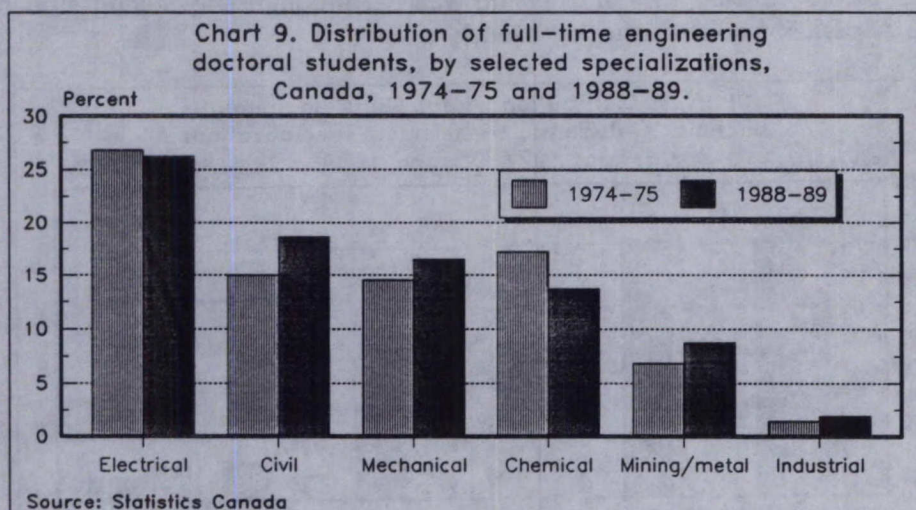
- Bachelor's enrolment in electrical and mechanical engineering has more than doubled since 1974-75, increasing from 3 180 to 7 515 and from 2 646 to 7 074, respectively.



- At the master's level, electrical engineering was the most popular field. Moreover, the percentage of students enrolling in this specialization grew from 24.2% in 1974-75 to 29.6% in 1988-89 (Chart 8).



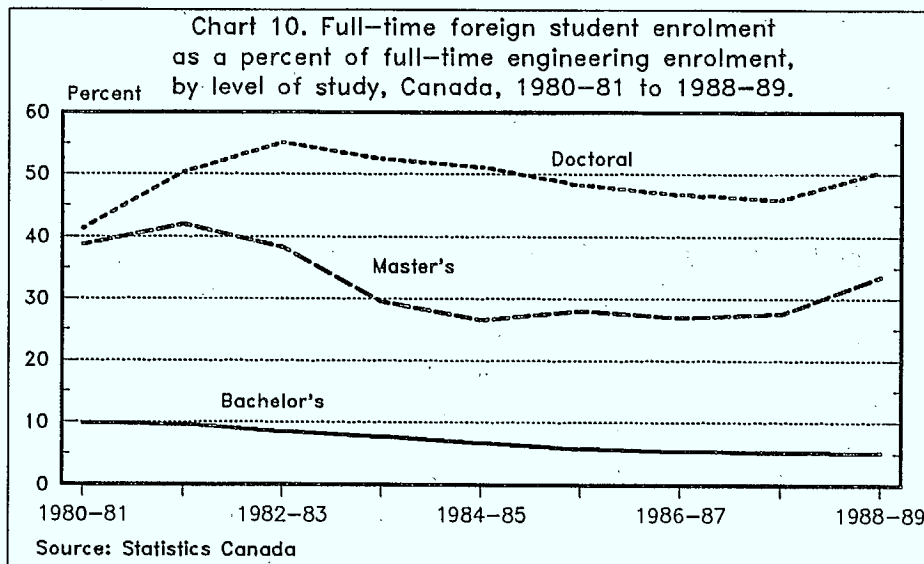
- Electrical engineering, together with mechanical and civil engineering accounted for almost two-thirds of the master's students in engineering in 1988-89.
- With 26.2% of 1988-89 enrolment, electrical engineering was also the most popular specialization at the doctoral level, followed by civil engineering (18.6%), mechanical engineering (16.5%) and chemical engineering (13.7%) (Chart 9).



### Foreign student enrolment

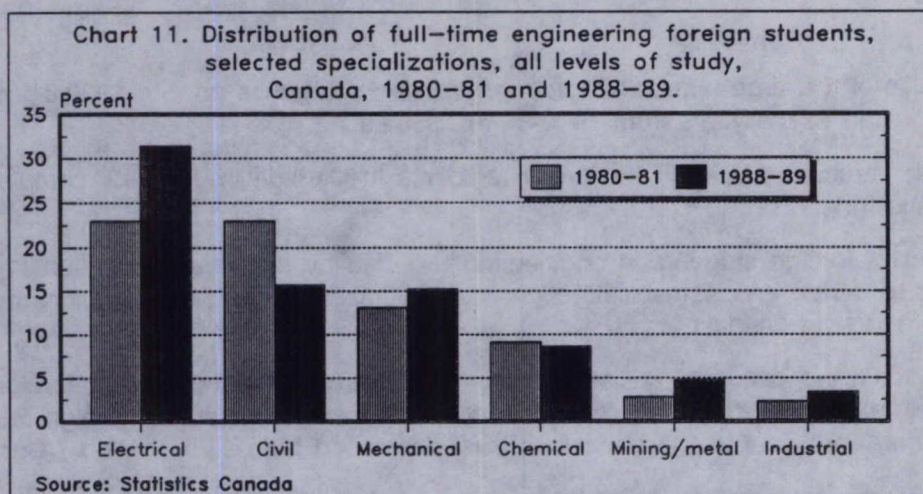
Because of the large numbers in the *not reported* categories prior to 1980-81, the time series examined is limited to the years from 1980-81 to 1988-89.

- Engineering attracted 17.8% of the foreign students in Canada in 1988-89, compared with 8.2% of Canadian students.
- The number of foreign students in engineering dropped by 5.1% between 1980-81 and 1988-89, from 4 222 to 4 005. As a result, in 1988-89, they made up 10.1% of engineering enrolment, down from 10.8% in 1980-81.
- Most of the decline occurred at the bachelor's level where the number of foreign engineering students fell from 3 018 in 1980-81 to 1 779 in 1988-89. As a result, the foreign students' share of engineering enrolment at the bachelor's level decreased from 9.9% to 5.2% (Chart 10).

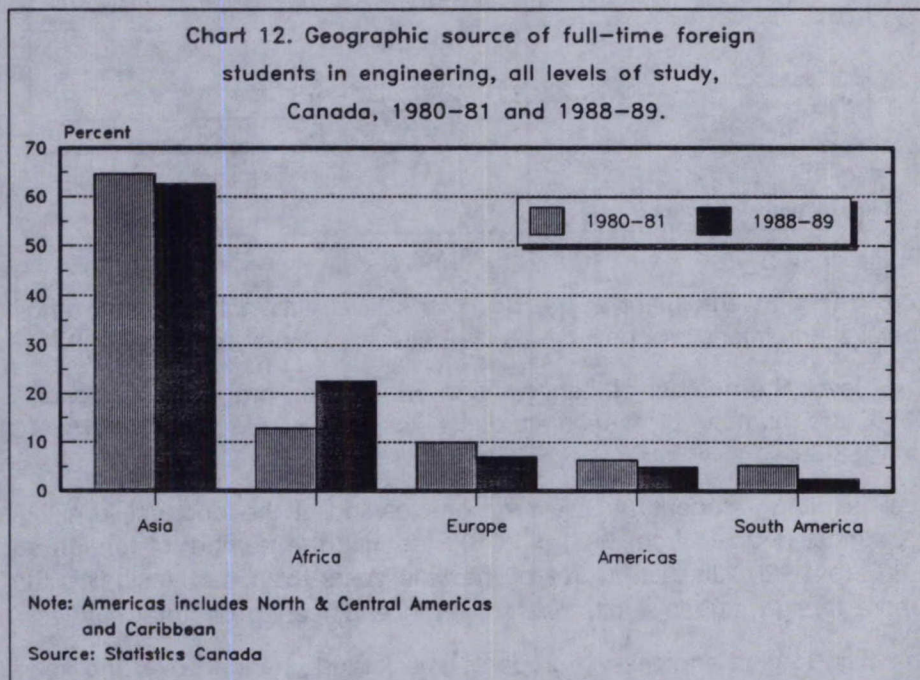


- The downturn in foreign enrolment at the bachelor's level was not unique to engineering. Total foreign bachelor's enrolment dropped by 18.4% between 1980-81 and 1988-89.
- At the master's level, the number of Canadians in engineering programs increased by 78.3% from 1 328 to 2 368, the number of foreign students rose by 42.0% from 843 to 1 197 between 1980-81 and 1988-89.
- The presence of foreign students was even more marked at the doctoral level. As the number of Canadians almost doubled from 513 to 1 013 students, the number of foreign students almost tripled from 361 to 1 029. In fact, in five of the nine years examined, including the most recent, there were more foreign students than Canadians in engineering doctoral studies.
- The areas in which foreign engineering students specialized changed over the years. In 1988-89, 31.4% chose electrical engineering, up from 23.0% in 1980-81 (Chart 11).





- Regardless of the level of study, electrical engineering was the most popular choice amongst foreign students. Civil engineering lost popularity, with its share falling from 23.0% in 1980-81 to 15.8% in 1988-89.
- Almost two-thirds of the foreign engineering students were from Asia, throughout the years 1980-81 to 1988-89.
- Growing from 536 to 902, Africa's share of foreign engineering enrolment almost doubled from 12.8% in 1980-81 to 22.6% in 1988-89 (Chart 12).



- On the other hand, the number of students from Europe, South America, North/Central America and the Caribbean fell lowering their shares of foreign enrolment.

Table 1. Full-time bachelor's\* enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	1 384	1 617	1 992	2 218	2 312	3 020	3 199	2 867	3 045	2 987	2 910	2 831	2 796	2 737	2 599
Male	1 292	1 482	1 736	1 921	1 954	2 596	2 728	2 323	2 396	2 313	2 232	2 114	2 087	2 032	1 905
Female	92	135	256	297	358	424	471	544	649	674	678	717	709	705	694
Civil	3 293	3 694	4 377	5 123	5 206	4 742	4 348	4 187	4 518	4 333	4 111	4 039	4 010	3 918	4 280
Male	3 206	3 557	4 172	4 835	4 878	4 405	4 036	3 828	4 057	3 861	3 637	3 542	3 483	3 371	3 604
Female	87	137	205	288	328	337	312	359	461	472	474	497	527	547	676
Electrical	3 180	3 342	3 887	4 667	5 148	5 318	5 669	6 031	7 156	7 414	7 841	8 017	8 043	7 507	7 515
Male	3 122	3 262	3 772	4 509	4 961	5 113	5 425	5 723	6 746	6 942	7 289	7 454	7 424	6 925	6 888
Female	58	80	115	158	187	205	244	308	410	472	552	563	619	582	627
Engineering general	7 489	9 567	9 321	8 525	8 657	6 888	7 160	7 550	5 931	5 437	6 177	6 449	5 810	5 777	5 836
Male	7 225	9 148	8 844	8 042	8 108	6 440	6 569	6 875	5 342	4 875	5 465	5 776	5 181	5 095	5 114
Female	264	419	477	483	549	448	591	675	589	562	712	673	629	682	722
Industrial	409	422	525	534	604	695	855	801	871	834	844	969	1 062	1 069	1 084
Male	386	398	485	488	554	626	758	689	761	726	724	806	846	858	839
Female	23	24	40	46	50	69	97	112	110	108	120	163	216	211	245
Mechanical	2 646	2 877	3 381	4 118	4 377	4 715	5 023	5 606	6 578	6 716	6 816	6 869	6 965	7 028	7 074
Male	2 627	2 842	3 323	4 016	4 248	4 546	4 810	5 332	6 207	6 310	6 378	6 374	6 452	6 473	6 478
Female	19	35	58	102	129	169	213	274	371	406	438	495	513	555	596
Mining/metallurgical	574	572	619	685	765	850	886	992	932	885	912	735	663	676	691
Male	562	540	576	631	708	769	811	906	822	782	798	636	571	587	588
Female	12	32	43	54	57	81	75	86	110	103	114	99	92	89	103
Other engineering**	2 206	1 817	1 776	1 829	1 889	3 877	4 050	4 306	5 195	6 287	5 246	5 262	5 540	5 669	5 549
Male	2 085	1 742	1 683	1 725	1 766	3 554	3 660	3 867	4 641	5 558	4 637	4 623	4 864	4 977	4 886
Female	121	75	93	104	123	323	390	439	554	729	609	639	676	692	663
Total engineering	21 181	23 908	25 878	27 699	28 958	30 105	31 190	32 340	34 226	34 893	34 857	35 171	34 889	34 381	34 628
Male	20 505	22 971	24 591	26 167	27 177	28 049	28 797	29 543	30 972	31 367	31 160	31 325	30 908	30 318	30 302
Female	676	937	1 287	1 532	1 781	2 056	2 393	2 797	3 254	3 526	3 697	3 846	3 981	4 063	4 326
Total university	287 559	307 445	314 292	312 416	306 498	309 495	317 471	332 014	351 099	370 983	379 953	385 818	390 610	400 180	412 171
Male	168 861	176 445	176 392	173 087	168 113	168 430	171 377	177 104	186 678	194 918	196 701	197 240	197 359	199 245	201 867
Female	118 698	131 000	137 900	139 329	138 385	141 065	146 094	154 910	164 421	176 065	183 252	188 578	193 251	200 935	210 304

\* Includes first professional.

\*\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.



Table 2. Full-time master's enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	222	233	211	193	186	181	243	268	337	404	383	354	345	350	335
Male	209	218	198	179	162	154	210	225	268	328	309	294	283	277	257
Female	13	15	13	14	24	27	33	43	69	76	74	60	62	73	78
Civil	413	408	455	450	470	461	484	563	712	836	804	741	736	638	582
Male	397	392	439	422	444	437	449	532	662	764	729	662	635	539	503
Female	16	16	16	28	26	24	35	31	50	72	75	79	101	99	79
Electrical	471	518	488	465	447	411	507	563	688	905	914	914	973	994	1 054
Male	453	490	469	443	428	395	484	537	655	859	865	861	910	918	973
Female	18	28	19	22	19	16	23	26	33	46	49	53	63	76	81
Industrial	62	49	51	49	39	33	37	43	48	52	61	49	80	80	88
Male	56	47	48	42	35	31	32	37	44	45	47	35	61	59	64
Female	6	2	3	7	4	2	5	6	4	7	14	14	19	21	24
Mechanical	258	250	249	224	219	233	254	300	448	633	634	539	545	599	593
Male	252	248	247	223	217	228	247	292	432	596	593	496	499	551	546
Female	6	2	2	1	2	5	7	8	16	37	41	43	46	48	47
Mining/metallurgical	115	110	106	115	106	109	126	166	201	221	214	224	253	210	201
Male	112	106	99	110	99	99	116	151	185	203	204	206	226	185	167
Female	3	4	7	5	7	10	10	15	16	18	10	18	27	25	34
Other engineering*	409	459	451	499	433	421	520	468	469	584	644	552	576	657	712
Male	385	436	420	466	405	380	464	424	416	523	564	493	510	573	614
Female	24	23	31	33	28	41	56	44	53	61	80	59	66	84	98
Total engineering	1 950	2 027	2 011	1 995	1 900	1 849	2 171	2 371	2 903	3 635	3 654	3 373	3 508	3 528	3 565
Male	1 864	1 937	1 920	1 885	1 790	1 724	2 002	2 198	2 662	3 318	3 311	3 047	3 124	3 102	3 124
Female	86	90	91	110	110	125	169	173	241	317	343	326	384	426	441
Total university	21 828	23 543	24 035	24 436	24 459	24 678	25 802	27 622	29 472	31 656	32 376	31 944	33 029	33 240	33 866
Male	15 350	16 158	16 086	15 890	15 496	15 024	15 510	16 282	17 361	18 763	18 740	18 087	18 556	18 741	18 780
Female	6 478	7 385	7 949	8 546	8 963	9 654	10 292	11 340	12 111	12 893	13 636	13 857	14 473	14 499	15 086

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 3. Full-time doctoral enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	166	148	151	140	121	134	132	148	182	196	219	251	265	281	280
Male	155	138	145	135	116	123	116	128	158	166	195	224	235	252	247
Female	11	10	6	5	5	11	16	20	24	30	24	27	30	29	33
Civil	145	144	199	157	149	119	131	174	209	269	290	304	311	334	380
Male	141	140	194	149	142	112	125	163	199	259	278	292	290	312	350
Female	4	4	5	8	7	7	6	11	10	10	12	12	21	22	30
Electrical	259	245	246	235	227	211	206	226	297	346	423	433	487	481	536
Male	253	234	231	221	214	198	201	219	286	334	407	421	470	454	500
Female	6	11	15	14	13	13	5	7	11	12	16	12	17	27	36
Industrial	14	15	11	12	22	13	11	13	17	14	12	14	37	37	39
Male	13	14	10	12	21	12	8	10	13	11	10	11	31	30	32
Female	1	1	1	-	1	1	3	3	4	3	2	3	6	7	7
Mechanical	140	141	122	121	126	101	106	117	156	183	208	214	254	297	337
Male	136	134	118	116	122	98	103	112	150	172	194	199	236	274	314
Female	4	7	4	5	4	3	3	5	6	11	14	15	18	23	23
Mining/metallurgical	66	59	54	50	43	52	57	60	85	106	122	134	162	157	178
Male	64	59	54	49	42	50	52	58	79	98	111	122	147	137	154
Female	2	0	0	1	1	2	5	2	6	8	11	12	15	20	24
Other engineering*	177	156	171	207	153	154	231	182	161	181	203	219	219	263	292
Male	169	149	163	198	148	149	220	172	151	165	186	197	197	238	271
Female	8	7	8	9	5	5	11	10	10	16	17	22	22	25	21
Total engineering	967	908	954	922	841	784	874	920	1 107	1 295	1 477	1 569	1 735	1 850	2 042
Male	931	868	915	880	805	742	825	862	1 036	1 205	1 381	1 466	1 606	1 697	1 868
Female	36	40	39	42	36	42	49	58	71	90	96	103	129	153	174
Total university	9 436	9 270	9 746	9 681	9 554	9 731	9 947	10 357	11 228	11 997	12 901	13 501	14 351	15 235	16 318
Male	7 290	7 055	7 326	7 140	6 925	6 885	6 972	7 142	7 655	8 108	8 695	9 025	9 475	9 933	10 661
Female	2 146	2 215	2 420	2 541	2 629	2 846	2 975	3 215	3 573	3 889	4 206	4 476	4 876	5 302	5 657

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 4. Citizenship of full-time bachelor's\* students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	3 185	2 867	3 045	2 987	2 910	2 831	2 796	2 737	2 599
	<i>Cdn/perm.res.</i>	2 967	2 659	2 883	2 841	2 769	2 707	2 675	2 609	2 500
	<i>Non-Canadian</i>	218	208	162	146	141	124	121	128	99
Civil	<i>Reported #</i>	4 320	4 187	4 518	4 290	4 070	4 008	3 980	3 894	4 251
	<i>Cdn/perm.res.</i>	3 583	3 489	3 890	3 755	3 679	3 722	3 765	3 702	4 073
	<i>Non-Canadian</i>	737	698	628	535	391	286	215	192	178
Electrical	<i>Reported #</i>	5 601	6 031	7 156	7 316	7 731	7 945	7 970	7 444	7 458
	<i>Cdn/perm.res.</i>	4 902	5 301	6 375	6 572	6 999	7 287	7 312	6 806	6 850
	<i>Non-Canadian</i>	699	730	781	744	732	658	658	638	608
Engineering general	<i>Reported #</i>	6 782	7 550	5 931	5 191	5 935	6 179	5 559	5 478	5 564
	<i>Cdn/perm.res.</i>	6 129	6 805	5 392	4 792	5 594	5 805	5 228	5 164	5 225
	<i>Non-Canadian</i>	653	745	539	399	341	374	331	314	339
Industrial	<i>Reported #</i>	855	801	871	834	844	969	1 062	1 069	1 038
	<i>Cdn/perm.res.</i>	787	733	797	754	779	914	1 002	998	955
	<i>Non-Canadian</i>	68	68	74	80	65	55	60	71	83
Mechanical	<i>Reported #</i>	4 895	5 606	6 578	6 627	6 719	6 762	6 863	6 930	6 968
	<i>Cdn/perm.res.</i>	4 492	5 203	6 172	6 256	6 420	6 504	6 606	6 683	6 696
	<i>Non-Canadian</i>	403	403	406	371	299	258	257	247	272
Mining/metallurgical	<i>Reported #</i>	886	992	932	885	912	735	663	676	691
	<i>Cdn/perm.res.</i>	843	948	885	836	846	691	627	649	665
	<i>Non-Canadian</i>	43	44	47	49	66	44	36	27	26
Other engineering**	<i>Reported #</i>	4 003	4 256	5 195	6 118	5 079	5 095	5 377	5 563	5 471
	<i>Cdn/perm.res.</i>	3 806	4 048	4 915	5 812	4 820	4 876	5 206	5 383	5 297
	<i>Non-Canadian</i>	197	208	280	306	259	219	171	180	174
Total engineering	<i>Reported #</i>	30 527	32 290	34 226	34 248	34 200	34 524	34 270	33 791	34 040
	<i>Cdn/perm.res.</i>	27 509	29 186	31 309	31 618	31 906	32 506	32 421	31 994	32 261
	<i>Non-Canadian</i>	3 018	3 104	2 917	2 630	2 294	2 018	1 849	1 797	1 779
Total university	<i>Reported #</i>	314 182	330 244	349 688	368 940	377 656	383 103	387 862	398 456	408 957
	<i>Cdn/perm.res.</i>	298 322	311 485	328 931	347 931	358 419	366 771	373 938	385 791	396 011
	<i>Non-Canadian</i>	15 860	18 759	20 757	21 009	19 237	16 332	13 924	12 665	12 946

\* Includes first professional.

\*\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.



