

Chapter 4: Teaching and Learning

Starting Points

The College of Engineering's strategic plan for teaching and learning is comprised of multiple initiatives. These include programs to: increase undergraduate recruitment (Chapter 4A), improve undergraduate retention (Chapter 4B), balance student/faculty ratios (Chapter 4C), improve assessment and accreditation (Chapter 4D), improve graduate recruiting (Chapter 4E), prepare our students to work globally (Chapter 4F), and create a learning community (Chapter 4G). A plan to improve and support diversity within the College appears in Chapter 8. In this section, pertinent background information for the College's teaching and learning initiatives is presented.

Degree Programs. The College of Engineering administers baccalaureate programs in chemical engineering, civil engineering, electrical engineering, computer engineering, mechanical engineering, environmental engineering, and engineering science.² Options within the engineering science program include international engineering and a program to prepare engineers to become high school science and technology teachers. The College also administers a certificate in biomedical engineering, a Master of Engineering degree with several concentrations, and M.S. and Ph.D. programs in atmospheric science, chemical engineering, civil engineering, electrical engineering, and mechanical engineering.

Table 4.1 Starting Points

	CSU	COE
Undergraduate Student Profile (2005)		
Total Undergraduate Students	20,720	1,405
Student Body Composition		
✘ Colorado Residents	82%	80.9%
✘ Domestic Out-of-State	17%	19.0%
✘ International	1%	3.1%
✘ Domestic Ethnic Minorities	12%	9.5%
✘ Female		16.9%
Undergraduate Completion Data (2004/2005)		
Degrees Awarded	4,281	290
Fall-to-Fall Freshman Retention Rate	83%	
6-Year Graduation Rate	63%	
Freshman Class Entering (2005)		
Total Entering Class	3,893	248 ¹
Change from 2004	-4.5%	-25.7%
Mean High School GPA	3.54	3.67
Average ACT/SAT Scores	24/1,117	26.3/1199
Mean CCHE Index Score	112.5	120.5
Graduate Student Profile (2005)		
Total Graduate Students	3,690	546
Student Body Composition		
✘ Colorado Residents	69%	51.7%
✘ Domestic Out-of-State	15%	17.0%
✘ International	16%	31.3%
✘ Domestic Ethnic Minorities	8%	5.5%
✘ Female		24.0%
Graduate Degrees Conferred (2004/2005)		
Masters	1,045	129
Doctoral	187	33
Data for 2004/2005 except student enrollment (FA'05)		

¹ This number underestimates new students in the College of Engineering because many have more than 30 credits of advanced placement or IB. 260 new students entered the College in FA'05.

² Graduate and undergraduate programs in bioresource engineering are being phased out.

National Engineering Enrollment Trends. During the most recent five years, national engineering enrollments at the B.S., M.S., and Ph.D. level have increased substantially (Figures 4.1, 4.2, and 4.3). The largest enrollment increases have been observed in biomedical engineering at all levels (Table 4.2). Undergraduate enrollments in mechanical engineering increased 25.6% nationally, consistent with ME enrollment increases observed at CSU. National trends indicate increases in doctoral enrollments in all our majors.

Table 4.2 National Engineering Enrollment Trends (comparing 2004 to 1999)

Engineering Discipline	Bachelors Trend	Masters Trend	Doctoral Trend
Biomedical	142.4%	119.3%	147.1%
Chemical	-19.3%	-9.8%	31.9%
Civil	14.1%	4.5%	28.3%
Electrical and Computer	-0.5%	23.2%	45.1%
Engineering Science	33.9%	-66.1%	42.9%
Environmental	31.1%	64.5%	127.3%
Mechanical	25.6%	15.9%	32.5%
Total Engineering	12.9%	24.3%	47.2%