Table 5. Citizenship of full-time master's students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	243	268	337	404	383	354	345	350	335
	<i>Cdn/perm.res.</i>	141	138	189	287	292	262	263	258	222
	<i>Non-Canadian</i>	102	130	148	117	91	92	82	92	113
Civil	<i>Reported #</i>	484	563	712	836	804	741	736	638	582
	<i>Cdn/perm.res.</i>	303	331	451	592	582	507	510	435	352
	<i>Non-Canadian</i>	181	232	261	244	222	234	226	203	230
Electrical	<i>Reported #</i>	507	563	688	905	914	914	973	994	1 054
	<i>Cdn/perm.res.</i>	332	368	419	605	623	620	668	723	687
	<i>Non-Canadian</i>	175	195	269	300	291	294	305	271	367
Industrial	<i>Reported #</i>	37	43	48	52	61	49	80	80	88
	<i>Cdn/perm.res.</i>	13	16	24	35	40	31	55	52	58
	<i>Non-Canadian</i>	24	27	24	17	21	18	25	28	30
Mechanical	<i>Reported #</i>	254	300	448	633	634	539	545	599	593
	<i>Cdn/perm.res.</i>	144	143	268	467	504	412	424	446	414
	<i>Non-Canadian</i>	110	157	180	166	130	127	121	153	179
Mining/metallurgical	<i>Reported #</i>	126	166	201	221	214	224	253	210	201
	<i>Cdn/perm.res.</i>	72	91	127	156	163	174	191	150	135
	<i>Non-Canadian</i>	54	75	74	65	51	50	62	60	66
Other engineering*	<i>Reported #</i>	520	468	469	584	644	552	576	657	712
	<i>Cdn/perm.res.</i>	323	290	309	421	477	422	455	492	500
	<i>Non-Canadian</i>	197	178	169	163	167	130	121	165	212
Total engineering	<i>Reported #</i>	2 171	2 371	2 903	3 635	3 654	3 373	3 508	3 528	3 565
	<i>Cdn/perm.res.</i>	1 328	1 377	1 787	2 563	2 681	2 428	2 566	2 556	2 368
	<i>Non-Canadian</i>	843	994	1 116	1 072	973	945	942	972	1 197
Total university	<i>Reported #</i>	25 802	27 622	29 472	31 656	32 376	31 944	33 029	33 240	33 866
	<i>Cdn/perm.res.</i>	21 839	23 181	24 879	27 163	28 024	27 633	28 637	28 731	28 783
	<i>Non-Canadian</i>	3 963	4 441	4 593	4 493	4 352	4 311	4 392	4 509	5 083

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 6. Citizenship of full-time doctoral students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	132	148	182	196	219	251	265	281	280
	<i>Cdn/permanent.res.</i>	69	66	81	91	105	133	145	160	149
	<i>Non-Canadian</i>	63	82	101	105	114	118	120	121	131
Civil	<i>Reported #</i>	131	174	209	269	290	304	311	334	380
	<i>Cdn/permanent.res.</i>	77	80	83	113	129	147	163	164	157
	<i>Non-Canadian</i>	54	94	126	156	161	157	148	170	223
Electrical	<i>Reported #</i>	206	226	297	346	423	433	487	481	536
	<i>Cdn/permanent.res.</i>	108	108	132	170	203	211	236	236	253
	<i>Non-Canadian</i>	98	118	165	176	220	222	251	245	283
Industrial	<i>Reported #</i>	11	13	17	14	12	14	37	37	39
	<i>Cdn/permanent.res.</i>	6	6	7	5	3	6	13	16	17
	<i>Non-Canadian</i>	5	7	10	9	9	8	24	21	22
Mechanical	<i>Reported #</i>	106	117	156	183	208	214	254	297	337
	<i>Cdn/permanent.res.</i>	65	59	73	88	98	116	144	182	180
	<i>Non-Canadian</i>	41	58	83	95	110	98	110	115	157
Mining/metallurgical	<i>Reported #</i>	57	60	85	106	122	134	162	157	178
	<i>Cdn/permanent.res.</i>	37	37	47	57	61	62	85	74	79
	<i>Non-Canadian</i>	20	23	38	49	61	72	77	83	99
Other engineering*	<i>Reported #</i>	231	182	161	181	203	219	219	263	292
	<i>Cdn/permanent.res.</i>	151	101	74	93	123	138	139	169	178
	<i>Non-Canadian</i>	80	81	87	88	80	81	80	94	114
Total engineering	<i>Reported #</i>	874	920	1 107	1 295	1 477	1 569	1 735	1 850	2 042
	<i>Cdn/permanent.res.</i>	513	457	497	617	722	813	925	1 001	1 013
	<i>Non-Canadian</i>	361	463	610	678	755	756	810	849	1 029
Total university	<i>Reported #</i>	9 947	10 357	11 228	11 997	12 901	13 501	14 351	15 235	16 318
	<i>Cdn/permanent.res.</i>	7 381	7 563	8 068	8 738	9 535	10 125	10 823	11 442	11 863
	<i>Non-Canadian</i>	2 566	2 794	3 160	3 259	3 366	3 376	3 528	3 793	4 455

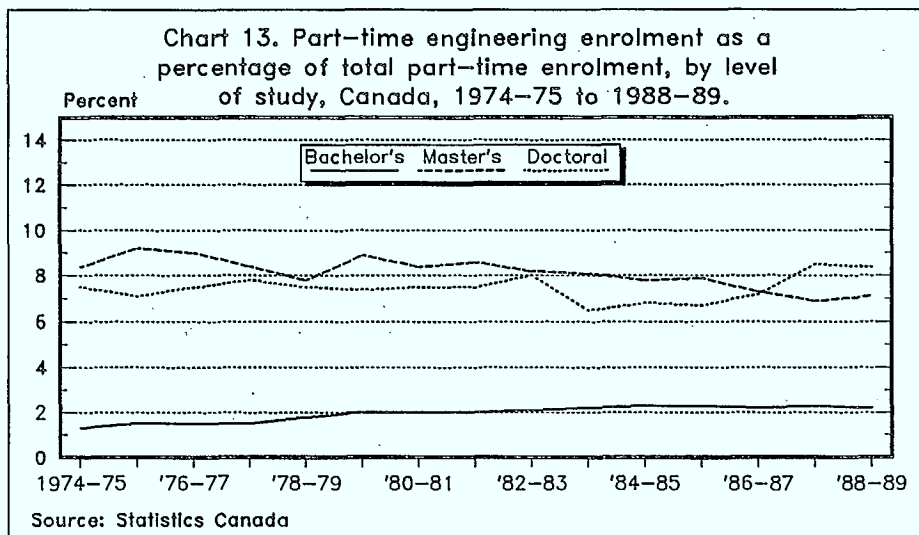
\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

## Part-time enrolment

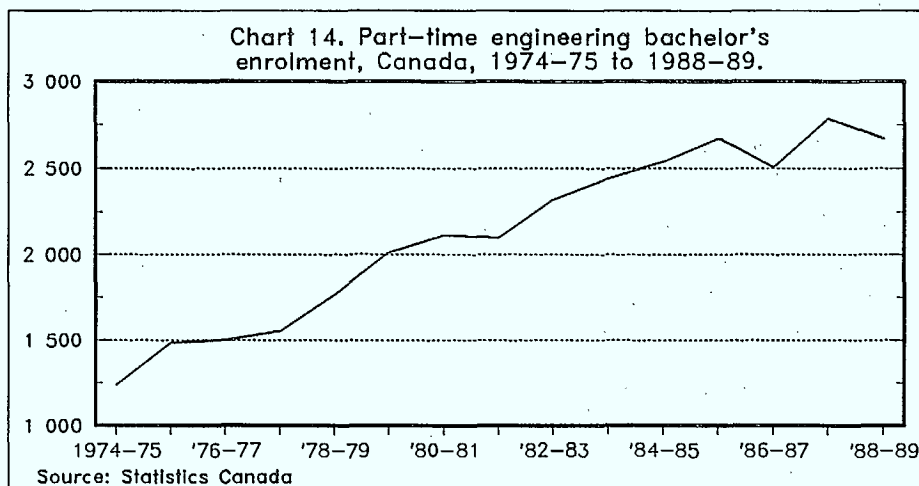
### Field of study

- In 1988-89, engineering accounted for 2.2% of total part-time enrolment at the bachelor's level, 7.1% at the master's level, and 8.4% at the doctoral level. This was an increase of about one percentage point over the 1974-75 figures at the bachelor's and doctoral levels, but a drop of one percentage point at the master's level (Chart 13).

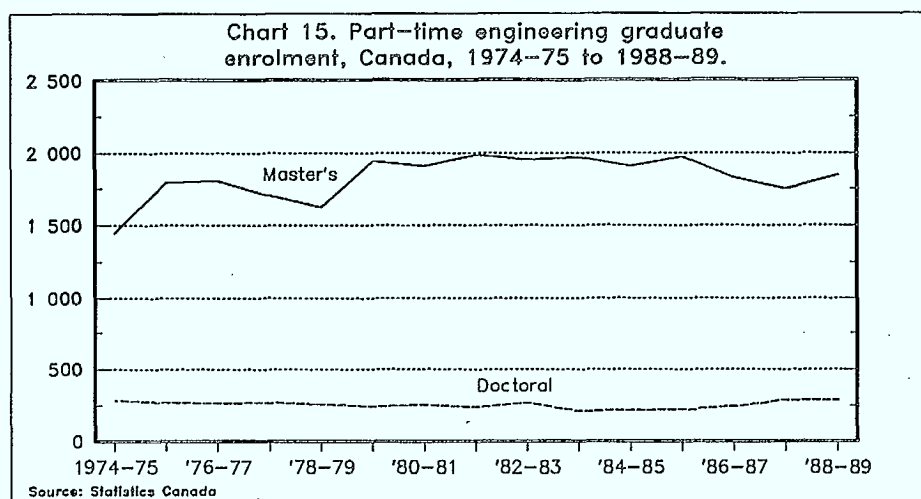


### Level of study

- Engineering enrolment rose at the undergraduate and graduate levels. Bachelor's enrolment more than doubled from 1 239 in 1974-75 to 2 673 in 1988-89. This overall increase masked a 4.0% decline in 1988-89 relative to the figure for the previous year (Chart 14, Table 7).



- The growth in engineering bachelor's enrolment outpaced part-time enrolment overall, which rose by 27.0% during the same period. In contrast to the situation in full-time enrolment, the bachelor's level also outpaced the rate of growth at the graduate level.
- Engineering enrolment at the master's level grew 27.2% from 1 447 in 1974-75 to 1 841 in 1988-89. (Chart 15, Table 8).



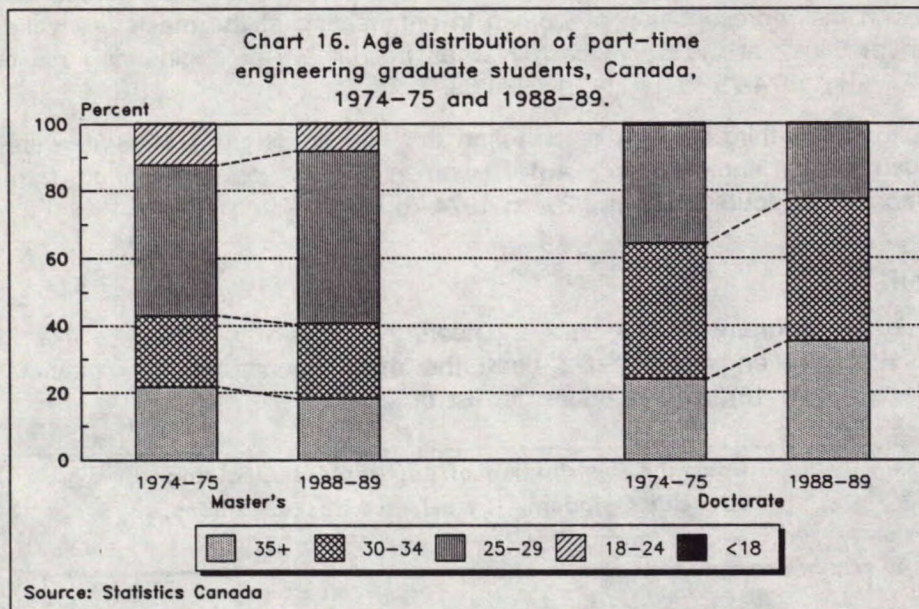
- It did not, however, keep pace with total part-time master's enrolment, which rose by 50.1% from 1974-75 to 1988-89.
- The slowest growth in engineering enrolment was at the doctoral level, which fluctuated from year to year, starting at 282 students in 1974-75 and ending 2.8% higher at 290 in 1988-89. This contrasted with total part-time doctoral enrolment which dropped from 3 765 in 1974-75, bottomed out at 3 200 in 1981-82 and has since recovered to reach 3 444 in 1988-89, still 8.5% below the 1974-75 figure.

## Age

The age distribution of part-time students is not the same as that of full-time students, as individuals choose to extend their studies while participating in the work force or to return to studies after an extended absence.

- Historically, just over half of the engineering students at the bachelor's level have been between 18-24 years of age, compared with some 80% of the full-time students.
- Part-time engineering graduate students were younger than their counterparts in other graduate programs. In 1988-89, just over half (51.2%) of part-time engineering master's students were 25-29 years of age, an increase from 44.6% in 1974-75. Only 18.1% of engineering master's students were 35 years of age or older versus 43.3% of all master's students (Chart 16).

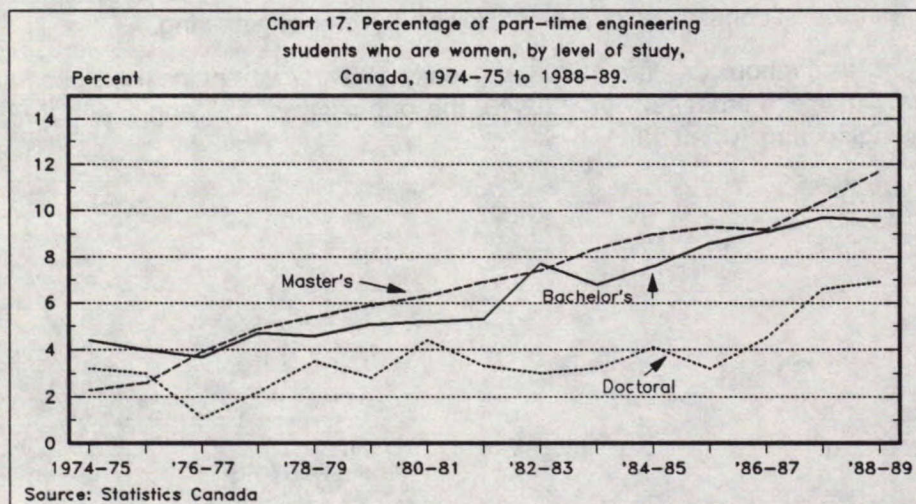




- The younger age distribution of part-time engineering students continued at the doctoral level. For example, in 1988-89, about one in five engineering students was between 25 and 29 years of age, compared with about one in ten part-time doctoral students overall. While there was a significant increase in the proportion of part-time engineering doctoral students falling into the 35 years and older group, from 24.0% in 1974-75 to 35.2% in 1988-89, the percentage this age cohort represented was still much lower than that of part-time doctoral students overall, where the figures increased from 32.3% to 57.8%.

### Gender

- In 1988-89, while almost two-thirds (63.7%) of the part-time bachelor's students were women, fewer than 1% of them chose engineering. Nevertheless, as their numbers rose from 55 in 1974-75 to 256 in 1988-89, women more than doubled their share from 4.4% to 9.6% (Chart 17).

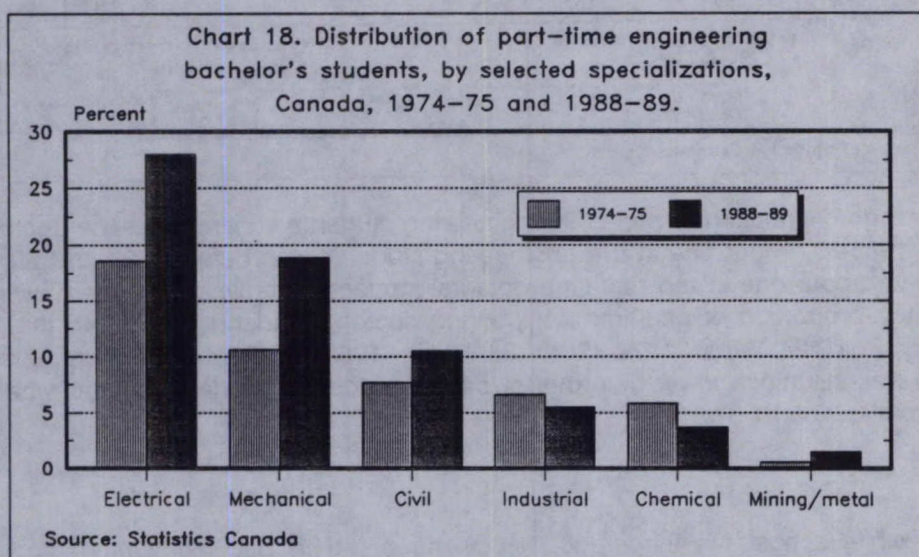




- Half of all part-time master's students in 1988-89 were women; 1.7% of them chose engineering. The increase in the representation of women in engineering at the master's level was somewhat greater than their rise at the bachelor's level, as their share of engineering master's enrolment grew from 2.3% in 1974-75 to 11.7% in 1988-89.
- While more than one-third (38.3%) of part-time doctoral students in 1988-89 were women, only 1.5% of them chose engineering. Again, women's share of engineering part-time doctoral enrolment more than doubled, from 3.2% in 1974-75 to 6.9% in 1988-89.

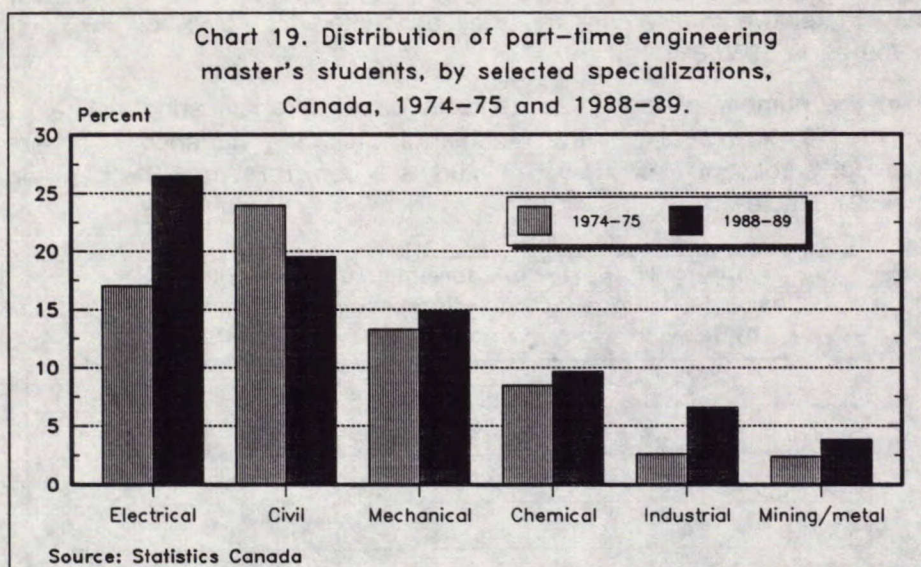
### Specialization

- The popularity of programs in part-time engineering studies was similar to that of the full-time programs. Electrical engineering has been the most popular by far since 1974-75 at the bachelor's level (Chart 18)(see Appendix for list of specializations).

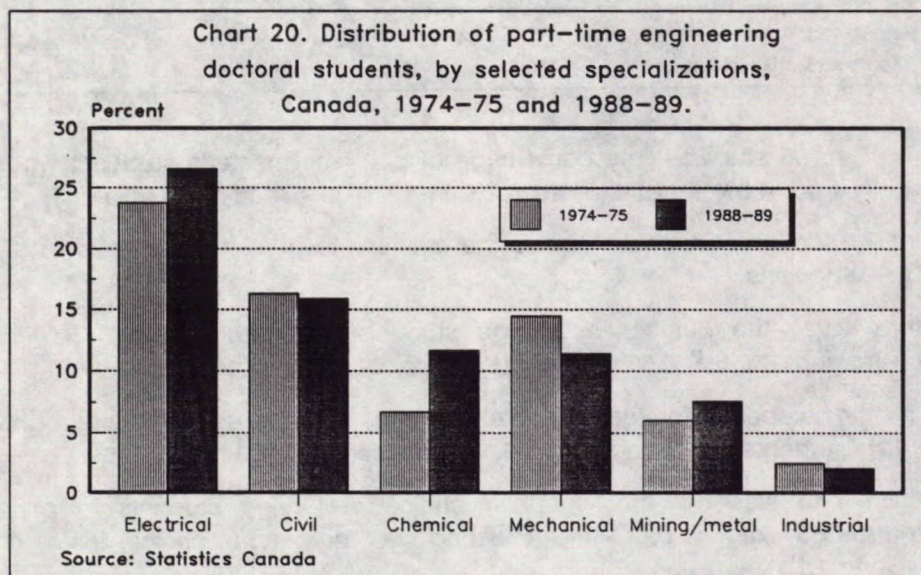


- By 1988-89, more than one-quarter (28.0%) of the part-time engineering students were in electrical engineering, the 1974-75 figure of 231 more than tripling to reach 749 by 1988-89. Mechanical engineering was the second most popular, followed by civil engineering.
- In 1974-75, and throughout the late 1970s and early 1980s, civil engineering accounted for most of the part-time master's students. In 1982-83, the popularity of civil engineering was surpassed by electrical engineering (Chart 19).





- As with full-time studies, electrical engineering was the most popular specialty at the doctoral level. This was true throughout the time period examined. In 1974-75, 23.8% of part-time engineering doctoral students were in electrical engineering, and in 1988-89, the figure was 26.6% (Chart 20).



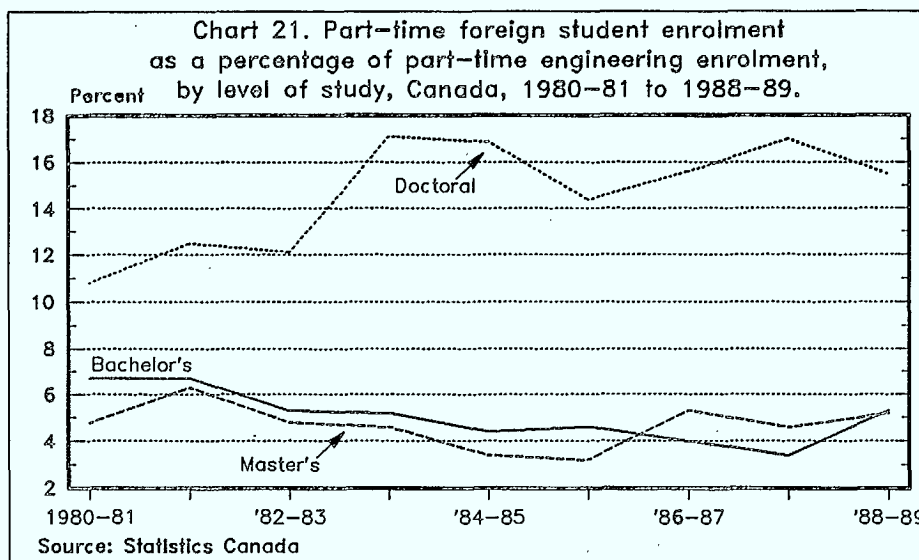
### Foreign student enrolment

The presence of foreign students was considerably less in part-time studies than in full-time. However, as with full-time enrolment, foreign students were concentrated at the graduate levels of study.

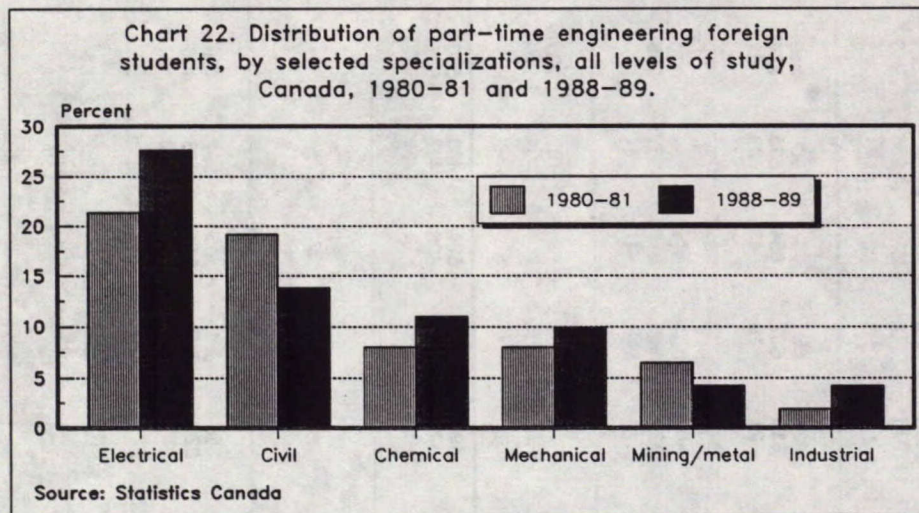
- In 1988-89, engineering attracted 7.9% of foreign students in part-time bachelor's studies; this compares with 2.2% of Canadian part-time students.



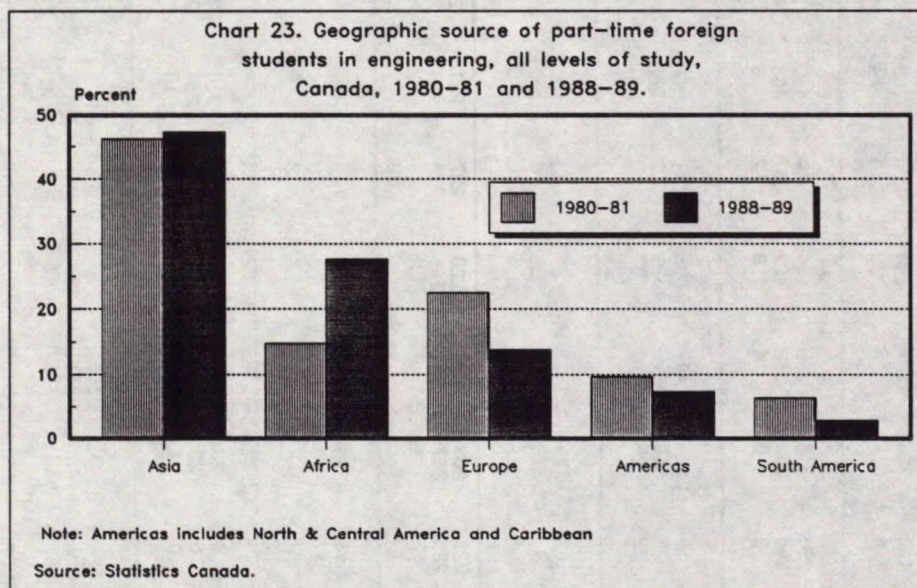
- The number of foreign students in engineering rose by 8.4% from 261 to 283 between 1980-81 and 1988-89. In relative terms, however, they accounted for 10.5% of engineering enrolment, about the same as in 1980-81.
- The growth in the number of foreign students in part-time engineering bachelor's studies was outpaced by the 15.4% increase in the number of Canadian students. Consequently, foreign students' share of enrolment at this level of study fell from 6.7% to 5.3% between 1980-81 and 1988-89 (Chart 21, Table 10).



- Growing from 92 to 95 students, the percentage of part-time master's students who were foreign increased slightly from 4.8% in 1980-81 to 5.2% in 1988-89 (Chart 21, Table 11).
- The growth of the foreign students' share at the master's level was mainly due to a 3.8% drop in the number of Canadians.
- At the doctoral level, the number of foreign students grew from 27 to 45, increasing their representation from 10.8% to 15.5% (Chart 21, Table 12).
- The growth in the number of foreign students in part-time engineering doctoral studies outpaced that of Canadian students which increased 9.4% between 1980-81 to 1988-89.
- Electrical engineering was the most popular choice of foreign students in part-time studies throughout the period examined. Civil engineering was the second choice, followed by chemical engineering (Chart 22).



- As with full-time students, the majority of part-time foreign students came from Asia. Their numbers grew from 109 to 134 increasing their representation from 14.8% to 27.6% (Chart 23).



- The number of African students more than doubled (from 35 to 78), and subsequently their share increased from 14.8% to 27.6%. And as with full-time studies, the presence of European students and students from the Americas and the Caribbean dropped as their numbers fell from 53 to 39, from 38 to 29, and from 23 to 21, respectively.



Table 7. Part-time bachelor's\* enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	72	84	86	98	94	111	107	102	113	92	101	124	130	113	99
Male	66	67	68	80	83	101	91	82	84	73	82	97	101	77	74
Female	6	17	18	18	11	10	16	20	29	19	19	27	29	36	25
Civil	95	127	140	216	278	298	281	321	389	398	403	414	293	284	282
Male	92	123	138	204	264	280	268	304	369	373	371	375	266	243	252
Female	3	4	2	12	14	18	13	17	20	25	32	39	27	41	30
Electrical	231	288	315	386	431	449	469	500	672	634	656	707	666	815	749
Male	230	286	309	382	422	437	463	481	650	613	637	664	633	774	715
Female	1	2	6	4	9	12	6	19	22	21	19	43	33	41	34
Engineering general	390	658	574	447	508	571	644	550	262	359	387	341	398	370	419
Male	375	626	548	419	471	532	599	521	227	323	348	310	351	335	369
Female	15	32	26	28	37	39	45	29	35	36	39	31	47	35	50
Industrial	82	87	79	73	89	83	106	80	86	78	85	125	109	125	146
Male	82	87	79	72	86	78	100	76	78	73	76	114	101	110	125
Female	-	-	-	1	3	5	6	4	8	5	9	11	8	15	21
Mechanical	131	225	268	296	220	227	221	218	375	495	515	524	480	580	504
Male	130	223	267	291	218	224	214	212	355	475	489	506	447	533	470
Female	1	2	1	5	2	3	7	6	20	20	26	18	33	47	34
Mining/metallurgical	7	14	20	18	18	12	22	34	27	33	29	31	33	40	41
Male	7	11	18	16	16	10	16	29	24	29	24	27	32	37	37
Female	-	3	2	2	2	2	6	5	3	4	5	4	1	3	4
Other engineering**	231	6	23	21	132	267	266	295	398	356	362	405	397	458	433
Male	202	6	22	18	128	253	256	283	357	320	317	347	348	406	375
Female	29	0	1	3	4	14	10	12	41	36	45	58	49	52	58
Total engineering	1 239	1 489	1 505	1 555	1 770	2 018	2 116	2 100	2 322	2 445	2 538	2 671	2 506	2 785	2 673
Male	1 184	1 429	1 449	1 482	1 688	1 915	2 007	1 988	2 144	2 279	2 344	2 440	2 279	2 515	2 417
Female	55	60	56	73	82	103	109	112	178	166	194	231	227	270	256
Total university	95 765	102 116	101 311	100 553	99 233	100 335	104 042	105 452	109 916	111 705	110 917	114 630	116 477	118 836	121 654
Male	39 352	41 329	40 462	39 822	39 146	39 547	40 722	41 267	43 253	43 934	43 558	43 903	43 563	43 625	44 119
Female	56 413	60 787	60 849	60 731	60 087	60 788	63 320	64 185	66 663	67 771	67 359	70 727	72 914	75 211	77 535

\* Includes first professional.

\*\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 8. Part-time master's enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	123	153	140	149	152	171	166	185	163	190	199	178	161	177	178
Male	117	146	132	137	140	147	138	146	129	152	155	142	126	142	140
Female	6	7	8	12	12	24	28	39	34	38	44	36	35	35	38
Civil	347	390	619	360	367	500	517	494	514	462	417	420	373	361	359
Male	339	380	596	341	350	467	480	456	469	413	375	371	334	323	307
Female	8	10	23	19	17	33	37	38	45	49	42	49	39	38	52
Electrical	246	373	388	350	352	406	402	405	460	492	494	500	463	438	488
Male	239	363	365	330	337	395	392	396	448	469	469	473	434	416	459
Female	7	10	23	20	15	11	10	9	12	23	25	27	29	22	29
Industrial	37	72	62	52	48	74	62	70	61	61	44	50	129	141	122
Male	36	67	60	47	43	64	54	61	53	52	36	43	113	116	103
Female	1	5	2	5	5	10	8	9	8	9	8	7	16	25	19
Mechanical	193	234	220	184	223	222	217	259	302	301	304	345	295	252	274
Male	191	231	215	181	218	215	214	249	291	291	287	330	282	238	256
Female	2	3	5	3	5	7	3	10	11	10	17	15	13	14	18
Mining/metallurgical	35	51	51	55	58	73	75	77	69	75	75	76	83	75	70
Male	34	50	49	52	54	69	68	74	65	71	72	72	80	69	61
Female	1	1	2	3	4	4	7	3	4	4	3	4	3	6	9
Other engineering*	466	517	320	550	419	493	469	496	387	387	375	400	317	303	350
Male	457	506	312	528	390	468	441	467	356	354	343	354	284	262	299
Female	9	11	8	22	29	25	28	29	31	33	32	46	33	41	51
Total engineering	1 447	1 790	1 800	1 700	1 619	1 939	1 908	1 986	1 956	1 968	1 908	1 969	1 821	1 747	1 841
Male	1 413	1 743	1 729	1 616	1 532	1 825	1 787	1 849	1 811	1 802	1 737	1 785	1 653	1 566	1 625
Female	34	47	71	84	87	114	121	137	145	166	171	184	168	181	216
Total university	17 255	19 571	19 946	20 338	20 781	21 755	22 665	23 193	23 783	24 202	24 460	24 889	24 878	25 249	25 902
Male	12 289	13 737	13 617	13 355	13 166	13 611	13 819	13 785	13 670	13 581	13 378	13 376	13 040	12 798	13 002
Female	4 966	5 834	6 329	6 983	7 615	8 144	8 846	9 408	10 113	10 621	11 082	11 513	11 838	12 451	12 900

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 9. Part-time doctoral enrolment in engineering and total university, by gender, Canada, 1974-75 to 1988-89.

Field of study	1974-75	'75-76	'76-77	'77-78	'78-79	'79-80	'80-81	'81-82	'82-83	'83-84	'84-85	'85-86	'86-87	'87-88	'88-89
Chemical	19	25	24	21	21	20	33	28	23	20	25	16	25	27	34
Male	18	22	23	20	19	19	33	28	23	19	22	15	24	23	30
Female	1	3	1	1	2	1	-	-	-	1	3	1	1	4	4
Civil	46	41	60	43	51	38	45	34	54	38	41	42	35	35	46
Male	46	41	60	42	49	37	44	34	51	38	41	42	35	32	43
Female	-	-	-	1	2	1	1	-	-	-	-	-	-	3	3
Electrical	67	68	72	63	81	61	53	54	68	55	57	62	64	89	77
Male	67	68	71	62	79	60	49	54	67	55	54	59	61	87	74
Female	-	-	1	1	2	1	4	-	1	-	3	3	3	2	3
Industrial	7	3	5	6	3	6	3	1	2	2	2	2	6	7	6
Male	6	3	5	5	2	5	3	1	2	2	1	2	3	4	3
Female	1	-	-	1	1	1	-	-	-	-	1	-	3	3	3
Mechanical	41	37	33	33	29	38	35	38	44	36	35	34	41	43	33
Male	39	36	33	33	29	37	33	36	43	33	35	33	39	41	32
Female	2	1	-	-	-	1	2	2	1	3	-	1	2	2	1
Mining/metallurgical	17	14	19	24	20	14	15	15	14	14	9	13	12	19	22
Male	16	13	19	24	19	13	15	15	13	14	9	13	12	18	22
Female	1	1	-	-	1	1	-	-	1	-	-	-	-	1	-
Other engineering*	85	83	53	82	52	69	67	70	59	51	50	53	61	68	72
Male	81	80	52	80	51	68	63	64	57	48	48	51	59	64	66
Female	4	3	1	2	1	1	4	6	2	3	2	2	2	4	6
Total engineering	282	271	266	272	257	246	251	240	264	216	219	222	244	288	290
Male	273	263	263	266	248	239	240	232	256	209	210	215	233	269	270
Female	9	8	3	6	9	7	11	8	8	7	9	7	11	19	20
Total university	3 765	3 831	3 549	3 490	3 405	3 313	3 362	3 200	3 292	3 300	3 237	3 335	3 369	3 390	3 444
Male	2 912	2 920	2 654	2 599	2 474	2 359	2 346	2 192	2 227	2 188	2 087	2 089	2 082	2 064	2 126
Female	853	911	895	891	931	954	1 016	1 008	1 065	1 112	1 150	1 246	1 287	1 326	1 318

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 10. Citizenship of part-time bachelor's\* students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	107	102	113	92	101	124	130	113	99
	<i>Cdn/perm.res.</i>	101	93	101	88	94	118	125	108	88
	<i>Non-Canadian</i>	6	9	12	4	7	6	5	5	11
Civil	<i>Reported #</i>	281	321	389	398	403	414	293	284	282
	<i>Cdn/perm.res.</i>	257	293	363	365	385	390	284	268	266
	<i>Non-Canadian</i>	24	28	26	33	18	24	9	16	16
Electrical	<i>Reported #</i>	469	500	672	634	656	707	666	815	749
	<i>Cdn/perm.res.</i>	442	482	646	607	623	677	640	790	707
	<i>Non-Canadian</i>	27	18	26	27	33	30	26	25	42
Engineering general	<i>Reported #</i>	644	550	262	359	387	341	398	370	419
	<i>Cdn/perm.res.</i>	589	515	247	339	378	325	378	347	387
	<i>Non-Canadian</i>	55	35	15	20	9	16	20	23	32
Industrial	<i>Reported #</i>	106	80	86	78	85	125	109	125	146
	<i>Cdn/perm.res.</i>	103	74	82	75	81	119	103	121	140
	<i>Non-Canadian</i>	3	6	4	3	4	6	6	4	6
Mechanical	<i>Reported #</i>	221	218	375	495	515	524	480	580	504
	<i>Cdn/perm.res.</i>	210	201	352	478	496	504	460	566	492
	<i>Non-Canadian</i>	11	17	23	17	19	20	20	14	12
Mining/metallurgical	<i>Reported #</i>	22	34	27	33	29	31	33	40	41
	<i>Cdn/perm.res.</i>	19	32	24	31	29	29	31	39	38
	<i>Non-Canadian</i>	3	2	3	2	0	2	2	1	3
Other engineering**	<i>Reported #</i>	266	295	398	356	362	405	397	458	433
	<i>Cdn/perm.res.</i>	253	270	384	334	341	385	384	450	412
	<i>Non-Canadian</i>	13	25	14	22	21	20	13	8	21
Total engineering	<i>Reported #</i>	2 116	2 100	2 322	2 445	2 538	2 671	2 506	2 785	2 673
	<i>Cdn/perm.res.</i>	1 974	1 960	2 199	2 317	2 427	2 547	2 405	2 689	2 530
	<i>Non-Canadian</i>	142	140	123	128	111	124	101	96	143
Total university	<i>Reported #</i>	102 150	103 432	106 913	108 240	108 008	110 494	112 733	114 840	117 364
	<i>Cdn/perm.res.</i>	100 106	100 930	104 551	105 682	105 798	108 373	110 829	113 127	115 560
	<i>Non-Canadian</i>	2 044	2 502	2 362	2 558	2 210	2 121	1 904	1 713	1 804

\* Includes first professional.

\*\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 11. Citizenship of part-time master's students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	166	185	163	190	199	178	161	177	178
	<i>Cdn/perm.res.</i>	157	169	153	178	190	177	153	175	167
	<i>Non-Canadian</i>	9	16	10	12	9	1	8	2	11
Civil	<i>Reported #</i>	517	494	514	462	417	420	373	361	359
	<i>Cdn/perm.res.</i>	496	465	484	442	401	412	351	336	341
	<i>Non-Canadian</i>	21	29	30	20	16	8	22	25	18
Electrical	<i>Reported #</i>	402	405	460	492	494	500	463	438	488
	<i>Cdn/perm.res.</i>	376	366	445	468	473	478	437	419	461
	<i>Non-Canadian</i>	26	39	15	24	21	22	26	19	27
Industrial	<i>Reported #</i>	62	70	61	61	44	50	129	141	122
	<i>Cdn/perm.res.</i>	61	68	58	60	42	48	125	136	117
	<i>Non-Canadian</i>	1	2	3	1	2	2	4	5	5
Mechanical	<i>Reported #</i>	217	259	302	301	304	345	295	252	274
	<i>Cdn/perm.res.</i>	211	242	293	292	300	338	284	239	263
	<i>Non-Canadian</i>	6	17	9	9	4	7	11	13	11
Mining/metallurgical	<i>Reported #</i>	75	77	69	75	75	76	83	75	70
	<i>Cdn/perm.res.</i>	64	71	59	69	73	72	81	70	66
	<i>Non-Canadian</i>	11	6	10	6	2	4	2	5	4
Other engineering*	<i>Reported #</i>	469	496	387	387	375	400	317	303	350
	<i>Cdn/perm.res.</i>	451	479	370	368	364	381	293	291	331
	<i>Non-Canadian</i>	18	17	17	19	11	19	24	12	19
Total engineering	<i>Reported #</i>	1 908	1 986	1 956	1 968	1 908	1 969	1 821	1 747	1 841
	<i>Cdn/perm.res.</i>	1 816	1 860	1 862	1 877	1 843	1 906	1 724	1 666	1 746
	<i>Non-Canadian</i>	92	126	94	91	65	63	97	81	95
Total university	<i>Reported #</i>	22 665	23 193	23 783	24 202	24 460	24 889	24 878	25 249	25 902
	<i>Cdn/perm.res.</i>	22 059	22 578	23 122	23 632	23 918	24 300	24 295	24 715	25 295
	<i>Non-Canadian</i>	606	615	661	570	542	589	583	534	607

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.



Table 13. Citizenship of part-time doctoral students in engineering and total university, Canada, 1980-81 to 1988-89.

Field of study		1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89
Chemical	<i>Reported #</i>	33	28	23	20	25	16	25	27	34
	<i>Cdn/perm.res.</i>	27	23	18	10	13	10	15	20	25
	<i>Non-Canadian</i>	6	5	5	10	12	6	10	7	9
Civil	<i>Reported #</i>	45	34	54	38	41	42	35	35	46
	<i>Cdn/perm.res.</i>	40	30	49	33	34	33	27	27	41
	<i>Non-Canadian</i>	5	4	5	5	7	9	8	8	5
Electrical	<i>Reported #</i>	53	54	68	55	57	62	64	89	77
	<i>Cdn/perm.res.</i>	50	48	60	46	51	55	57	70	68
	<i>Non-Canadian</i>	3	6	8	9	6	7	7	19	9
Industrial	<i>Reported #</i>	3	1	2	2	2	2	6	7	6
	<i>Cdn/perm.res.</i>	2	1	1	-	2	2	6	7	5
	<i>Non-Canadian</i>	1	-	1	2	-	-	-	-	1
Mechanical	<i>Reported #</i>	35	38	44	36	35	34	41	43	33
	<i>Cdn/perm.res.</i>	31	33	38	32	33	31	37	37	28
	<i>Non-Canadian</i>	4	5	6	4	2	3	4	6	5
Mining/metallurgical	<i>Reported #</i>	15	15	14	14	9	13	12	19	22
	<i>Cdn/perm.res.</i>	12	11	11	12	8	11	8	16	17
	<i>Non-Canadian</i>	3	4	3	2	1	2	4	3	5
Other engineering*	<i>Reported #</i>	67	70	59	51	50	53	61	68	72
	<i>Cdn/perm.res.</i>	62	64	55	46	41	48	56	62	61
	<i>Non-Canadian</i>	5	6	4	5	9	5	5	6	11
Total engineering	<i>Reported #</i>	251	240	264	216	219	222	244	288	290
	<i>Cdn/perm.res.</i>	224	210	232	179	182	190	206	239	245
	<i>Non-Canadian</i>	27	30	32	37	37	32	38	49	45
Total university	<i>Reported #</i>	3 362	3 200	3 292	3 300	3 237	3 335	3 369	3 390	3 444
	<i>Cdn/perm.res.</i>	3 023	2 888	3 031	3 001	2 959	3 058	3 050	3 101	3 175
	<i>Non-Canadian</i>	339	312	261	299	278	277	319	289	269

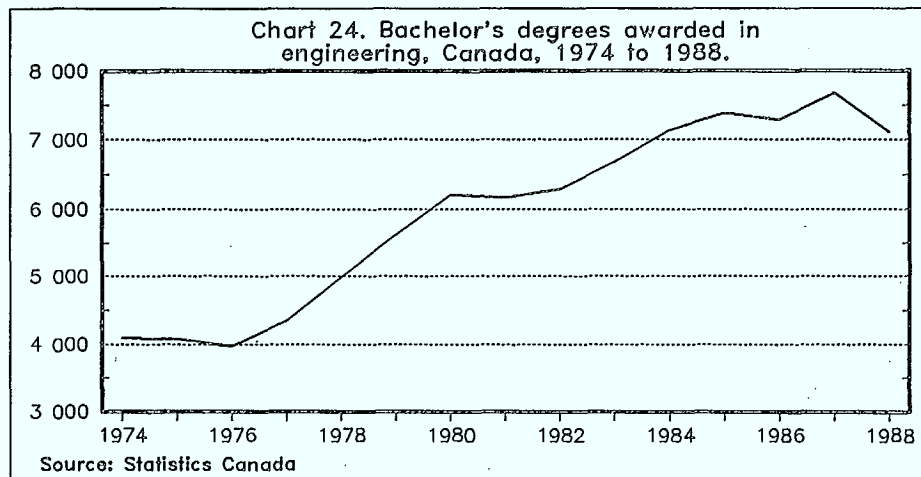
\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

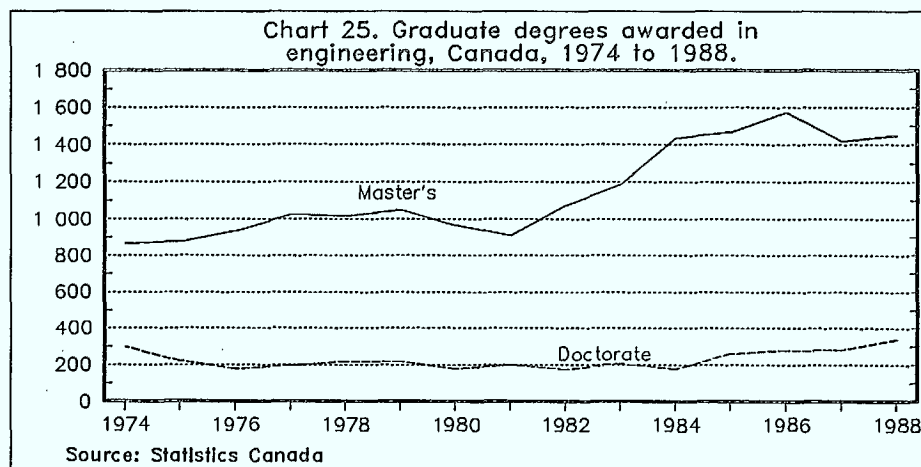
## Degrees

### Level of degree

- The annual number of engineering degrees awarded increased almost steadily during the past 15 years, resulting in a 69.2% increase over the 1974 level. This overall increase, however, masks a downturn since 1987.
- The recent decline is largely attributable to a 7.3% decrease in the number of bachelor's degrees awarded between 1987 and 1988, a drop from 7 670 to 7 113 (Chart 24, Table 13).



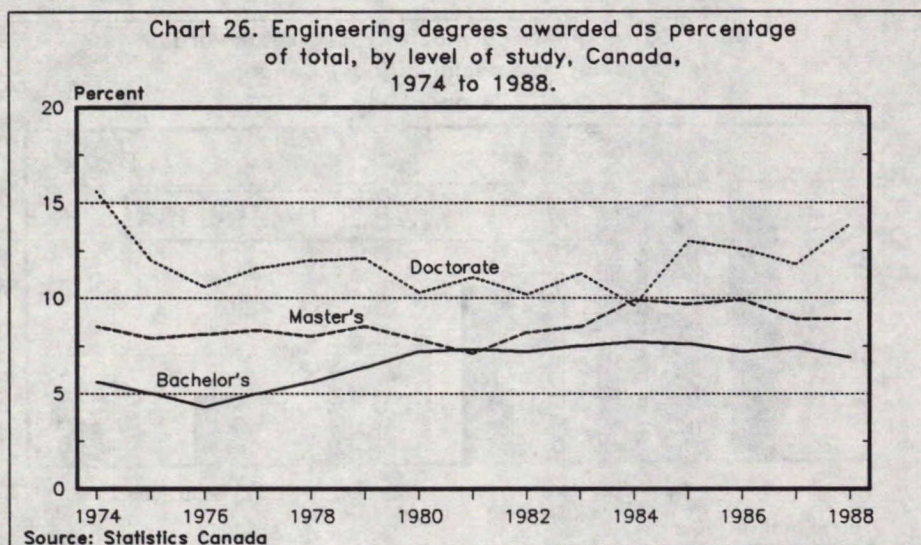
- At 1 449, the number of engineering master's degrees granted in 1988 was 2.1% higher than in the previous year, and 67.1% higher than in 1974 (Chart 25, Table 14).



- At 336 in 1988, the number of doctorates awarded was 19.1% higher than in the previous year. However, the 1988 figure was only 13.9% greater than the number awarded in 1974 (Chart 25, Table 15).



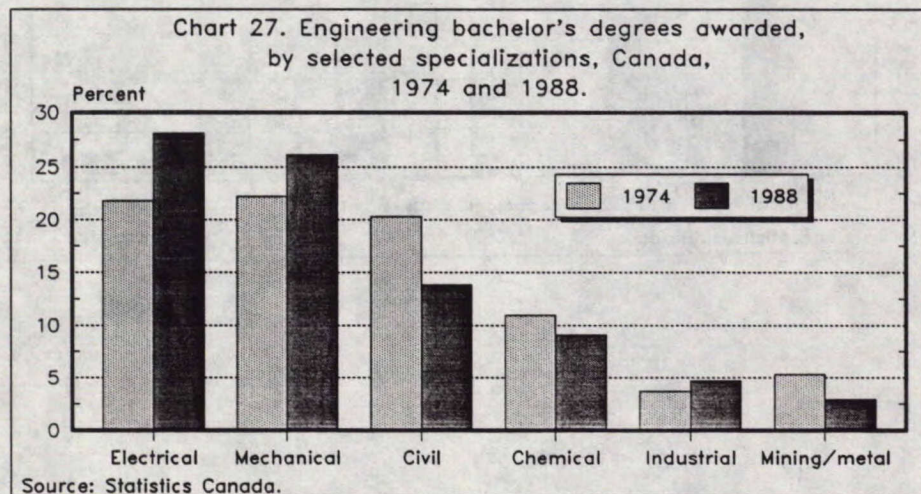
- As a proportion of all degrees awarded, the share awarded in engineering increased with each level of study. For example, in 1988, 6.9% of the bachelor's degrees, 8.9% of the master's degrees and 13.9% of the doctorates were in engineering (Chart 26).



- Overall, the popularity of engineering increased at the bachelor's level, while it decreased at the doctoral level.