Figure 4.1. National Undergraduate Enrollment Trends

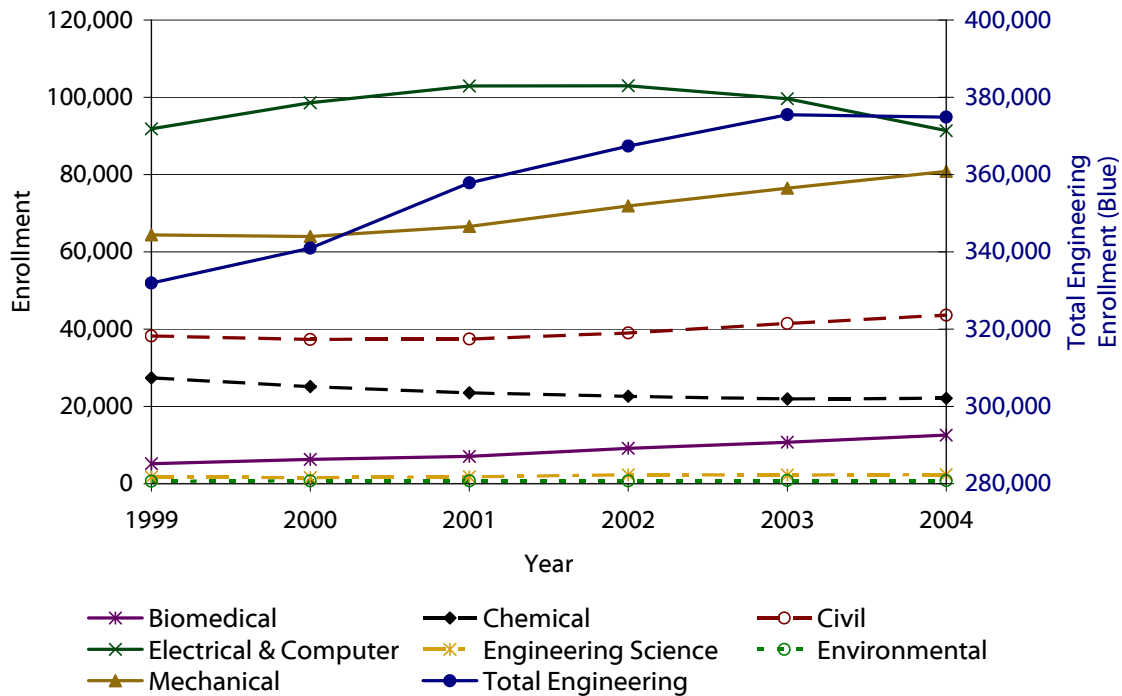


Figure 4.2. National Masters Enrollment Trends

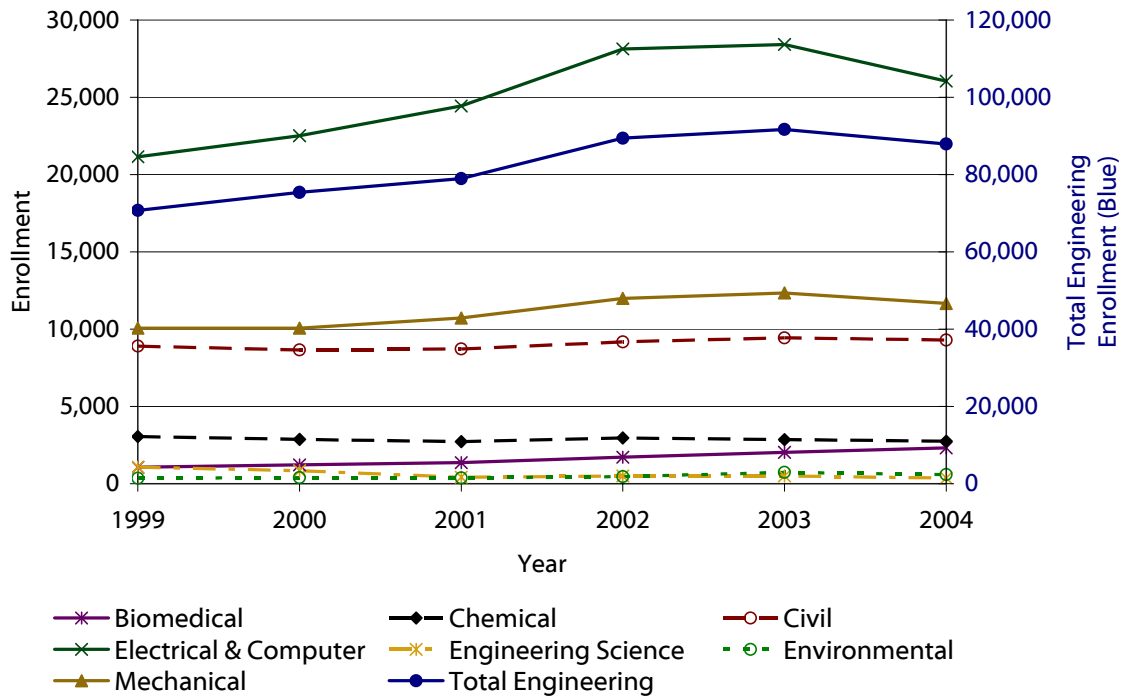
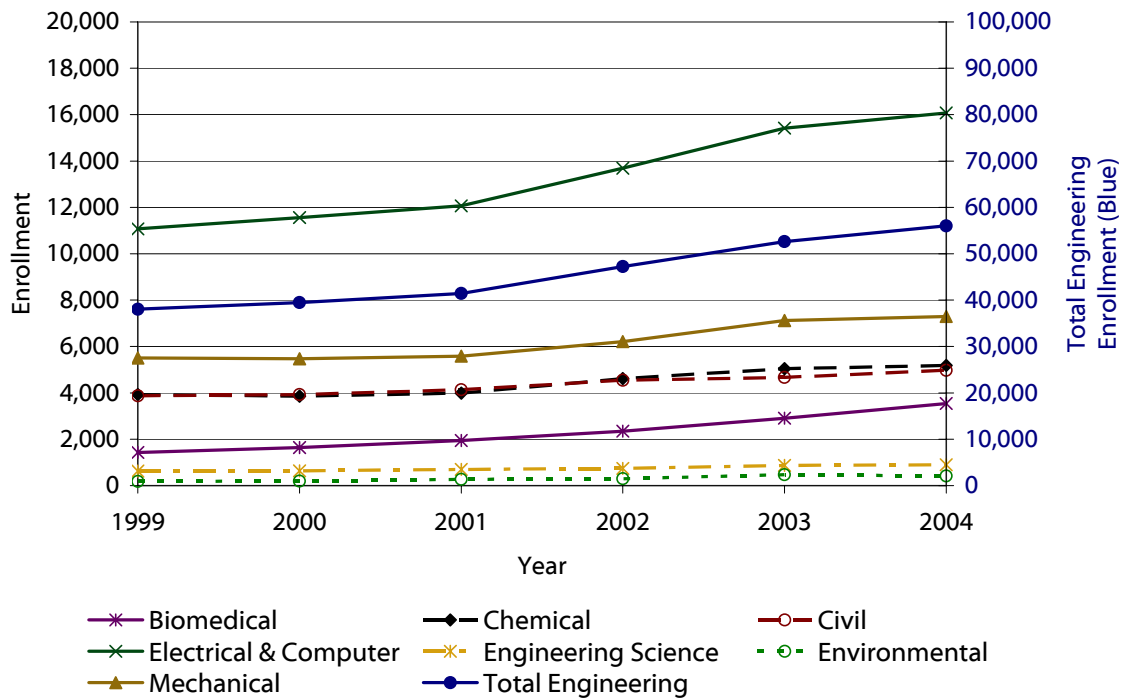


Figure 4.3. National Doctoral Enrollment Trends



CSU Engineering Enrollment Trends. Undergraduate and graduate enrollments in the College of Engineering increased by 15.3% and 16.7%, respectively, during the ten-year period between FA'95 and FA'05 (Figure 4.4 and Table 4.3). While the increase in B.S. enrollments is consistent with a national increase of 12.9%, our enrollment increase at the M.S. and Ph.D. levels are less than those observed nationally (Table 4.2).