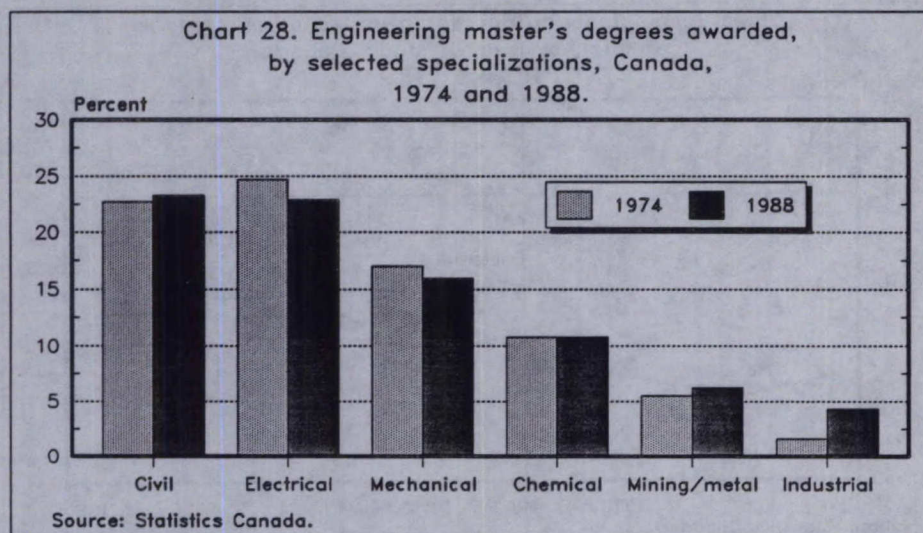
### Specialization

- In 1988, the specializations that accounted for the largest percentage of engineering degrees were electrical (27.4%), mechanical (24.0%) and civil engineering (15.4%) (see Appendix for list of specializations).
- At the bachelor's level, most qualifications were awarded in electrical engineering (28.1%) and mechanical engineering (26.1%), while civil engineering's share fell from 20.3% in 1974 to 13.8% in 1988 (Chart 27).

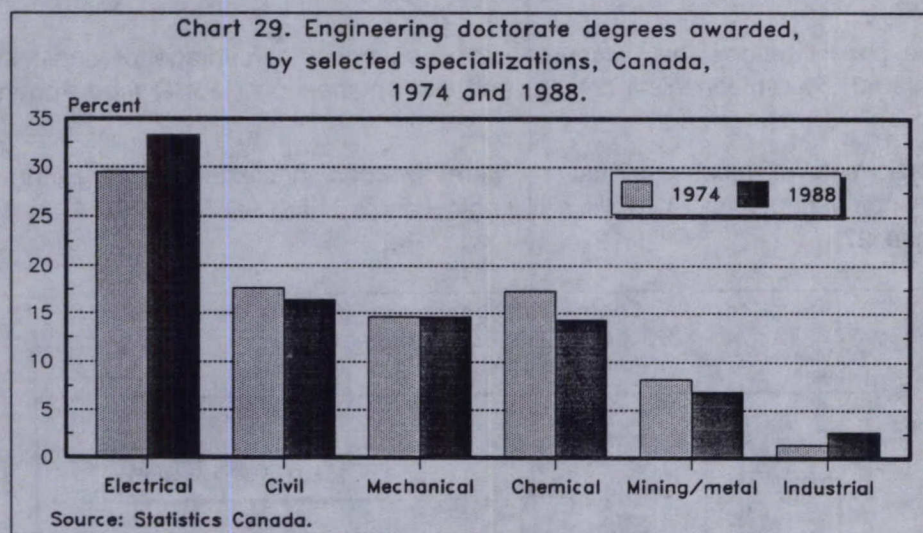




- In contrast to the bachelor's level, there was movement towards civil engineering at the master's level and away from electrical engineering and mechanical engineering. Civil engineering's share grew from 22.7% to 23.3%, while electrical engineering fell from 24.7% to 22.9%, and mechanical engineering from 17.0% to 15.9% (Chart 28).

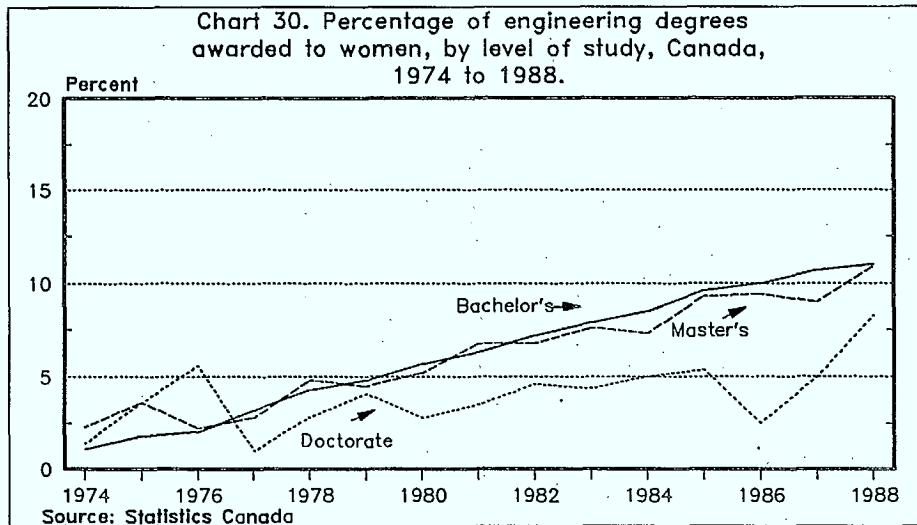


- At the doctoral level, electrical engineering's share grew from 29.5% to 33.3%, while civil engineering dropped from 17.6% to 16.4%. Mechanical engineering's share remained virtually unchanged (Chart 29).



## Gender

- Although the total number of engineering degrees awarded to women increased from 71 in 1974 to 968 in 1988, women still received only 11.0% of the bachelor's, 10.9% of the master's and 8.3% of the doctoral degrees (Chart 30).



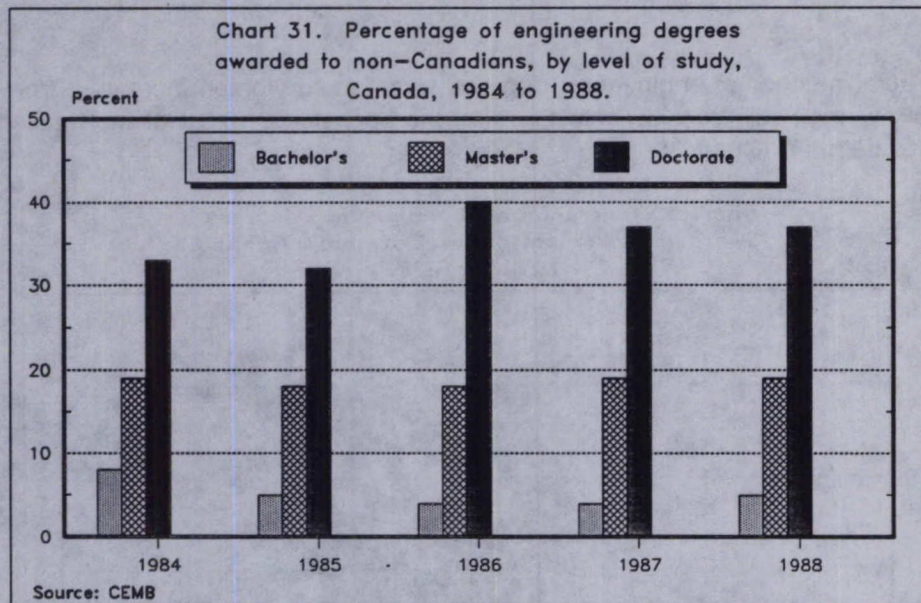
- The number of engineering degrees awarded to women at the bachelor's level grew every year until 1988, when 5.0% fewer were awarded to women than in the year before.
- The number of qualifications awarded to women at the graduate level grew almost annually since the late 1970s. In fact, in 1988, the number of master's degrees awarded to women increased by one-quarter over that in the previous year, while the number of doctorates doubled.

## Degrees awarded to non-Canadians

Statistics Canada does not publish information on the number of engineering degrees awarded to foreign students, and so estimates were obtained from the Canadian Engineering Manpower Board of the Canadian Council of Professional Engineers, which collects the information annually from the engineering schools. The time series is limited to the last five years.

- As a result of changing enrolment patterns of foreign students, there are now fewer of them receiving engineering degrees at the bachelor's level, about the same number at the master's level and considerably more at the doctoral level than there were five years ago.
- The proportion of engineering bachelor's degrees awarded to non-Canadians has been on the decline, from about 8% in 1984 to 5% in 1988 (Chart 31).





- The proportion of engineering master's degrees awarded to non-Canadians was fairly stable from 1984 to 1988 - between 18% and 19%. The proportion of engineering doctoral degrees awarded to non-Canadians remained high. In 1984, for example, 33% of the doctorates went to non-Canadians, and in 1988, the figure was 37%.



Table 13. Bachelor's\* degrees awarded in engineering and total university, by gender, Canada, 1974 to 1988.

Field of study	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Chemical	446	384	346	410	507	577	582	665	667	759	746	798	701	739	649
Male	436	374	329	377	456	506	504	559	565	626	589	629	533	556	473
Female	10	10	17	33	51	71	78	106	102	133	157	169	168	183	176
Civil	833	966	986	1 143	1 298	1 454	1 567	1 470	1 299	1 168	1 274	1 153	1 048	1 155	981
Male	824	948	963	1 113	1 239	1 388	1 465	1 384	1 214	1 081	1 164	1 021	929	1 044	868
Female	9	18	23	30	59	66	102	86	85	87	110	132	119	111	113
Electrical	895	974	993	958	1 111	1 325	1 385	1 427	1 514	1 602	1 769	1 915	2 058	2 202	1 997
Male	888	960	983	936	1 084	1 289	1 337	1 367	1 450	1 532	1 683	1 805	1 915	2 041	1 860
Female	7	14	10	22	27	36	48	60	64	70	86	110	143	161	137
Engineering general	470	364	349	462	505	72	135	45	52	53	46	29	17	14	19
Male	463	352	341	445	481	65	125	41	47	50	42	26	14	12	16
Female	7	12	8	17	24	7	10	4	5	3	4	3	3	2	3
Industrial	153	140	128	139	154	154	217	221	207	230	258	259	301	340	335
Male	152	133	124	131	143	144	203	201	178	201	230	228	253	279	278
Female	1	7	4	8	11	10	14	20	29	29	28	31	48	61	57
Mechanical	910	848	800	898	1 068	1 216	1 409	1 368	1 516	1 691	1 827	1 874	1 855	1 915	1 857
Male	904	843	793	886	1 046	1 182	1 374	1 332	1 452	1 606	1 733	1 771	1 746	1 782	1 722
Female	6	5	7	12	22	34	35	36	64	85	94	103	109	133	135
Mining/metallurgical	218	194	164	150	128	181	232	217	246	256	281	270	223	202	207
Male	216	192	158	147	118	167	210	200	217	236	256	235	199	173	177
Female	2	2	6	3	10	14	22	17	29	20	25	35	24	29	30
Other engineering**	172	208	211	196	220	647	687	760	793	930	944	1 090	1 088	1 103	1 068
Male	167	203	205	183	207	616	644	699	718	831	842	967	971	960	937
Female	5	5	6	13	13	31	43	61	75	99	102	123	117	143	131
Total engineering	4 097	4 078	3 977	4 356	4 991	5 626	6 214	6 173	6 294	6 689	7 145	7 388	7 291	7 670	7 113
Male	4 050	4 005	3 896	4 218	4 774	5 357	5 862	5 783	5 841	6 163	6 539	6 682	6 560	6 847	6 331
Female	47	73	81	138	217	269	352	390	453	526	606	706	731	823	782
Total university	74 851	80 754	83 292	87 356	89 349	87 238	86 410	84 926	87 106	89 770	92 828	97 569	101 668	103 070	103 775
Male	43 784	44 904	44 746	45 721	46 051	44 353	43 590	42 215	42 644	43 952	45 354	46 958	48 206	48 406	48 042
Female	31 067	35 850	38 546	41 635	43 298	42 885	42 820	42 711	44 462	45 818	47 474	50 611	53 462	54 664	55 733

\* Includes first professional.

\*\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 14. Master's degrees awarded in engineering and total university, by gender, Canada, 1974 to 1988.

Field of study	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Chemical	94	102	106	110	112	105	93	110	124	123	159	181	182	134	156
Male	92	98	102	107	105	100	84	99	100	103	134	143	148	108	122
Female	2	4	4	3	7	5	9	11	24	20	25	38	34	26	34
Civil	197	191	224	247	210	248	241	224	277	313	366	346	340	327	338
Male	189	189	222	241	202	237	225	208	264	287	345	309	308	303	299
Female	8	2	2	6	8	11	16	16	13	26	21	37	32	24	39
Electrical	214	170	217	252	239	244	209	215	242	245	320	337	389	373	332
Male	211	165	211	246	224	231	206	204	238	235	306	325	366	347	306
Female	3	5	6	6	15	13	3	11	4	10	14	12	23	26	26
Industrial	14	24	22	34	37	31	29	12	28	21	30	22	48	45	62
Male	14	22	21	33	33	28	28	11	23	21	24	19	38	37	50
Female	-	2	1	1	4	3	1	1	5	-	6	3	10	8	12
Mechanical	147	109	129	154	151	138	137	115	152	184	182	258	274	200	230
Male	147	104	129	152	150	137	135	111	146	178	179	244	256	185	220
Female	-	5	-	2	1	1	2	4	6	6	3	14	18	15	10
Mining/metallurgical	48	43	39	45	58	51	51	57	57	67	106	58	75	97	89
Male	48	41	39	42	56	49	50	52	53	65	96	56	70	89	85
Female	-	2	-	3	2	2	1	5	4	2	10	2	5	8	4
Other engineering*	153	239	197	183	209	231	207	178	195	231	274	265	264	242	242
Male	146	227	189	175	197	219	189	164	178	205	248	235	238	222	209
Female	7	12	8	8	12	12	18	14	17	26	26	30	26	20	33
Total engineering	867	878	934	1 025	1 016	1 048	967	911	1 075	1 184	1 437	1 467	1 572	1 418	1 449
Male	847	846	913	996	967	1 001	917	849	1 002	1 094	1 332	1 331	1 424	1 291	1 291
Female	20	32	21	29	49	47	50	62	73	90	105	136	148	127	158
Total university	10 196	11 068	11 555	12 375	12 637	12 351	12 432	12 903	13 110	13 925	14 562	15 187	15 948	15 978	16 269
Male	7 426	7 949	8 030	8 498	8 486	7 903	7 778	7 848	7 803	8 243	8 632	8 806	9 038	8 776	8 962
Female	2 770	3 119	3 525	3 877	4 151	4 448	4 654	5 055	5 307	5 682	5 930	6 381	6 910	7 202	7 307

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.

Table 15. Doctoral degrees awarded in engineering and total university, by gender, Canada, 1974 to 1988.

Field of study	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Chemical	51	46	36	34	34	26	26	34	32	35	29	27	38	48	48
Male	51	44	32	33	34	25	25	34	30	33	26	23	36	43	41
Female	-	2	4	1	-	1	1	-	2	2	3	4	2	5	7
Civil	52	41	19	33	36	60	31	34	31	35	32	49	65	45	55
Male	52	41	18	33	35	58	29	34	27	33	31	47	65	44	52
Female	-	-	1	-	1	2	2	-	4	2	1	2	-	1	3
Electrical	87	55	61	58	60	55	62	52	53	50	51	77	82	79	112
Male	85	53	61	57	59	50	60	46	53	50	50	73	79	76	108
Female	2	2	-	1	1	5	2	6	-	-	1	4	3	3	4
Industrial	4	6	3	-	2	4	3	4	-	4	1	2	1	1	9
Male	4	5	3	-	2	4	3	4	-	3	-	2	1	1	7
Female	-	1	-	-	-	-	-	-	-	1	1	-	-	-	2
Mechanical	43	32	25	38	36	26	22	27	29	32	25	46	36	42	49
Male	43	30	22	38	34	26	22	27	28	31	25	44	35	42	43
Female	-	2	3	-	2	-	-	-	1	1	-	2	1	-	6
Mining/metallurgical	24	9	7	14	20	10	12	16	9	16	13	21	20	24	23
Male	24	8	7	14	20	10	12	16	9	15	12	20	19	21	22
Female	-	1	-	-	-	-	-	-	-	1	1	1	1	3	1
Other engineering*	34	31	28	20	30	38	23	34	21	34	30	39	37	43	40
Male	32	31	26	20	28	37	23	33	20	32	28	38	37	41	35
Female	2	0	2	-	2	1	-	1	1	2	2	1	-	2	5
Total engineering	295	220	179	197	218	219	179	201	175	206	181	261	279	282	336
Male	291	212	169	195	212	210	174	194	167	197	172	247	272	268	308
Female	4	8	10	2	6	9	5	7	8	9	9	14	7	14	28
Total university	1 896	1 840	1 693	1 702	1 819	1 803	1 738	1 816	1 715	1 821	1 878	2 001	2 218	2 384	2 415
Male	1 662	1 544	1 375	1 396	1 488	1 434	1 339	1 377	1 290	1 370	1 368	1 473	1 609	1 702	1 677
Female	234	296	318	306	331	369	399	439	425	451	510	528	609	682	738

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada.



## Faculty

Faculty data are not as complete or up-to-date as information on students and degrees awarded. The most recent national statistics available are 1986, and prior to 1978, the category of *not reported* was rather extensive.

### Number

- In 1986, engineering departments employed 6.5% of the 35 373 full-time faculty in Canadian universities, a percentage that has not altered much over the nine-year period.
- In absolute numbers, full-time engineering faculty increased by 11.9%, from 2 060 in 1978 to 2 305 in 1986 (Table 16).

Table 16. Full-time faculty in engineering and total university, by specialization, Canada, 1978 to 1986.

Field of study	1978	1979	1980	1981	1982	1983	1984	1985	1986
<i>Chemical</i>	233	238	244	242	236	236	247	257	271
<i>Civil</i>	403	411	423	419	431	436	436	451	447
<i>Electrical</i>	475	484	495	497	499	531	529	545	532
<i>Engineering general</i>	269	292	279	293	319	337	347	278	156
<i>Industrial</i>	46	42	45	53	53	52	49	50	49
<i>Mechanical</i>	397	402	402	411	418	431	431	467	450
<i>Mining/metallurgical</i>	124	121	124	120	119	127	127	134	130
<i>Other engineering*</i>	113	115	112	102	99	102	109	193	270
Total engineering	2 060	2 105	2 124	2 137	2 174	2 252	2 275	2 375	2 305
Total university	32 645	32 803	33 299	33 599	34 078	34 280	34 665	35 171	35 373

\* Includes aeronautical/aerospace engineering, design systems engineering, engineering science and other engineering not elsewhere classified.

Source: Statistics Canada

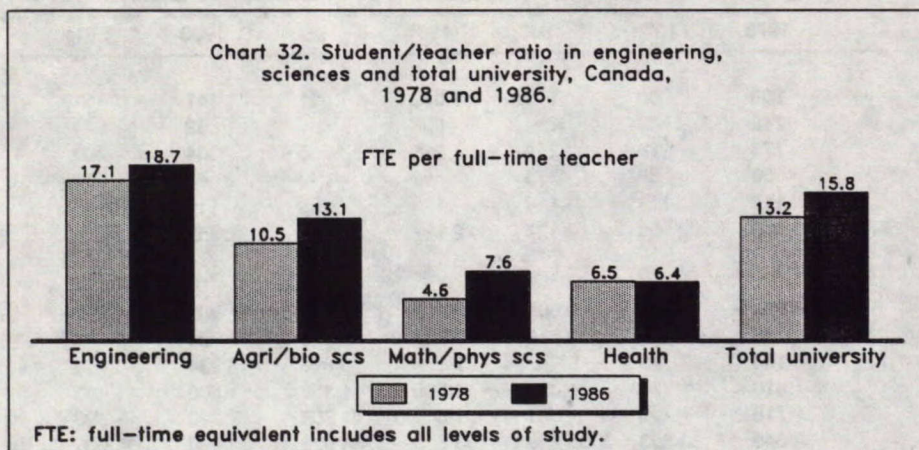
- In contrast to annual increases ranging from 1% to 2% per annum, in 1986, the engineering faculty registered its first decline in numbers - a drop of 2.9% relative to the previous year's level. Meanwhile, total university faculty numbers continued to grow, rising about 1% per annum.

### Student/teacher ratio

In order to estimate student/teacher ratios, part-time enrolment was converted to full-time equivalency (FTE) using a ratio of 3.5:1 and added to full-time enrolment. There are two cautions with regard to the results. Firstly, there is no information available on part-time faculty so numbers may be underrepresented. Secondly, the full-time faculty count also includes the teachers who spend most if not all of their time in administrative duties, research and other functions that remove them from the classrooms.

- In 1978, there were 17.1 students (FTE) per faculty member in engineering. The ratio continued to increase, peaking at 19.8:1 in 1982, and since dropping to 18.7:1 in 1986.
- The student/teacher ratio in engineering was higher than that in other major fields of study in the natural sciences. For example, in 1986, the student/teacher ratio in agriculture and biological sciences was 13.1:1, in mathematics and physical sciences, 7.6:1 and in health, 6.4:1 (Chart 32).

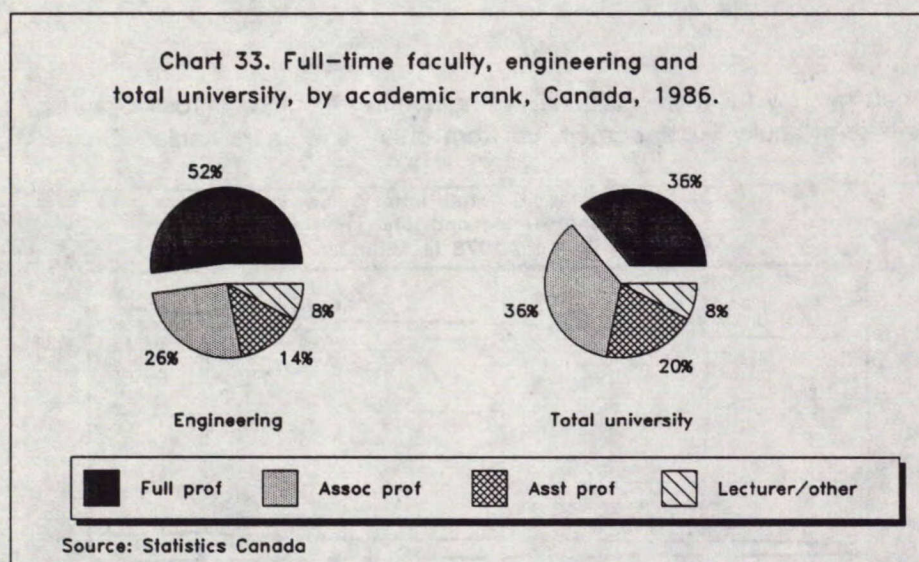




- Engineering's student/teacher ratio was significantly higher than that of university faculty overall. The student/teacher ratio in Canadian universities grew from 13.2:1 in 1978 to 15.8:1 in 1986. In fact, the student/teacher ratio in engineering in Canadian universities was about the same as that in elementary/secondary schools in Canada.

### Academic rank

- Compared with all university faculty, a greater percentage of engineering full-time teachers held the top rank of full professor. For example, in 1986, 52.2% of engineering faculty were full professors, compared with 35.6% of faculty overall (Chart 33, Table 17).



- Full professor together with the next rank of associate professor accounted for a full three-quarters of the full-time faculty in engineering.



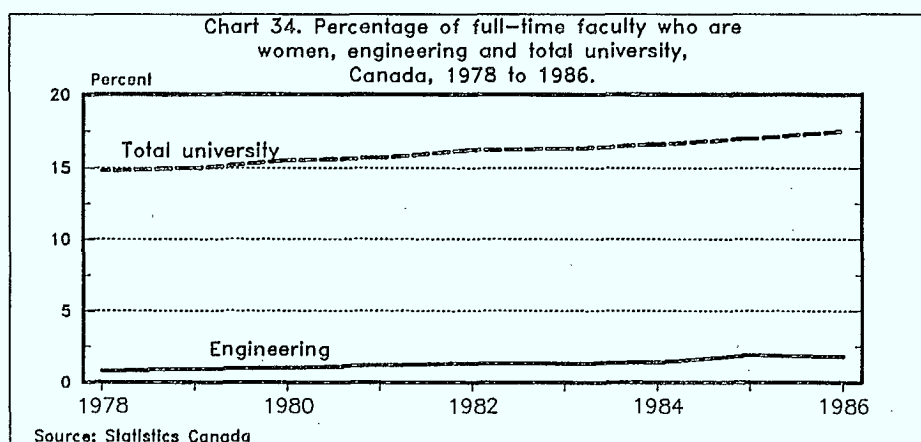
Table 17. Full-time faculty in engineering and total university, by academic rank, Canada, 1978 to 1986.

	1978	1979	1980	1981	1982	1983	1984	1985	1986
<b>Engineering</b>									
Full professor	869	906	971	1 032	1 091	1 141	1 161	1 211	1 202
Associate professor	742	736	714	697	660	652	641	646	596
Assistant professor	276	278	244	225	245	304	308	344	321
Lecturer	56	66	76	68	49	43	50	56	55
Other	117	119	119	115	129	112	115	118	131
All ranks	2 060	2 105	2 124	2 137	2 174	2 252	2 275	2 375	2 305
<b>Total university</b>									
Full professor	8 855	9 270	9 804	10 310	11 054	11 582	11 959	12 382	12 589
Associate professor	12 118	12 224	12 550	12 706	12 899	12 924	12 984	12 940	12 737
Assistant professor	8 144	7 753	7 367	7 136	6 890	6 934	6 946	7 066	7 121
Lecturer	1 810	1 770	1 697	1 598	1 536	1 500	1 453	1 421	1 376
Other	1 718	1 786	1 881	1 849	1 699	1 340	1 323	1 362	1 550
All ranks	32 645	32 803	33 299	33 599	34 078	34 280	34 665	35 171	35 373
<b>Engineering</b>									
Full professor	42.2%	43.0%	45.7%	48.3%	50.2%	50.7%	51.0%	51.0%	52.2%
Associate professor	36.0%	35.0%	33.6%	32.6%	30.3%	28.9%	28.2%	27.1%	25.8%
Assistant professor	13.4%	13.2%	11.5%	10.5%	11.3%	13.5%	13.5%	14.5%	13.9%
Lecturer	2.6%	3.1%	3.6%	3.2%	2.3%	1.9%	2.2%	2.4%	2.4%
Other	5.8%	5.7%	5.6%	5.4%	5.9%	5.0%	5.1%	5.0%	5.7%
All ranks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
<b>Total university</b>									
Full professor	27.1%	28.3%	29.4%	30.7%	32.4%	33.8%	34.5%	35.2%	35.6%
Associate professor	37.1%	37.3%	37.7%	37.8%	37.9%	37.7%	37.5%	36.8%	36.0%
Assistant professor	24.8%	23.6%	22.1%	21.2%	20.2%	20.2%	20.0%	20.1%	20.1%
Lecturer	5.6%	5.4%	5.1%	4.8%	4.5%	4.4%	4.2%	4.0%	3.9%
Other	5.4%	5.4%	5.7%	5.5%	5.0%	3.9%	3.8%	3.9%	4.4%
All ranks	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Statistics Canada

### Gender

- Very few women occupy full-time positions in engineering faculties across Canada. In 1986, only 1.8% of engineering faculty were women, up from 0.8% nine years earlier (Chart 34).

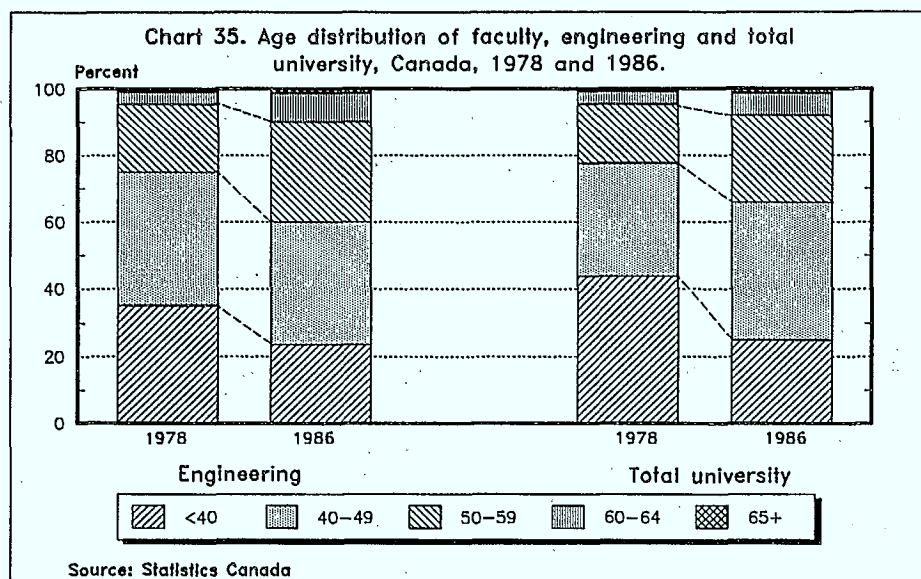




- This is not surprising, however, when one examines the pool of female doctorate graduates. For example, over the decade from 1974 to 1983, only 68 engineering doctorates were awarded to women compared with 2 021 awarded to men.
- Women fared somewhat better in university faculties overall, where their representation increased from 14.8% in 1978 to 17.5% in 1986.

### Age

- As is true of the Canadian professoriate overall, the engineering faculty is aging. In 1978, 35.2% of engineering faculty were under 40 years of age, compared with 43.7% of all university faculty. By 1986, the group of engineering faculty (under age 40) had shrunk to 23.6%, compared with 24.9% of total faculty (Chart 35).



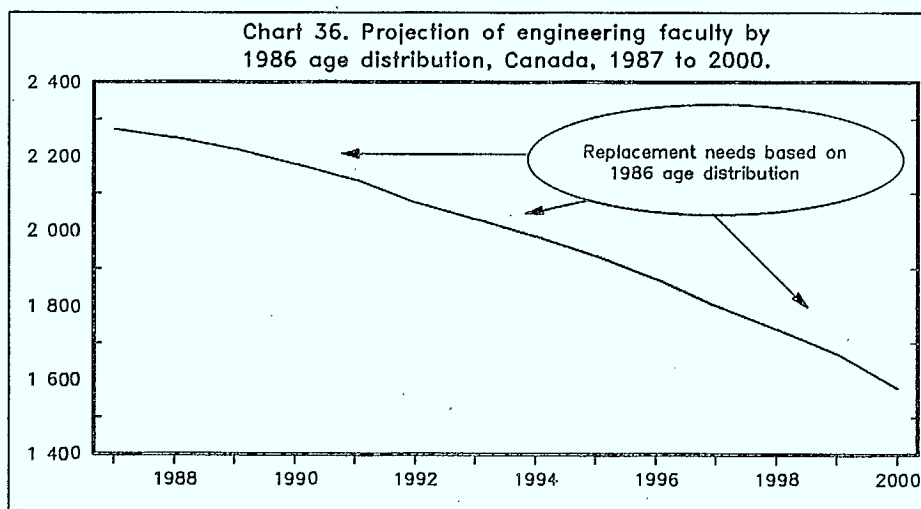
- In 1986, 39.8% of the engineering faculty were aged 50 years or older, compared with 34.2% of all faculty, and 9.8% of engineering faculty were 60 years of age or older, while 8.0% of total faculty were included in this age group.

### Age projection

To assess the replacement requirements for the future work force of engineering faculty, the 1986 faculty age file was examined by single year of age distribution. Each age cell was then projected to the year 2 000. The assumption was made that once the faculty member reaches age 65, he/she is excluded from the supply.

There are a number of cautions the reader must be made aware of. The projection does not take into account annual growth rates (new appointments less resignations, retirements and mortality); the projection is based on the examination of full-time faculty only.

- In 1986, there were 2 273 full-time engineering faculty (age 21-64). By the year 2000, the numbers will be reduced by about one-third (Chart 36).



- Based on the age distribution, the number of full-time teachers will drop by about 1% to 3% per annum through the early 1990s, and thereafter accelerate to reach 4% to 6% per annum until the year 2000.

### Salary

- Engineering faculty median salaries were about 10% to 11% higher than university faculty overall. For example, in 1986, the median salary of engineering faculty (all ranks) was \$57 939, compared with \$52 214 for faculty overall (Table 18).

Table 18. Median salary of full-time faculty, engineering and total university, by academic rank, Canada, 1978 to 1986.

	1981	1982	1983	1984	1985	1986
	(Current dollars)					
Engineering						
Full professor	\$50 968	\$56 549	\$57 933	\$59 921	\$62 569	\$65 944
Associate professor	\$40 866	\$45 550	\$46 685	\$48 264	\$49 968	\$52 512
Assistant professor	\$31 403	\$34 880	\$36 087	\$37 063	\$38 784	\$41 024
Lecturer	\$25 536	\$28 651	\$30 912	\$31 040	\$32 704	\$36 480
Other	\$41 806	\$46 401	\$48 714	\$51 015	\$53 049	\$55 346
All ranks	\$44 503	\$49 616	\$51 008	\$52 773	\$54 772	\$57 939
Total university						
Full professor	\$50 882	\$56 357	\$57 177	\$58 885	\$60 777	\$63 162
Associate professor	\$39 275	\$43 757	\$44 635	\$46 185	\$48 150	\$50 603
Assistant professor	\$30 668	\$33 840	\$34 979	\$35 853	\$37 133	\$38 623
Lecturer	\$24 439	\$27 328	\$28 576	\$29 305	\$30 724	\$32 083
Other	\$38 702	\$42 400	\$45 304	\$49 792	\$51 142	\$51 428
All ranks	\$40 116	\$44 792	\$45 920	\$47 680	\$49 704	\$52 214

Source: Statistics Canada

- Engineering salaries were higher at all ranks, relative to university faculty as a whole, with rare exception throughout the time period examined.

### Citizenship

- Engineering did not attract many of the foreign faculty at Canadian universities. For example, in 1986, fewer than 5% of foreign faculty were employed by engineering departments. This was the trend throughout the years examined (Table 19).

Table 19. Full-time faculty, engineering and total university, by immigration status, Canada, 1978 to 1986.

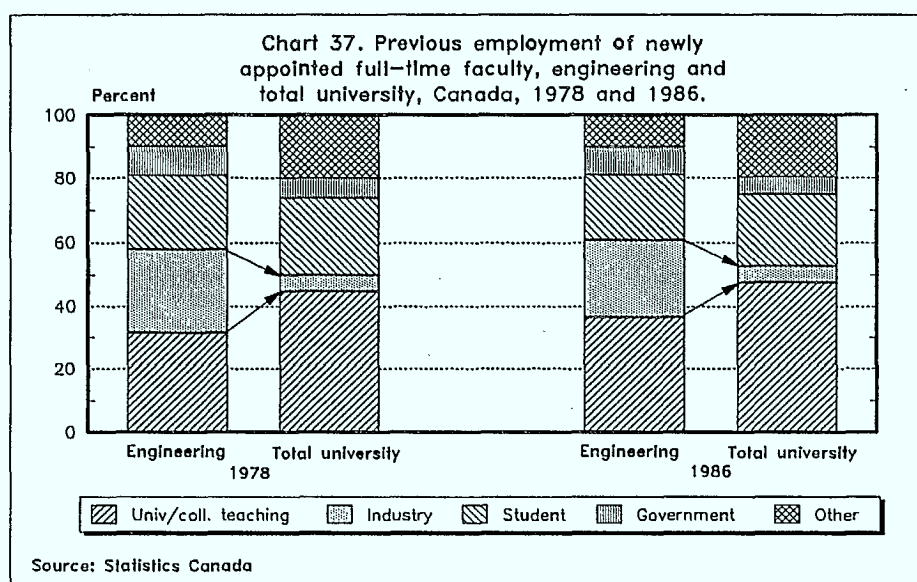
	1978	1979	1980	1981	1982	1983	1984	1985	1986
Engineering									
Reported #	1 985	2 031	2 053	2 064	2 108	2 226	2 234	2 344	2 275
Cdn/perm.res.	1 963	2 004	2 019	2 027	2 082	2 196	2 208	2 309	2 248
Foreign	22	27	34	37	26	30	26	35	27
Total university									
Reported #	31 720	31 776	32 239	32 589	33 085	33 649	33 879	34 531	34 827
Cdn/perm.res.	31 265	31 344	31 787	32 103	32 605	33 189	33 408	33 995	34 260
Foreign	455	432	452	486	480	460	471	536	567

Source: Statistics Canada

- Despite growth in actual numbers (from 22 to 27), foreign faculty accounted for less than 2% of engineering faculty in 1986.

### Previous employment

- For engineering faculty and university faculty as a whole, university or college teaching was the most common previous employment; that is, teachers transferring from one position or institution to another. Engineering, however, drew a smaller proportion of faculty from this category than faculty overall. Around one-third of engineering faculty were teaching in university or college prior to their appointment, while for faculty overall, the figure hovered around one-half (Chart 37).





- In both engineering and total faculty, a large percentage were hired upon graduation, that is their activity prior to their appointment was *student*. In 1986, 20.4% of engineering faculty and 22.1% of total faculty were students prior to their appointment.
- Engineering teachers were far more likely than their counterparts to be drawn from the industrial sector. In 1986, 20.4% of engineering faculty had been in industry prior to their appointment, compared with 5.2% of faculty overall.
- While traditionally engineering has relied heavily on the industrial sector for recruitment, the share of new appointments from this sector has been on the decline, while for total faculty, the percentage remained constant.
- Engineering to a far greater extent than faculty overall, also drew from the government sector. Typically, just under 10% of new appointments to engineering faculty were recruited from the government sector, compared with about 6% of faculty overall.

## From the classroom to the job

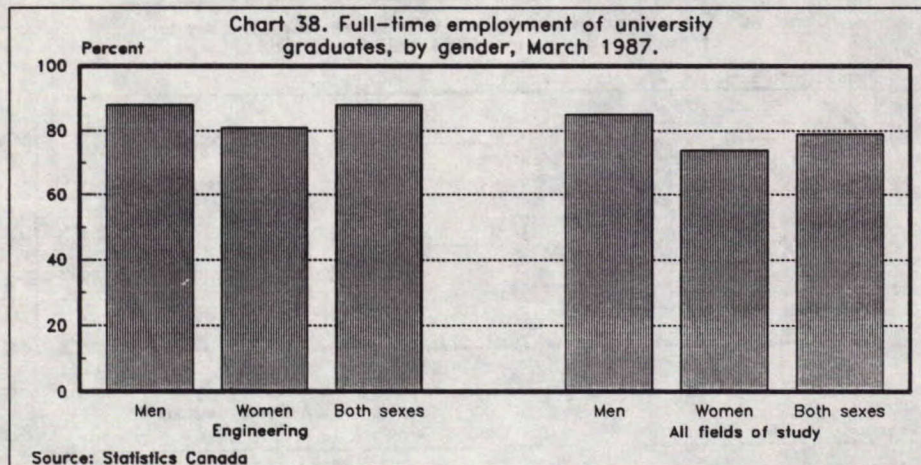
The relationship between an individual's university education and his or her full-time job is difficult to assess. In June 1984, Statistics Canada's *National Graduate Survey* collected information on the relationship between education and labour market experience of people who graduated from Canadian universities in 1982. The same group was questioned again in March 1987 in a follow-up survey. It is therefore possible to compare the early labour market experiences of those who chose to pursue studies in engineering with those of their classmates, and the Canadian labour force as a whole.

### The National Graduate Survey

#### *Employment*

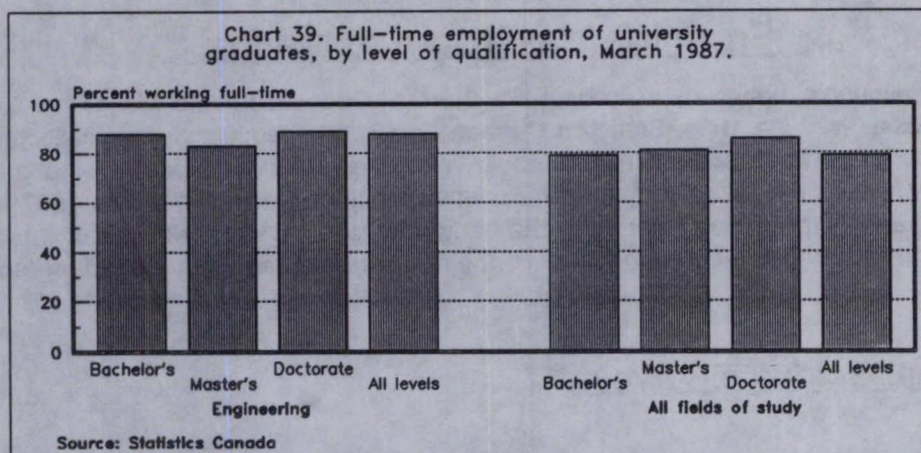
One measure of success of the program choice is the ability of the individual to secure employment.

- Five years after graduation, in March 1987, the unemployment rate of the class of '82 stood at only 4%, compared with 10% for the labour force overall. Engineering graduates had even better success - only 3% were unemployed.
- A higher percentage of the engineering graduates were working full-time, compared with their classmates: 88% versus 79% (Chart 38).



- The percentage of the graduates working full-time varied by gender. Eighty-eight percent of the men who graduated from engineering were working full-time, compared with 81% of the women.
- However, at 81%, a greater percentage of women who graduated from engineering reported full-time employment when compared with their classmates - 74%.
- The percentage of graduates working full-time also varied by level of qualification, although for engineering it did not increase by level of study, as would be expected. For example, 88% of the bachelor's graduates and 89% of the doctorate holders were working full-time, but only 83% of the master's graduates (Chart 39).

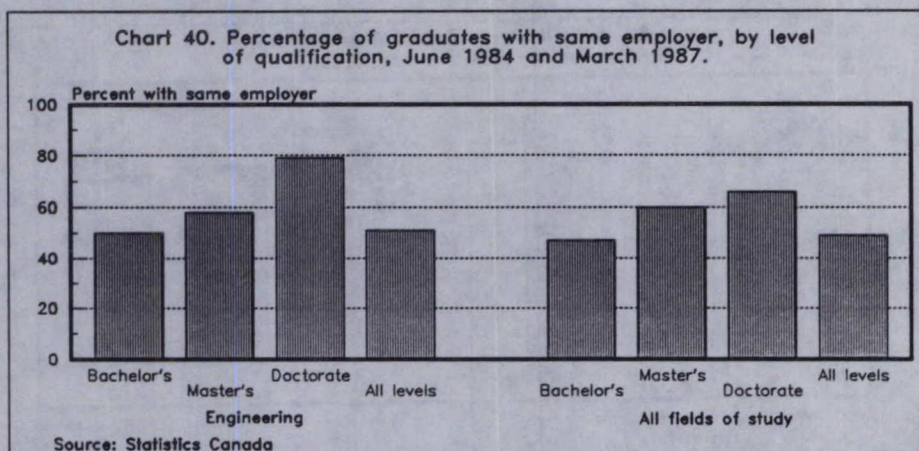




- The percentage of all class of '82 graduates working full-time increased by level of qualification. The portion of graduates with a bachelor's degree working full-time stood at 79%, while 81% of those with a master's degree and 86% with a doctoral degree were working full-time.

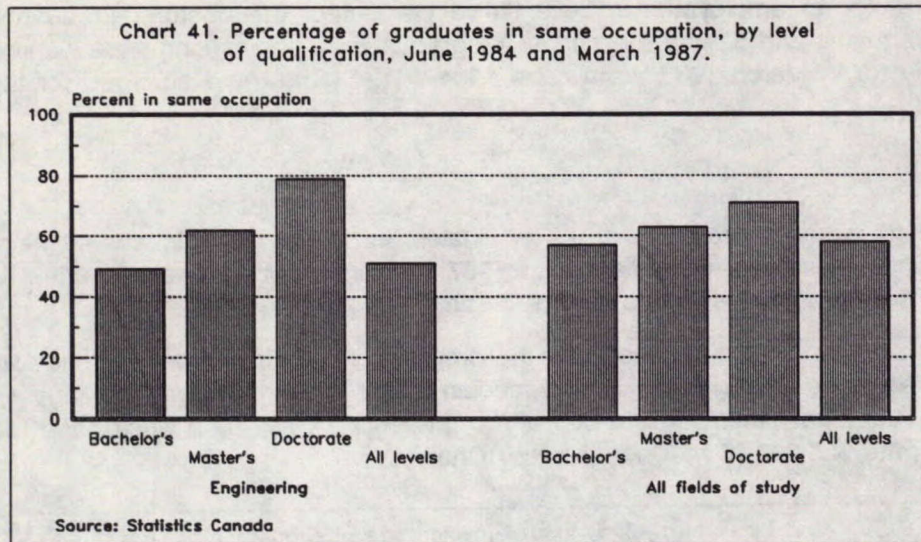
### Job mobility

- Engineering graduates were less likely to change employers than the class of '82 as a whole. Fifty-one percent of the engineering graduates reported the same employer in March 1987 and June 1984, compared with 49% of their classmates (Chart 40).

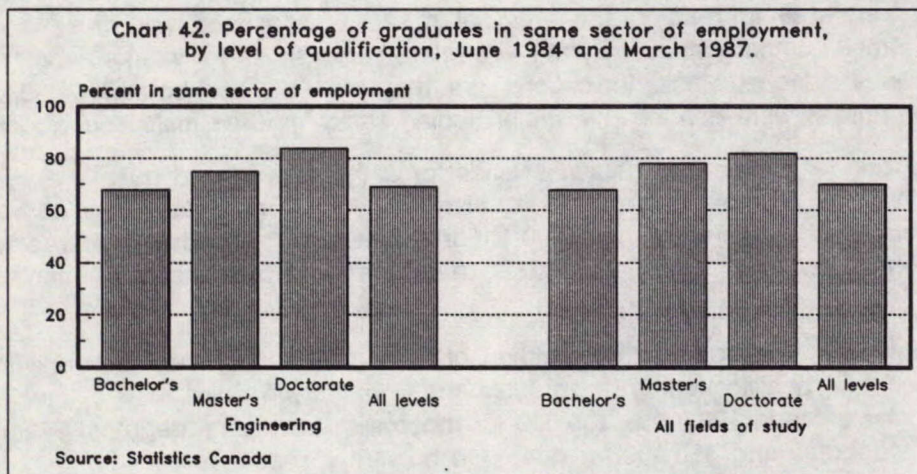


- As with their classmates in all fields, the higher the degree of the engineer, the more likely the individual was to have the same employer. For example, 50% of the graduates with a bachelor's qualification, 58% of the master's holders and 79% of the engineering doctoral graduates had the same employers in March 1987 as in June 1984.
- Engineering graduates, however, had a greater propensity to change occupations than others in their class. Fifty-one percent of the engineering graduates reported they were in the same occupations in March 1987 as they were in June 1984, compared with 58% of their classmates (Chart 41).





- This was not the case for engineers with doctorate degrees. A larger share of engineers with doctorates were in the same occupation in March 1987 and June 1984 compared with other classmates: 79% versus 71%.
- The higher the degree, the more likely the engineering graduate was to report the same occupation in March 1987 as in June 1984. Seventy-nine percent of engineers with a doctorate reported the same occupation, compared with 62% with a master's degree, and 49% with a bachelor's. Their classmates followed a similar pattern.
- The mobility of the engineering graduates in terms of sector of employment was about the same as that of the class of '82 overall. For example, 69% of the engineering graduates and 70% of their classmates were in the same sector of employment in March 1987 as they were in June 1984 (Chart 42).



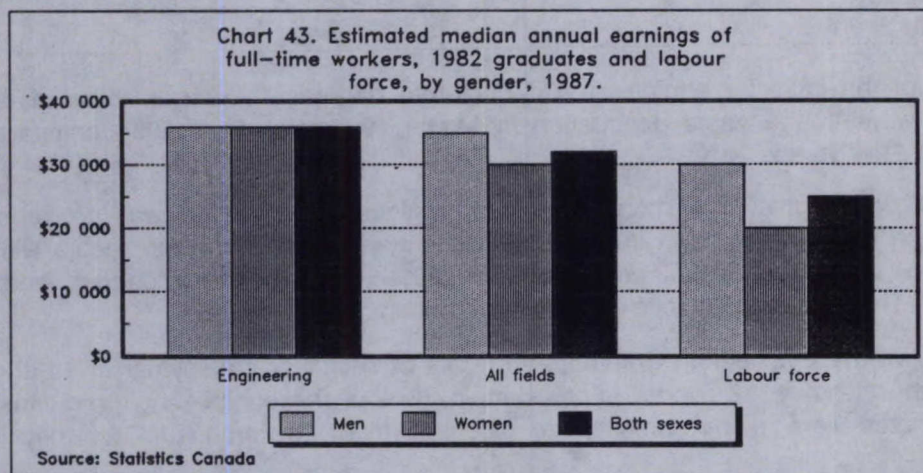


- The higher the degree of the engineering graduate, the more likely he or she was to remain in the same sector of employment. Seventy-five percent of the doctoral graduates, 58% of the master's graduates and 52% of the bachelor's graduates in engineering were working in the same industrial sector in March 1987 as in June 1984. The same trend emerged for the class of '82 as a whole.