Enrollment trends in each of our majors are shown in Figures 4.5 through 4.10.

- ✘ CSU graduate and undergraduate enrollments in most majors increased between FA'95 and FA'05.
- ✘ Bioresource engineering enrollments declined due to the elimination of the graduate and undergraduate programs in 2002.
- ✘ Chemical engineering enrollments decreased 31.6% at the undergraduate level and 30.0% at the graduate level between FA'95 and FA'05.
- ✘ Several undergraduate majors experienced large enrollment increases. These include the B.S. in mechanical engineering (+51.6% in 10 years), environmental engineering (+71.9% in 5 years), and engineering science (+100.0% in 5 years).
- ✘ At the graduate level, the largest 5-year enrollment increases were observed in civil engineering (+28.9%) and mechanical engineering (+32.4%).
- ✘ Atmospheric science graduate enrollments remained steady.
- ✘ Electrical and computer engineering enrollments mirrored national trends.

Table 4.3 Summary of CSU Enrollment Trends

Undergraduate Majors	1995 Enrollment	2000 Enrollment	2005 Enrollment	F'95- F'05 Change	F'00- F'05 Change
College of Engineering	1219	1374	1405	15.3%	2.3%
Chemical Engineering	145	152	104	-28.3%	-31.6%
Bioresource Engineering	43	35	4	-90.7%	-88.6%
Civil Engineering	361	307	322	-10.8%	4.9%
Environmental Engineering	0	32	55		71.9%
Mechanical Engineering	347	482	526	51.6%	9.1%
Electrical and Computer Engineering	242	328	284	17.4%	-13.4%
Engineering Science	60	33	66	10.0%	100.0%
Open Option	21	5	44	109.5%	780.0%
Graduate Majors	1995 Enrollment	2000 Enrollment	2005 Enrollment	F'95- F'05 Change	F'00- F'05 Change
College of Engineering	468	474	546	16.7%	15.2%
Chemical Engineering	25	30	21	-16.0%	-30.0%
Bioresource Engineering	22	21	3	-86.4%	-85.7%
Civil Engineering	180	149	192	6.7%	28.9%
Atmospheric Science	87	90	94	8.0%	4.4%
Mechanical Engineering	81	71	94	16.0%	32.4%
Electrical and Computer Engineering	73	113	115	57.5%	1.8%
Master of Engineering	0	0	27		