### Salary

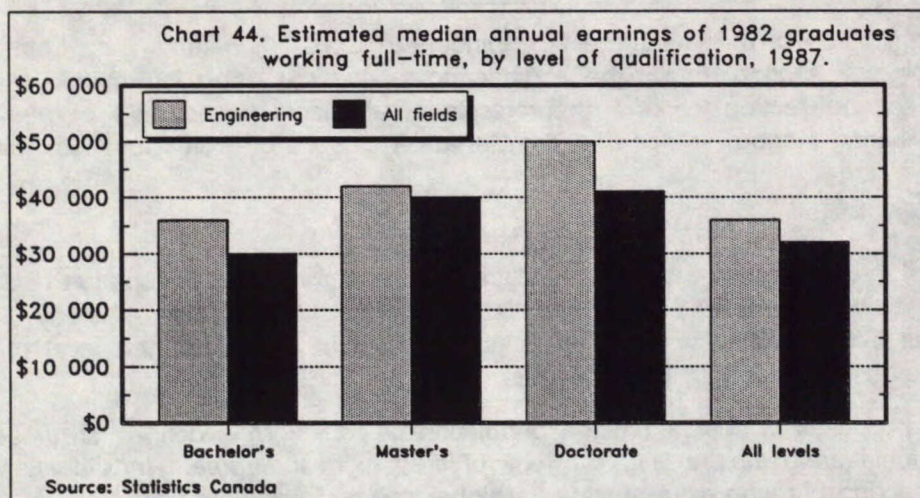
The median annual earnings of the graduates are based on estimates of their gross annual earnings as if they were to work the March 1987 job for the entire twelve months of 1987. The labour force median annual earnings are for full-time, full-year workers.

- If earnings are an indicator of success of the program chosen in university, engineering graduates did well. Five years after graduation, the median salary of an engineering graduate was \$36 000, more than 10% higher than the \$32 000 of the graduating class as a whole, and more than 40% higher than the \$25 000 of the labour force (Chart 43).



- Women did very well in reaping the financial rewards associated with this traditionally male profession. Small numbers make the data less reliable than those for women who graduated from other disciplines. Nonetheless, indications are that in 1987, at about \$36 000, women with engineering degrees were earning the same median salary as their male counterparts.
- There was a gender gap in the median salaries for all graduates, and quite a significant one for the labour force as a whole. The median salary of all male graduates was \$35 000, while for female graduates, the figure was \$30 000. For the labour force, the gap was wider, as the median salary for women stood at \$20 000, a full \$10 000 less than the men's, which had reached \$30 000.
- Individuals were also rewarded for the amount of time and money invested in university courses - the higher the qualifications, the greater the monetary reward. The median salary of engineering graduates in 1987 was \$36 000 for those with bachelor's degrees, \$42 000 for those with master's degrees and \$50 000 for doctorate holders (Chart 44).





- This contrasted with the situation for the graduating class as a whole, where the gap was between bachelor's and graduate degrees. While bachelor's graduates reported \$30 000, master's graduates were earning \$10 000 more with \$40 000. However, doctorate holders' median salary at \$41 000 was only marginally higher than that of master's graduates.
- The most frequent occupation chosen by engineering bachelor's graduates was in the natural sciences, engineering and mathematics (NSE) - 67%, which reported an annual median salary of \$36 000. Second was management - 13%, where the annual median salary reported was \$40 000.
- NSE accounted for about the same share of engineering master's graduates - 66%, reporting an annual median salary of \$42 000. Seventeen percent of the engineering master's graduates were in management, with an annual median salary of \$45 000.
- Just over half of the engineering doctoral graduates - 52%, were in NSE occupations, reporting an annual median salary of \$52 000. Twenty-eight percent of them were teaching in universities, with an annual median salary of \$42 000.



## The engineering work force

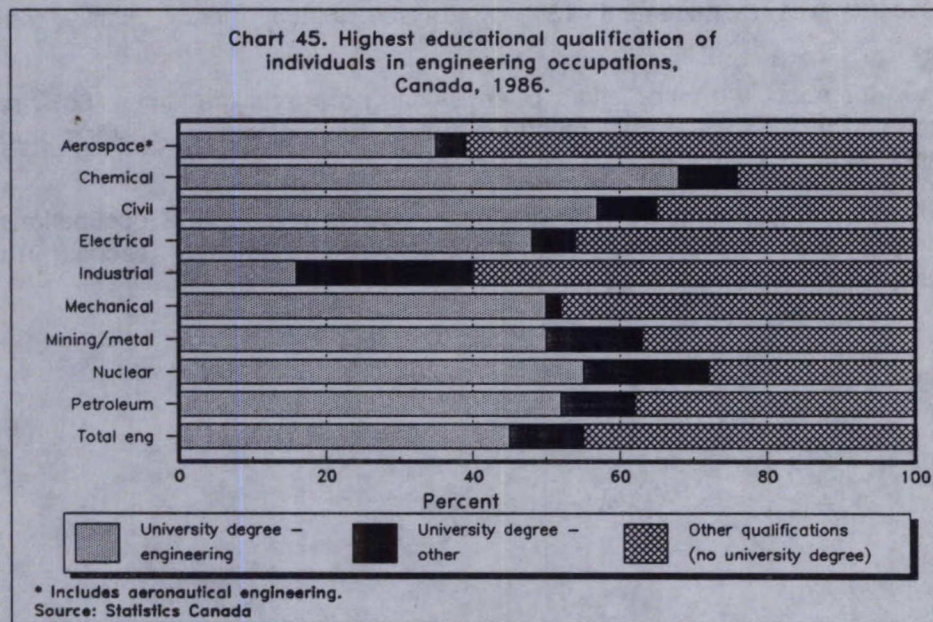
The examination of the workforce of engineers in Canada presents data from two national databases. The first section details the engineering work force using information from the 1986 Census. The second section focuses on professional engineers based on the 1988 data of the Canadian Engineering Manpower Board of the Canadian Council of Professional Engineers.

### Census

Historical information on the level of educational attainment and occupation of the Canadian population is available from the Census. In 1986, for the first time, the field of study of the highest qualification was introduced. By cross-tabulating the field of study and the level of educational attainment it is possible to isolate the engineers.

For the purposes of this report, the population of engineers is defined as *those individuals who reported engineering as the field of study of their highest degree*. Individuals who have a degree in engineering but who have obtained a higher degree in another field of study (for example, a Master's of Business Administration) are not included. This also excludes individuals classified by Census in engineering occupations but who do not meet the educational criteria as described.

Examination of the Census by occupation reveals that fewer than half (49%) of the individuals in engineering occupations meet the criteria; another 10% or so had a university degree in a specialization other than engineering and about 40% did not have a university degree (Chart 45).



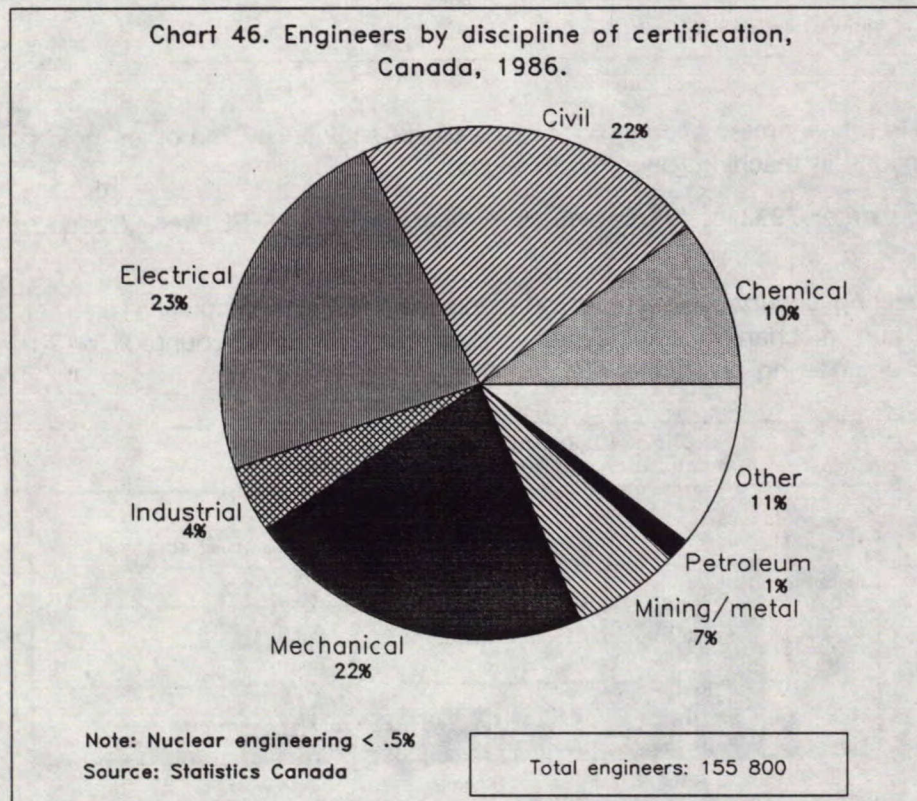
This examination deals with engineers (individuals who meet the criteria outlined above) in Canada, not the occupation of engineering.



A number of variables are available. How many engineers are there? How many women are there in this traditionally male field? What level of degree (bachelor's, master's, doctorate) do the engineers in the work force have? What occupations are they in? How old is the engineering work force? How many of the engineers are immigrants? How much are engineers earning? In what sectors of the economy are they working?

### Population

- There were approximately 155 800 engineers in Canada in 1986 according to the Census. This includes individuals age 15 years and over who reported engineering as the field of study of highest university degree.
- Individuals who held degrees in electrical engineering were the largest contingent, representing almost a quarter of the total. This group was followed closely in number by the mechanical and civil engineering degree holders. Together these specializations accounted for two-thirds of the engineers in Canada (Chart 46).

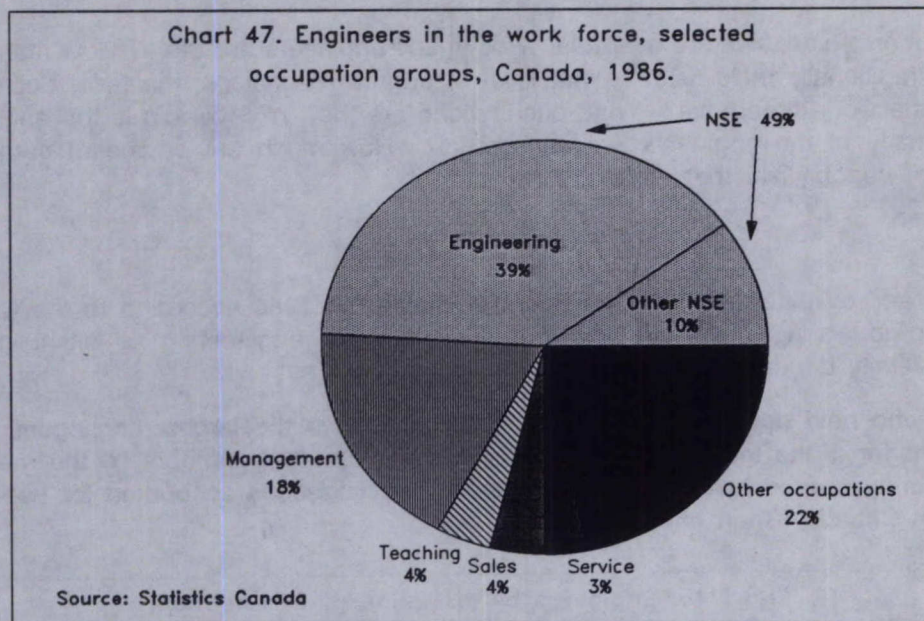


### Occupation

- Just under half (49%) of the 155 800 engineers were working in occupations in the natural sciences, mathematics and engineering (NSE) (Chart 47)(Refer to Appendix for Census occupations).

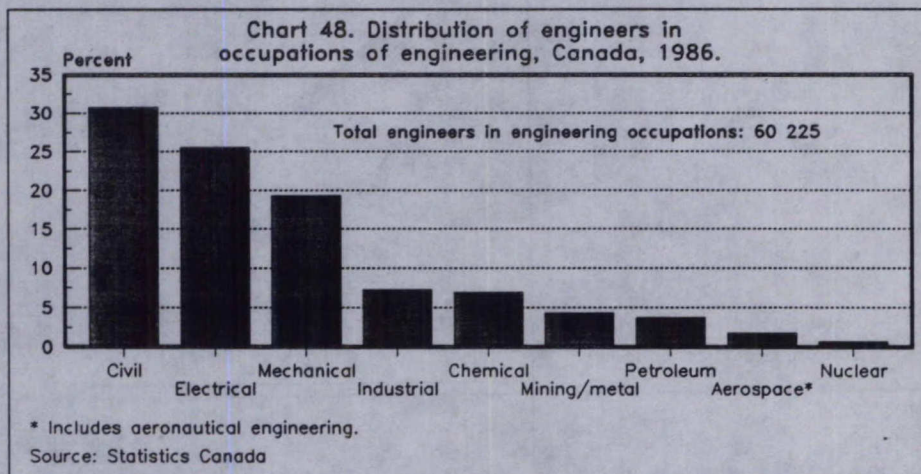


Chart 47. Engineers in the work force, selected occupation groups, Canada, 1986.



- Occupations in management accounted for 18% of the engineers. The other most popular pursuits were occupations in teaching, sales and service.
- Over three-quarters (79%) of the engineers in occupations in NSE were working in engineering occupations.
- Within engineering occupations, civil engineering was the most popular. Together with electrical engineering and mechanical engineering, these occupations accounted for three-quarters of engineers in engineering occupations (Chart 48).

Chart 48. Distribution of engineers in occupations of engineering, Canada, 1986.





### Level of qualification

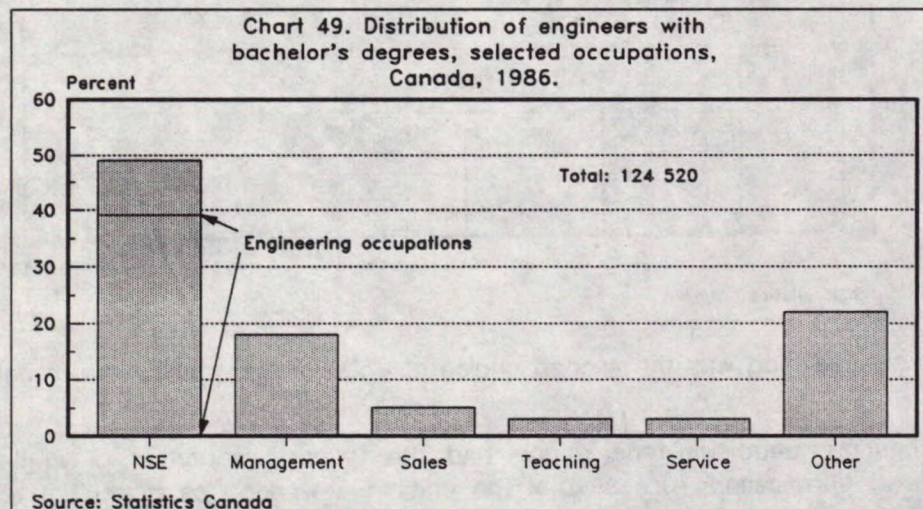
- A large percentage of engineers reported a bachelor's degree as their highest qualification - 80% (Table 20).

Table 20. Engineers by level of qualification and occupation, Canada, 1986.

Occupation	Bachelor's	Master's	Doctorate	All levels
Management/administration	81%	16%	3%	100%
Natural scs/eng/math	80%	17%	3%	100%
Engineering	78%	17%	5%	100%
Sales	88%	11%	1%	100%
Service	83%	16%	1%	100%
Teaching	51%	24%	25%	100%
All other occupations	84%	14%	2%	100%
Total	80%	16%	4%	100%

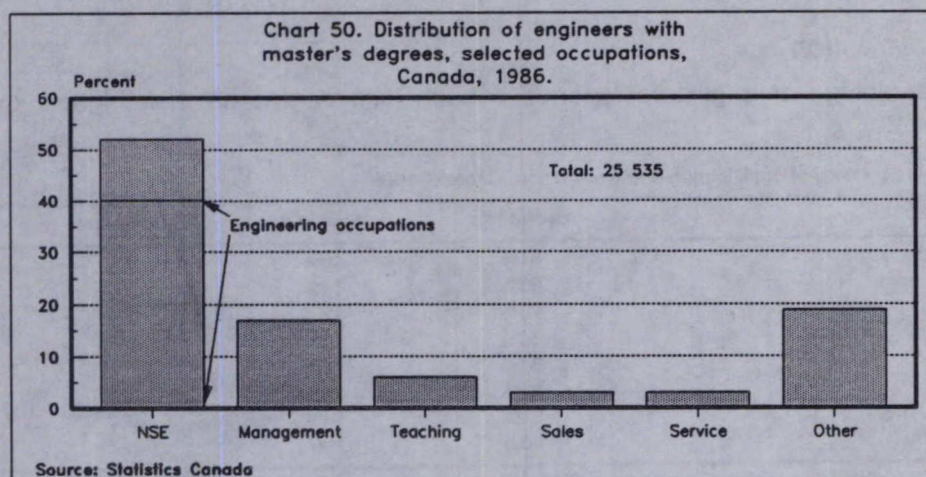
Source: Statistics Canada

- Sixteen percent of the engineers had a master's degree, while 4% were equipped with a doctorate.
- The level of degree obtained by engineers was about the same for university degree holders overall. That is, 78% of the degree holders in Canada reported a bachelor's degree as their highest degree, 18% a master's, and 4% a doctorate.
- Occupations in NSE accounted for the bulk of the 124 520 engineering bachelor's graduates - 49% (Chart 49).

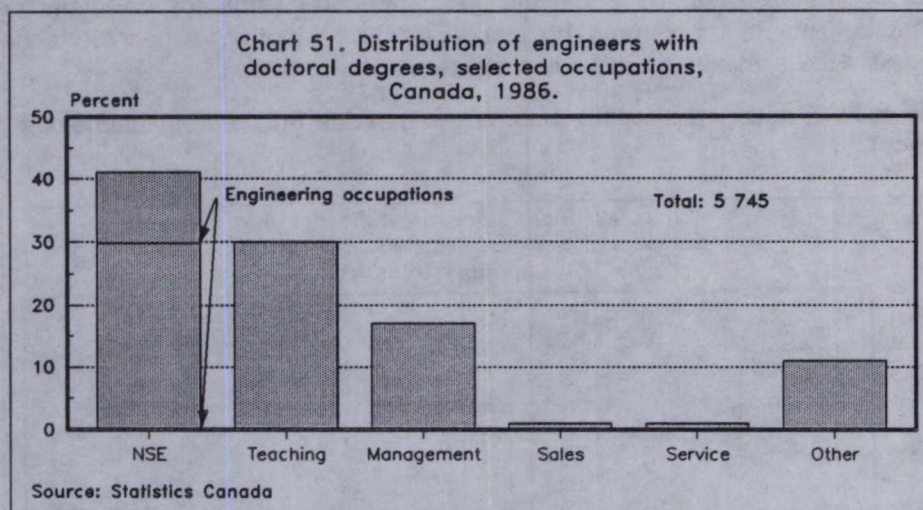


- The next most popular occupational group for engineering bachelor's holders was management where 18% of them could be found.
- About half of the 25 535 engineers with master's qualifications were working in NSE occupations. Of the 13 190 in NSE, three-quarters were in engineering occupations (Chart 50).



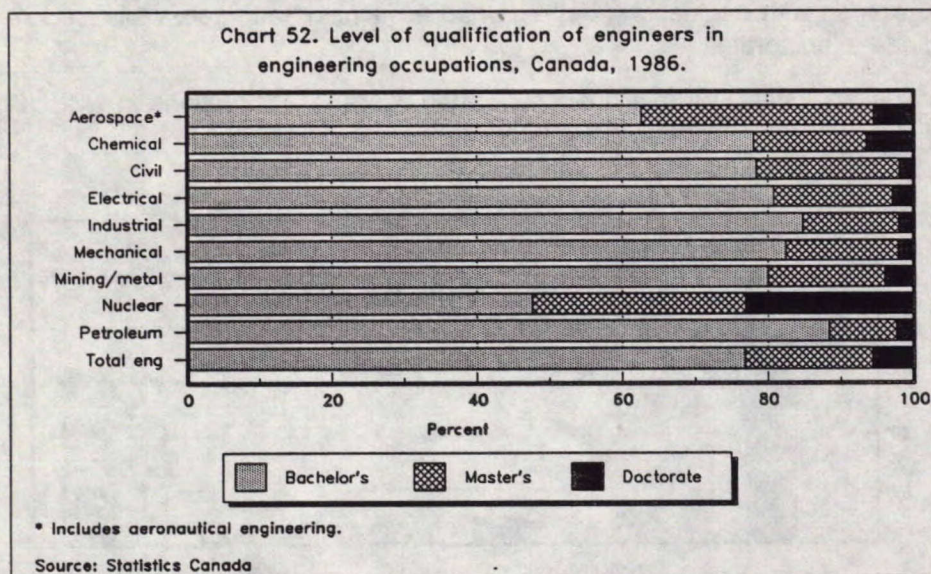


- The second choice of masters' holders were occupations in management.
- Forty percent of the 5 745 engineers with doctorates were in occupations in NSE; about three-quarters of the 2 320 in NSE were in engineering occupations (Chart 51).



- Not surprisingly, teaching was the second choice of PhD holders - 30% were in occupations in teaching.
- Within engineering, petroleum engineering had the highest proportion of engineers with a bachelor's level qualification; for 88% of the engineers working as petroleum engineers, the bachelor's degree was their highest qualification. With the exception of occupations in nuclear engineering and aeronautical/aerospace engineering, over three-quarters of the engineers in engineering occupations were working with a bachelor's degree as their highest qualification (Chart 52).

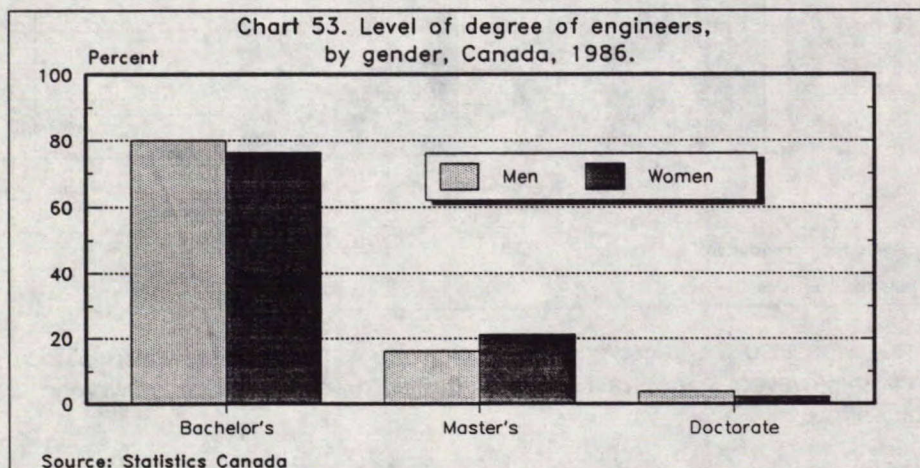




- In aeronautical/aerospace engineering, 32% of the engineers had a master's degree - the highest showing in the engineering occupations. Petroleum engineering had the lowest representation of engineers with master's degrees (9%).
- Nuclear engineering had the highest representation of engineers with doctorates (22%). Civil engineering had the lowest representation at 2%, along with occupations in industrial engineering and mechanical engineering.

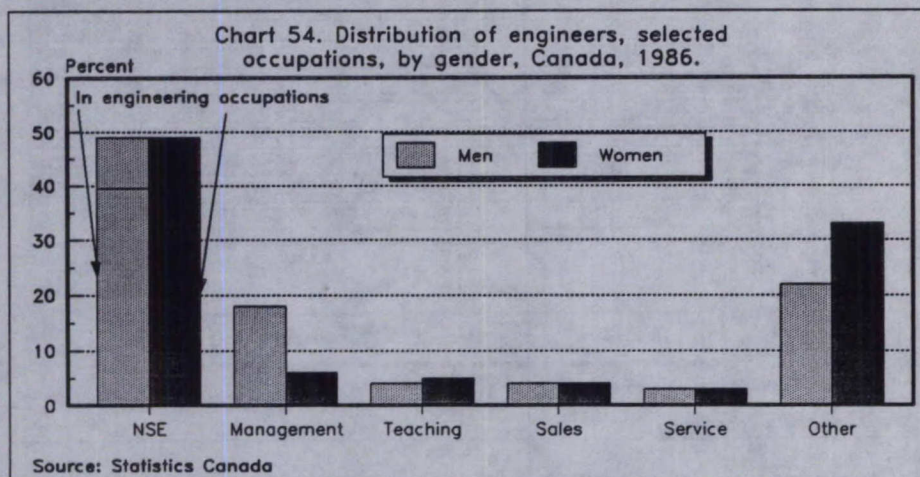
### Gender

- Only 5% of the 155 800 engineers in Canada were women.
- Eighty percent of the 148 170 men were in the work force with a bachelor's degree as their highest qualification, 16% had a master's degree and 4% were equipped with a doctorate (Chart 53).

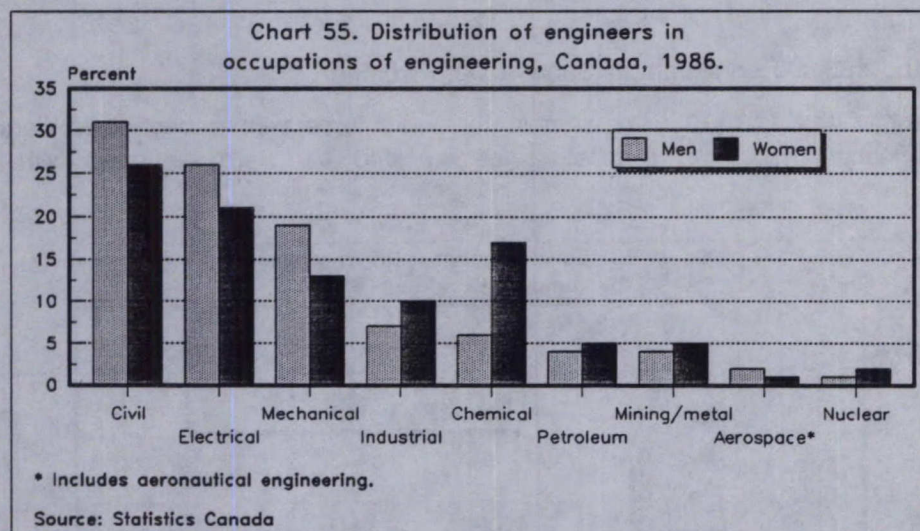




- Compared with men, a higher percentage of women had graduate degrees. For example, 76% of the 7 630 women with engineering degrees had a bachelor's degree, while 21% had a master's degree and 2% a doctorate.
- Only half of the engineers, be they men or women, were in occupations in NSE (Chart 54).



- A smaller share of women were in engineering occupations compared with men: 32% of the women versus 39% of the men.
- Within the engineering occupations, most of the men were to be found in civil engineering. Together with electrical engineering and mechanical engineering, these occupations accounted for 76% of them (Chart 55).



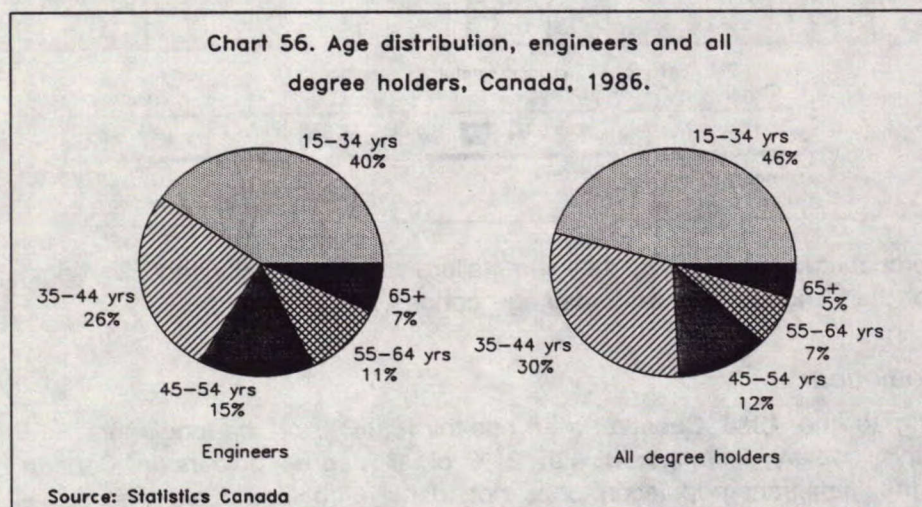
- Civil engineering was also the most popular choice for women (27%), with electrical engineering second at 21%. However, in contrast to men, the third largest share of women were found in chemical engineering.



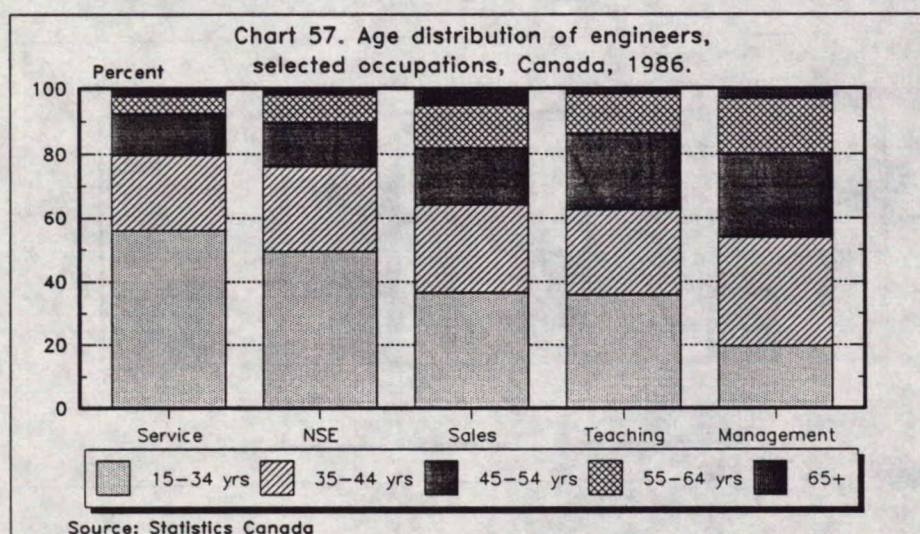
- As a result of the popularity of chemical engineering for women, and the low share of men in the occupation, it was the engineering occupation that had the strongest representation of women - 9% of the engineers in this occupation were women. Overall, occupations in engineering were still largely a male domain - women accounted for only 4% of the engineers in the engineering occupations.

### Age

- Engineers were older compared with other degrees holders in the work force. Almost one-fifth (18%) of the engineers were 55 years of age and older, while just over one-tenth (12%) of all degree holders fell in this age cohort (Chart 56).

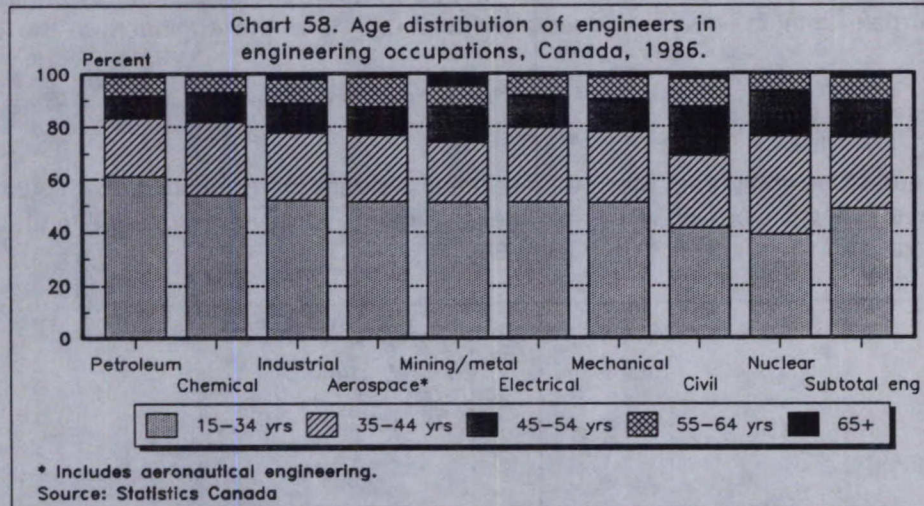


- As with the work force in general, a large share of the engineers in management occupations were 55 years of age and older - 20%. Occupations in sales also had a large share of its engineers in this age cohort - 18%. (Chart 57).





- Within the occupations of engineering, fewer than half (48%) of the engineers were under 35 years of age. Petroleum engineering had the youngest age profile, as 61% of the engineers in this occupation were under 35 years of age (Chart 58).

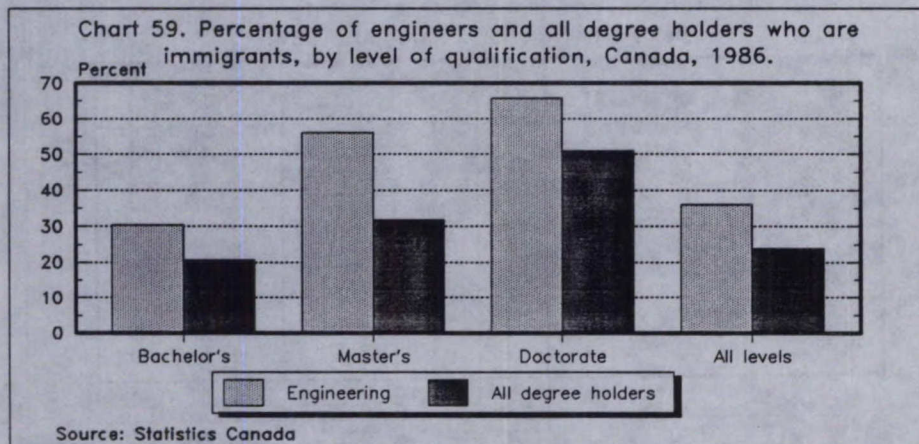


- Aerospace/aeronautical engineering, mining/metallurgical engineering and civil engineering had a large share of their engineers in the older age cohorts.

### Immigrant population

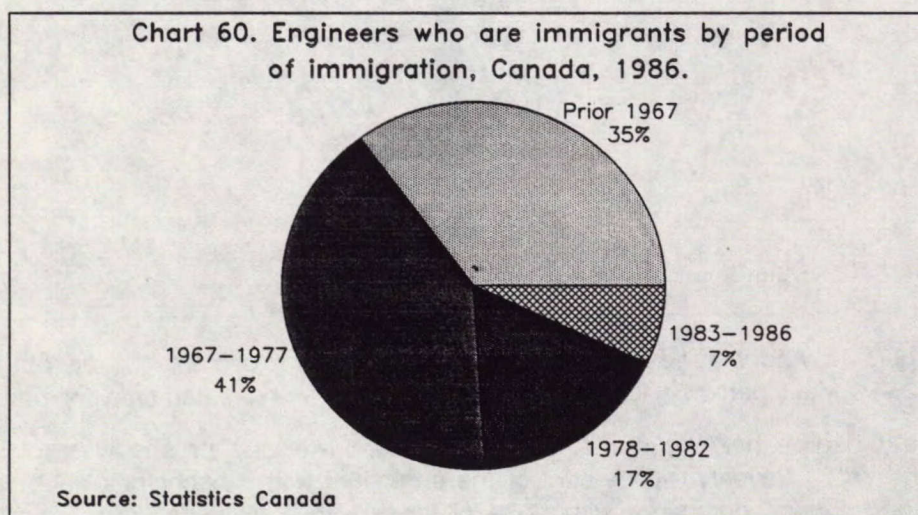
According to the 1986 Census, over one-third (36%) of the engineers in Canada were immigrants to this country, compared with 24% of all degree holders in Canada. While the information on the immigrant population does not identify the individuals who arrived in Canada equipped with a degree in engineering, it nonetheless shows the contribution of the immigrant population in Canada.

- Thirty percent of the engineers with bachelor's qualifications were immigrants. Only 21% of all bachelor's degree holders in Canada were immigrants (Chart 59).





- At the master's level, more than half (56%) of the engineers were immigrants, compared with 32% of all master's holders in Canada.
- It was the engineers with doctorate qualifications who showed the greatest representation of immigrant population; two-thirds of engineers in Canada with a doctoral qualification were immigrants to this country. Of all doctorate holders in Canada, just over half (51%) were immigrants.
- The largest share of the engineers who were immigrants came to Canada during the 1967-1977 decade - 41%. Together with those who arrived prior to 1967, they comprised three-quarters of all engineers who were immigrants (Chart 60).



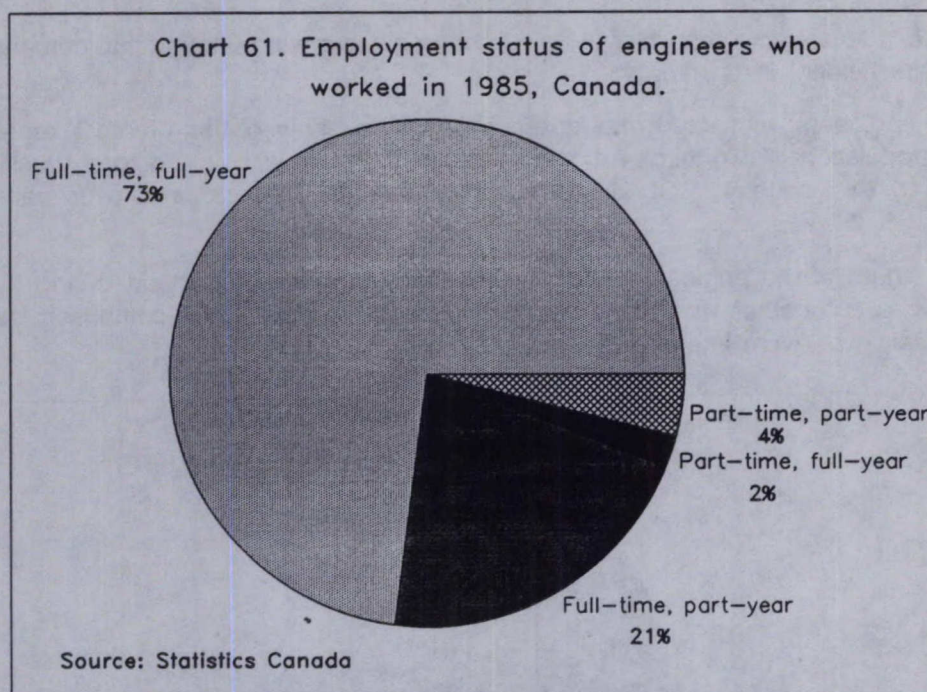
- The recent years, 1983 to 1986, saw 7% arriving. Those in this latter group more than likely came equipped with a completed or partially completed degree in engineering.

### Employment

The 1986 Census employment information is based on the 1985 calendar year.

- Nine percent of the 155 800 engineers did not work in 1985. This would include individuals who could not find employment, engineers continuing their studies, retirees and anyone not in the work force because of illness or personal responsibilities.
- Seventy-three percent of the 141 250 engineers who worked in 1985 worked full-time for the full year (Chart 61).





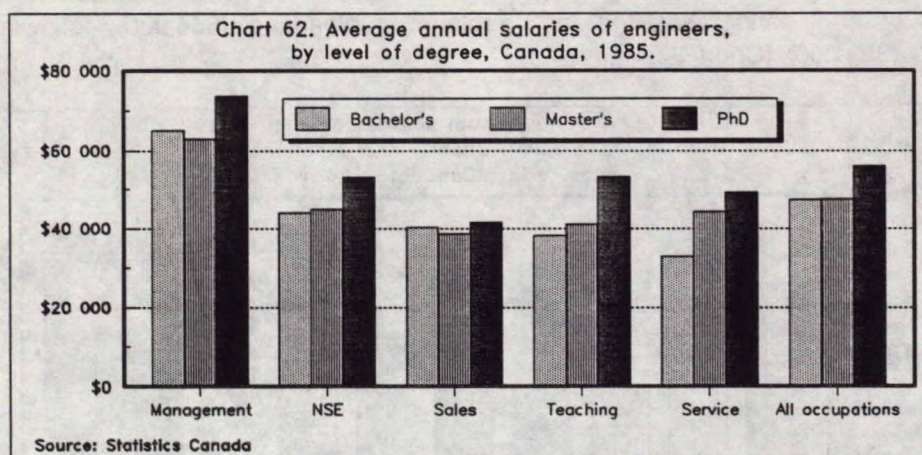
- Twenty-one percent who worked in 1985 reported full-time employment but did not work the full year. Only 2% worked part-time for the full year, while 4% worked part-time for part of 1985.
- The higher the degree held by the engineer, the more likely he or she was to work full-time throughout the year. Seventy-two percent of the engineers with a bachelor's qualification worked full-time for the full year, compared with 76% of those with a master's degree, and 86% with a doctorate.
- About the same proportion of engineers with bachelor's and master's degrees reported part-time employment (either full-year or part-year), 6% and 5%, respectively. Only 3% of the engineers with a doctorate worked on a part-time basis.

### Salary

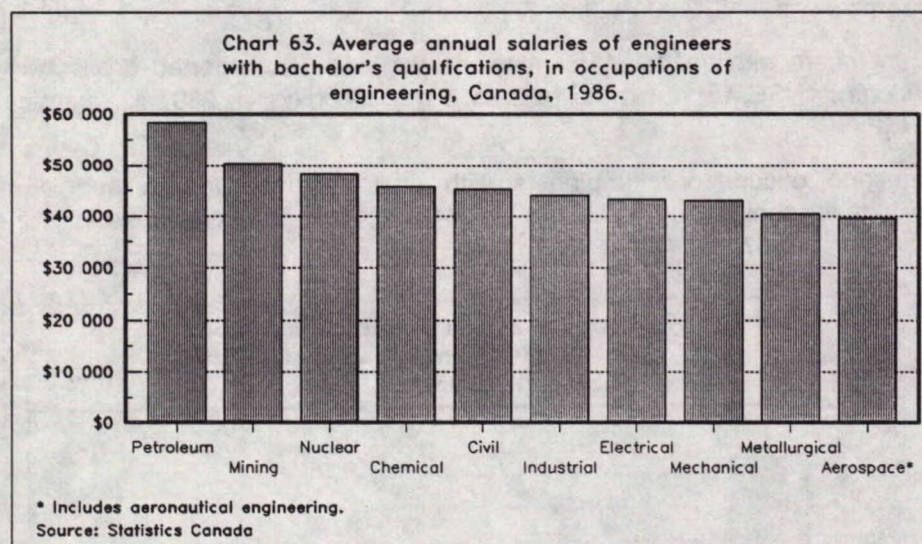
The salary information of the 1986 Census is based on the average salary of a full-time, full-year worker in 1985.

- The average salary for an engineer with a bachelor's qualification was \$47 200. For engineers with a master's qualification, the average annual salary was only marginally higher - \$47 500. However, engineers with doctoral qualifications reported an average annual salary almost \$10 000 higher - \$56 000 (Chart 62).





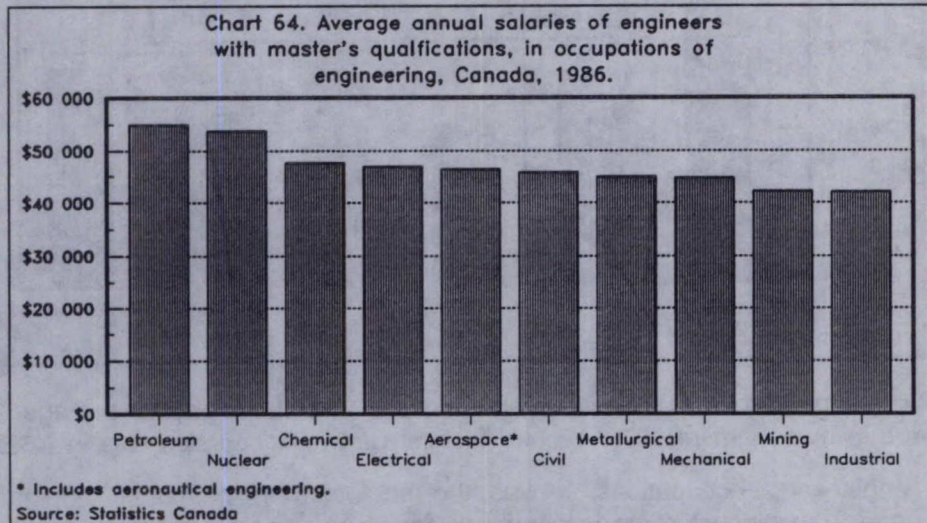
- Engineers with a bachelor's qualification reporting \$65 000, the highest average annual salary reported, were in management. The second highest paying occupation was in NSE - \$43 900.
- Within the engineering occupations, it was the engineers in petroleum engineering who at \$58 000, reported the highest average annual salary for engineers with a bachelor's qualification (Chart 63).



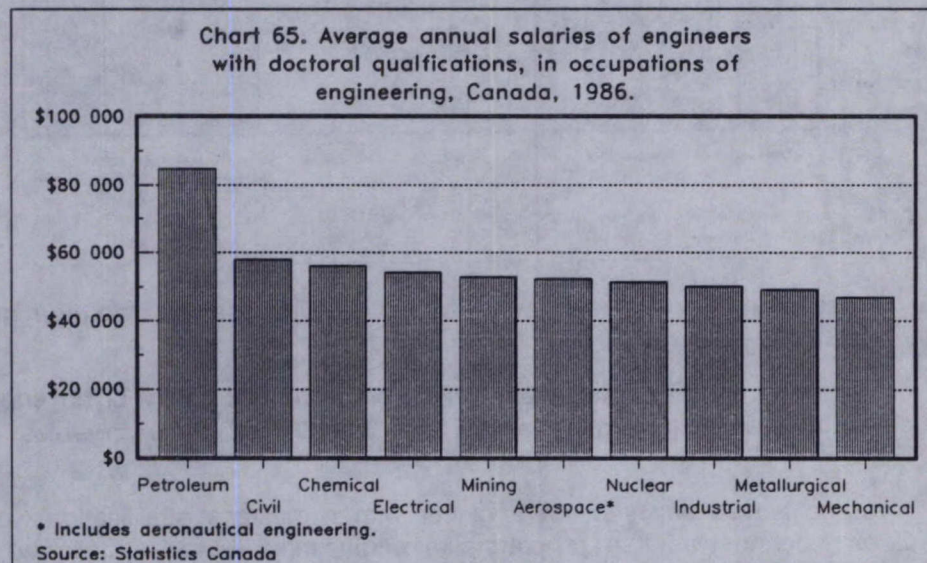
- It was also in management that engineers with master's qualifications reported the highest average annual salary - \$63 100 (Chart 62).
- At \$45 000 for engineers in NSE occupations, the average annual salary of an engineer with a master's qualification was only slightly above the \$44 000 of those in sales occupations (Chart 62).
- The highest average annual salary of an engineer with a master's qualification working in the occupation of engineering was that of petroleum engineering (\$54 900), followed by nuclear engineering (\$53 000) (Chart 64).



- The highest average annual salary of an engineer with a master's qualification working in the occupation of engineering was that of petroleum engineering (\$54 900), followed by nuclear engineering (\$53 000) (Chart 64).



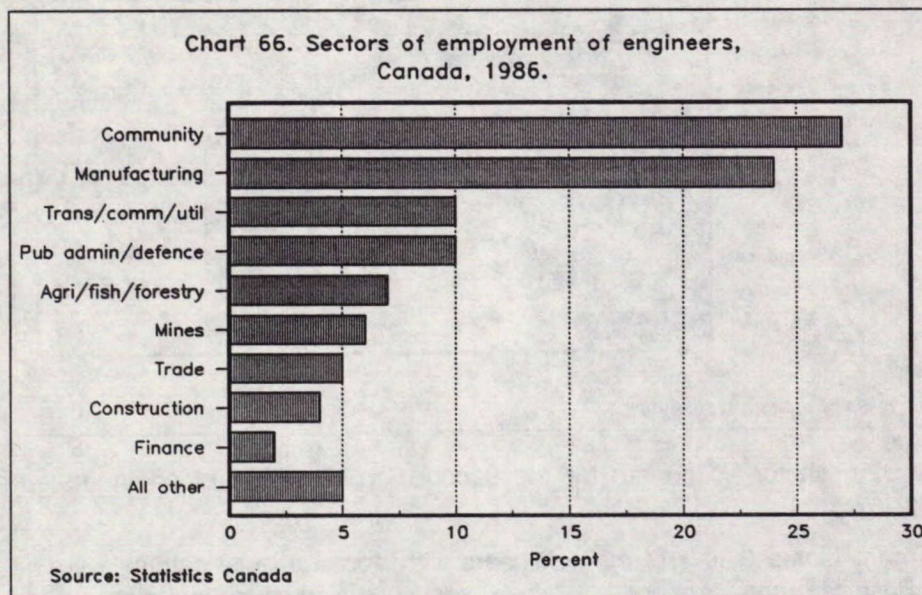
- Management occupations also offered the highest annual average salary for engineers with doctorate qualifications - \$73 000 (Chart 62).
- Contrary to engineers with bachelor's or master's degrees who reported a second highest salary from occupations in NSE, for doctorate holders it was teaching, at \$53 200, marginally above the \$53 000 of NSE.
- Within engineering occupations, engineers with doctorates working in petroleum engineering reported the highest annual average salary - \$84 000. Second were those in civil engineering, considerably lower at \$57 900 (Chart 65).



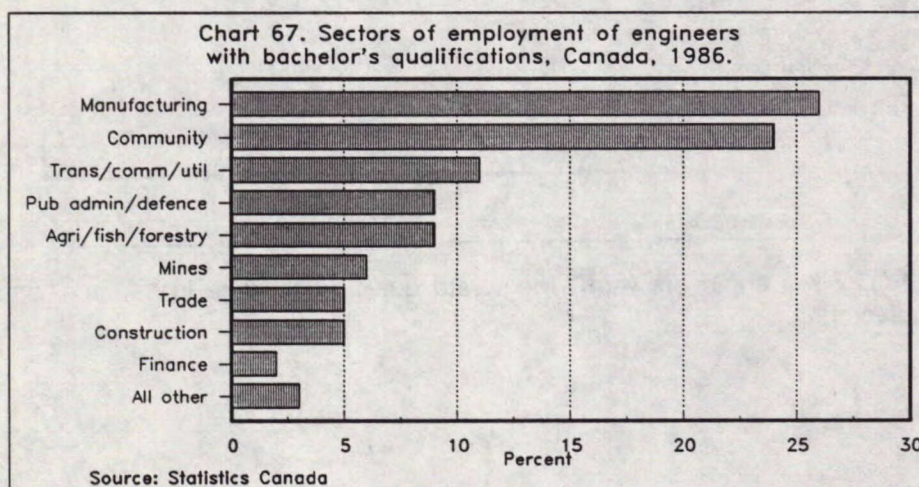


### Sector of employment

- The *Community, Business and Personal Services* sector employed 27% of the engineers (Chart 66).



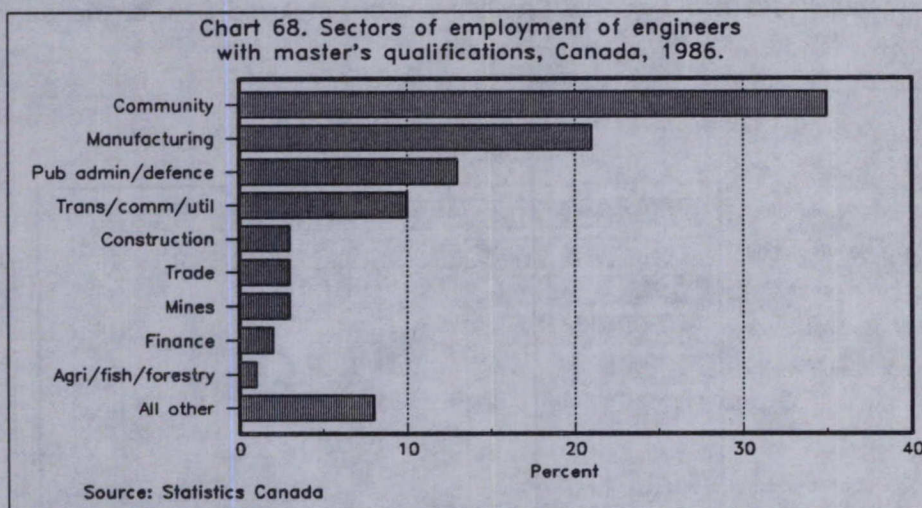
- The *Community, Business and Personal Services* sector includes engineering services to business, so it is not surprising that some 42 000 engineers were in this sector (see Appendix, Standard Industrial Classification).
- The *Manufacturing* sector accounted for the second largest share of engineers. Twenty-four percent of the engineers were working in this sector.
- The *Manufacturing* sector accounted for the largest share of engineers with a bachelor's qualification - 26% (Chart 67).



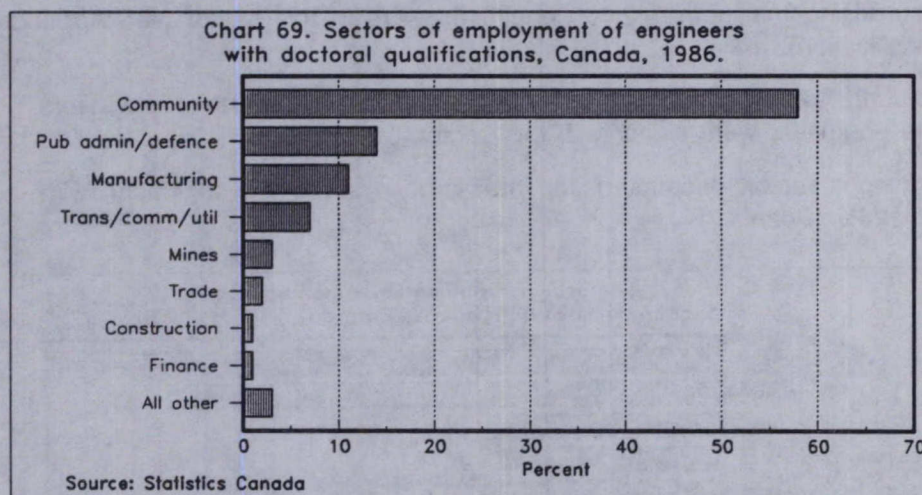
- Second, at 24% was the *Community, Business and Personal Services* sector.



- The *Community, Business and Personal Services* sector also accounted for the largest share of engineers with a master's qualification - some 9 100 engineers (35%) (Chart 68).



- The manufacturing sector accounted for the second largest share of engineers with a master's qualification (21%).
- Fifty-eight percent (some 3 300) of the engineers with doctoral qualifications were working in the *Community, Business and Personal Services* sector, which also includes *university teaching* (Chart 69).



- About 800 (14%) of the engineers with a doctorate qualification were in defence, and about 600 (11%) in manufacturing.

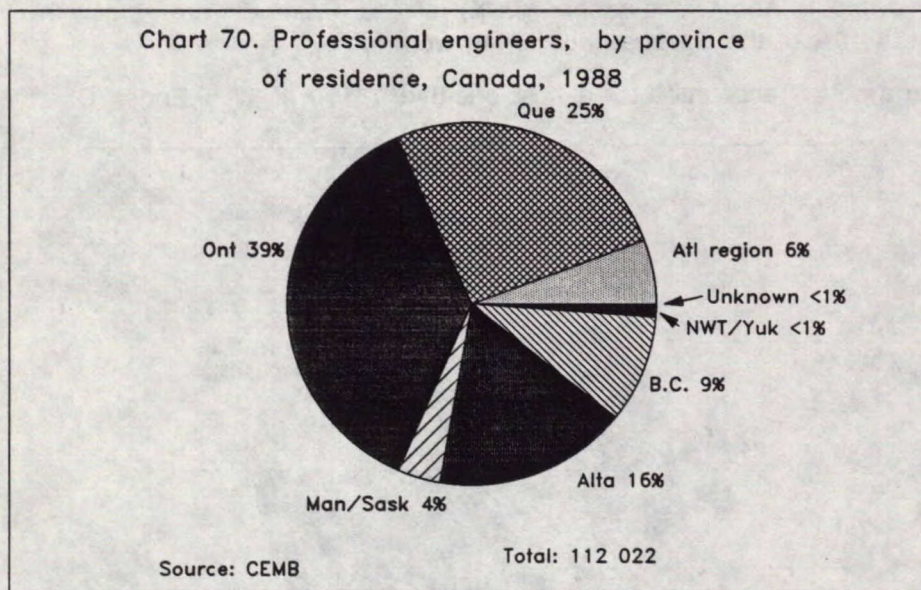


## P.Eng.

Once an individual graduates from an accredited university engineering program at a Canadian university, at least two years of engineering work experience is required before he or she may apply for professional licensing with a provincial association. Membership in a provincial engineering association is necessary for the individual to legally practise as a professional engineer (P.Eng.) in Canada. However, there are instances when licensing is approved through a combination of education and work experience in the absence of a Canadian engineering university degree.

### *Population*

- According to the Canadian Engineering Manpower Board (CEMB) of the Canadian Council of Professional Engineers, in 1988, there were 115 562 P.Engs.
- Ninety-seven percent of Canadian P.Engs. were residing in Canada. Of those living in Canada, almost two-thirds were accounted for by two provinces, Ontario and Quebec. Alberta was the other province that attracted a large number of the P.Engs. - about 17% (Chart 70).

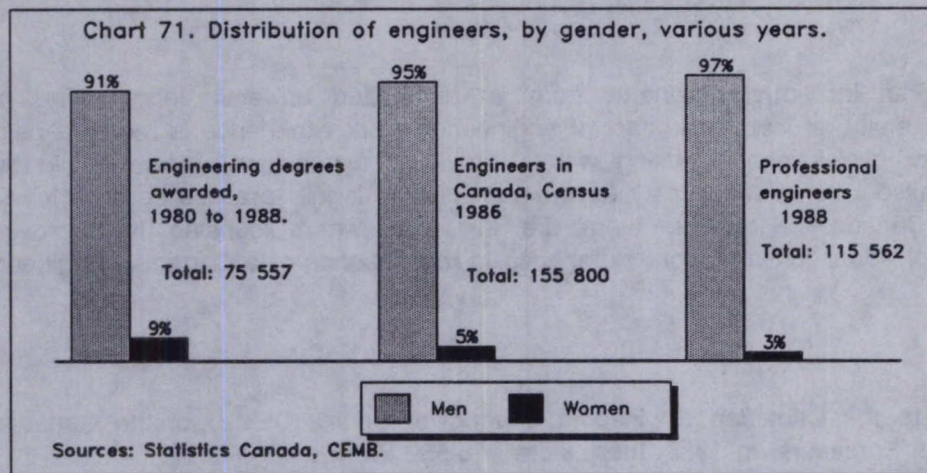


- Only 3% of the Canadian P.Engs. reside outside of the country. Most of the 3 540 outside of Canada were in the United States.

### *Gender*

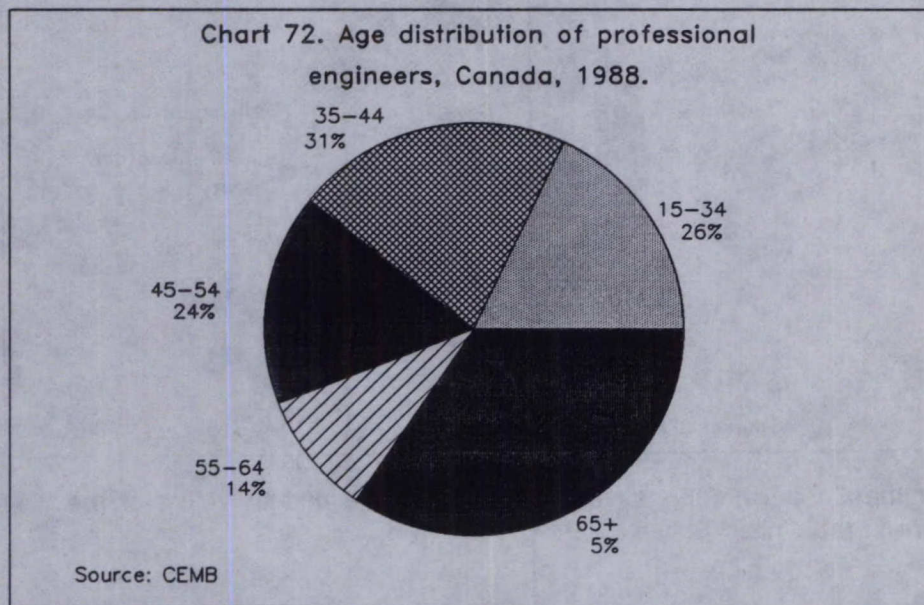
- Women earned 9% of the engineering degrees awarded at Canadian universities from 1980 to 1988. According to the Census, 5% of individuals who reported engineering as the field of study of their highest degree were women. However, only 3% of the P.Engs. in Canada in 1988 were women (Chart 71).





### Age

- Proportionately, there were fewer young professional engineers compared with the engineering work force overall. About one-quarter (26%) of the P.Engs. were under 35 years of age, compared with 40% of the Census engineering work force.
- The 35-44 age cohort accounted for almost one-third (31%) of the P.Engs. (Chart 72).



- Female P.Engs. were much younger than their male counterparts. For example, more than two-thirds of the women were under 35 years of age, compared with one-quarter of the men.



### Level of qualification

- Ninety-six percent of the professional engineers had a university degree. More than three-quarters (79%) of those with a university degree reported a bachelor's degree as their highest qualification, 17% had a master's, and 4% a doctorate.
- Only 4% of the P.Engs. had been licensed with a diploma, certificate or qualification other than a university degree.

### Salary

Salary data are not available from the CEMB on a national basis. Salary information is derived from data of the Pay Research Bureau of Canada. Also for this variable only, a time series to 1989 was available, so it is included.

- In 1989, the average salary for an engineer was \$50 917, having risen by an average of about 3% per annum over the past five years. (Table 21).

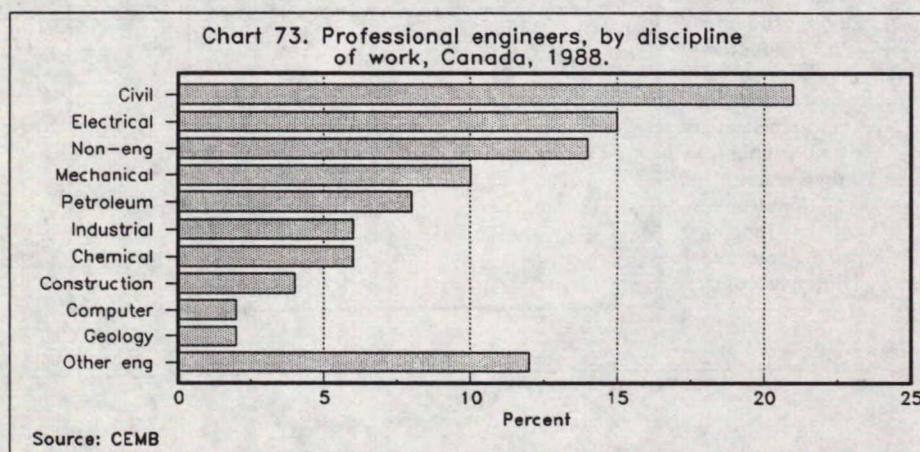
Table 21. Average salaries of engineers in Canada, 1981 to 1989.

	1981	1982	1983	1984	1985	1986	1987	1988	1989
<i>Average salary (current dollars)</i>									
Atlantic	\$32,805	\$36 555	\$38 713	\$41 532	\$42 407	\$43 370	\$43 330	\$45 437	\$46 792
Quebec	\$35 300	\$39 647	\$41 311	\$44 083	\$44 239	\$45 810	\$47 780	\$49 790	\$50 144
Ontario	\$35 228	\$39 915	\$41 893	\$43 944	\$45 361	\$45 312	\$48 658	\$50 501	\$52 651
Prairies	\$36 736	\$41 903	\$43 959	\$46 088	\$45 713	\$47 750	\$49 331	\$49 562	\$53 365
British Columbia	\$39 517	\$43 538	\$45 931	\$47 292	\$47 827	\$48 831	\$49 704	\$50 818	\$51 630
Canada	\$35 917	\$40 311	\$42 361	\$44 588	\$45 109	\$46 214	\$47 761	\$49 221	\$50 917

Source: Derived from data supplied by the Pay Research Bureau of Canada.

### Discipline of work

- Most of the P.Engs. were working in civil engineering. Together with electrical and mechanical engineering, they accounted for almost half (46%) of the P.Engs. (Chart 73).



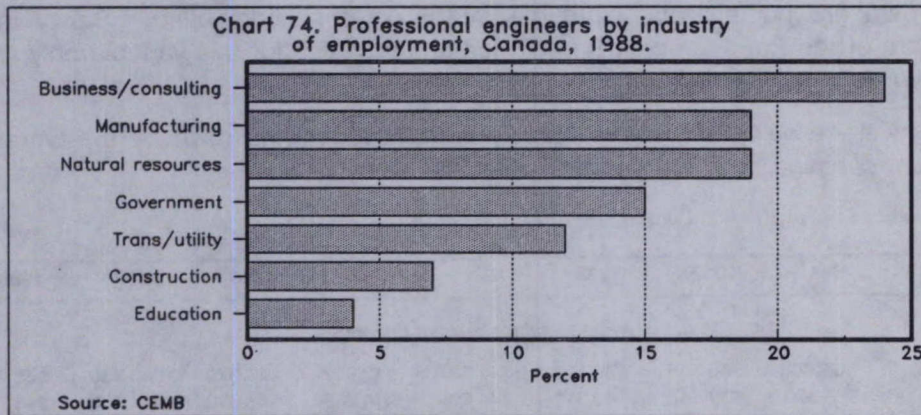
- Only 14% of them reported non-engineering type work.



- Civil engineering was also the most popular discipline of work for women - 19%. However, for women, petroleum engineering was the second choice of work. Electrical and mechanical engineering were not as popular with women, accounting for 12% and 6% of them, respectively.

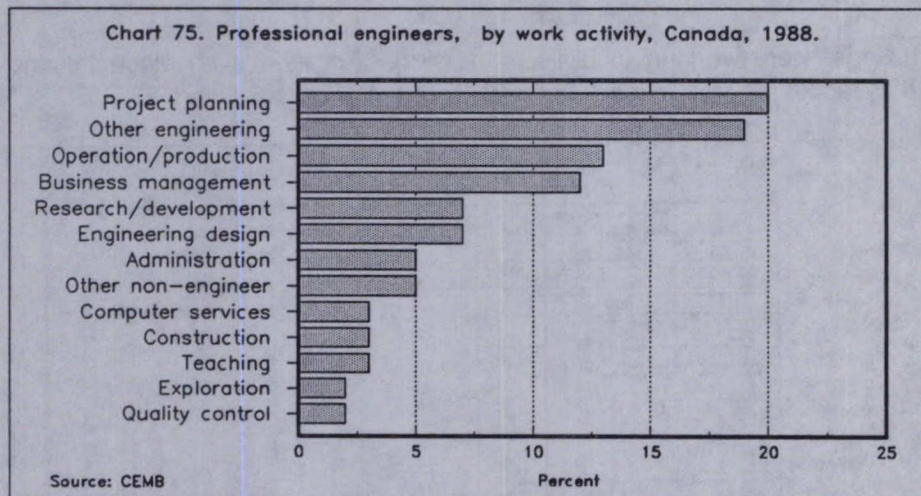
### *Sector of employment*

- Business services, which includes engineering consulting, accounted for the largest share of professional engineers - 24%. Manufacturing was the second largest employer, along with natural resources, both at 19%. Government also accounted for a significant share - 15% (Chart 74).



### *Type of work*

- One in five of the professional engineers was involved in project planning. Thirteen percent of the P.Engs. were in operations and production. Another 12% were in business management activities (Chart 75).



## Appendix

### *Technical notes*

#### 1. Full- and part-time enrolment; degrees awarded; faculty.

##### *Engineering includes:*

Chemical engineering

Civil engineering

Design/systems engineering

Electrical engineering

Includes electronics

Engineering science

Includes engineering physics

engineering chemistry

Engineering general

Used only for undergraduates who have not yet opted for a specialization.

Industrial engineering

Mining/metallurgical engineering

includes ceramics engineering

Other engineering

Includes aerospace/aeronautical engineering

biomedical engineering

computer engineering

environmental engineering

geological engineering

ocean engineering

petroleum engineering

agricultural engineering

survey engineering

other engineering not elsewhere classified

#### 2. Census: Field of study/degree specialization.

##### *Engineering includes Census codes 270-293 as follows:*

Aeronautical and aerospace engineering

Chemical engineering

Biological engineering, bioengineering

Biomedical clinical engineering

Chemical engineering

Civil engineering

Design/systems engineering

Electrical/electronic engineering

Computer engineering

Electrical/electronic engineering

Music and recording engineering

Engineering not elsewhere classified

Industrial/manufacturing engineering

Mechanical engineering

Mechanical engineering - general

Instrumentation engineering

Mining, metallurgical and petroleum engineering

Geological engineering

Metallurgical engineering

Mining engineering

Petroleum engineering



### 3. Census - 1971 Standard Occupational Classification - selected groups

#### *Managerial, administrative and related occupations*

Officials and administrators unique to government

Other managers and administrators includes:

General managers and other senior officials

Management occupations, natural sciences and engineering

Management occupations, social sciences and related fields

Administrators in teaching and related fields

Financial management occupations

Personnel and industrial relations management occupations

Sales and advertising management occupations

Purchasing management occupations

Services management occupations

Production management occupations

Management occupations, construction operations

Management occupations, transport and communications operations

Other managers and administrators not elsewhere classified in:

Mines, quarries and oil wells

Durable goods manufacturing

Non-durable goods manufacturing

Construction

Transportation, communication and other utilities

Trade

Community, business and personal service industries

Other industries unspecified

Occupations related to management and administration

#### *Occupations in natural sciences, engineering and mathematics*

Occupations in physical sciences

Occupations in life sciences

Architects and engineers

Architects

Chemical engineers

Civil engineers

Electrical engineers

Industrial engineers

Mechanical engineers

Metallurgical engineers

Mining engineers

Petroleum engineers

Aeronautical engineers

Nuclear engineers

Architects and engineers not elsewhere classified

Other occupations in architecture and engineering

Occupations in mathematics, statistics, systems analysis and related

#### *Occupations in social sciences and related occupations*

##### *Teaching and related occupations*

University teaching and related occupations

Elementary and secondary school teaching and related occupations

Other teaching and related occupations

Community college and vocational teachers

##### *Occupations in medicine and health*

##### *Clerical and related occupations*

##### *Sales occupations*

Sales occupations, commodities

Supervisors, sales occupations, commodities

Technical salesmen and related advisers

Sales occupations, services  
Supervisors, sales occupations, services  
Business services salesmen  
*Service occupations*  
Protective service occupations  
Armed forces  
Personal service occupations

*For a complete listing of Standard Occupational Classifications refer to Statistics Canada publication 93-151.*

#### 4. Census - 1970 Standard Industrial Classification - selected groups

##### *Agriculture*

Farms  
Services incidental to agriculture

##### *Forestry*

Forestry services

##### *Fishing and trapping*

Fishery services

##### *Mines, quarries and oil wells*

Metal mines  
Mineral fuels  
Non-metal mines  
Quarries and sand pits  
Services incidental to mining

##### *Manufacturing industries*

Food and beverage industries  
Tobacco product industries  
Rubber and plastics products industries  
Leather industries  
Textile industries  
Knitting mills  
Clothing industries  
Wood industries  
Furniture and fixtures industries  
Paper and allied industries  
Printing, publishing and allied industries  
Primary metal industries  
Metal fabricating industries (except machinery and transportation equipment)  
Machinery industries (except electrical machinery)  
Transportation equipment industries  
Electrical products industries  
Non-metallic mineral products industries  
Petroleum and coal products industries  
Chemical and chemical products industries  
Miscellaneous manufacturing industries

##### *Construction*

General contractors  
Building construction  
Highway, bridge, street construction  
Special trade contractors

##### *Transportation, communication and other utilities*

Transportation  
Storage  
Communication  
Electric power, gas and water utilities

##### *Trade*



*Finance, insurance and real estate*

*Community, business and personal service industries*

Education and related services

Health and welfare services

Services to business management includes:

Employment agencies and personnel suppliers

Computer services

Offices of architects

Engineering and scientific services

Offices of management and business consultants

Miscellaneous services to business management

*Public administration and defence*

Federal administration

Provincial administration

Local administration

Other government offices

*For a complete listing of Standard Industrial Classifications refer to Statistics Canada publication 93-152.*

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