Figure 4.4. Historical College of Engineering Enrollments

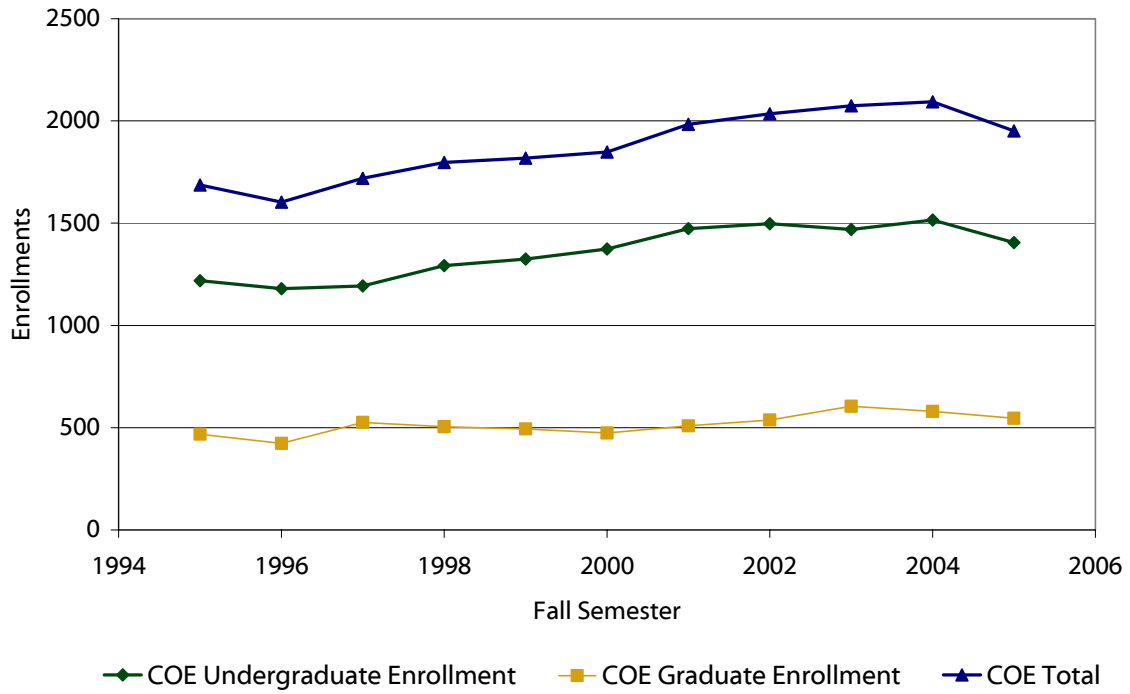


Figure 4.5. Historical CBE Enrollments

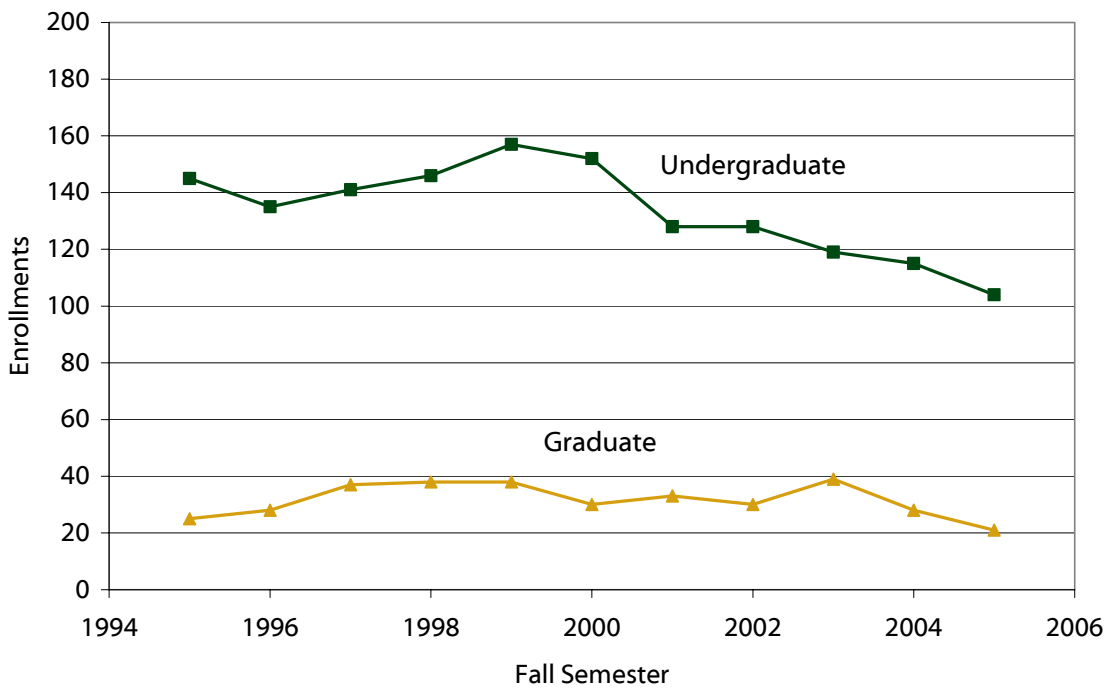


Figure 4.6. Historical CE Enrollments

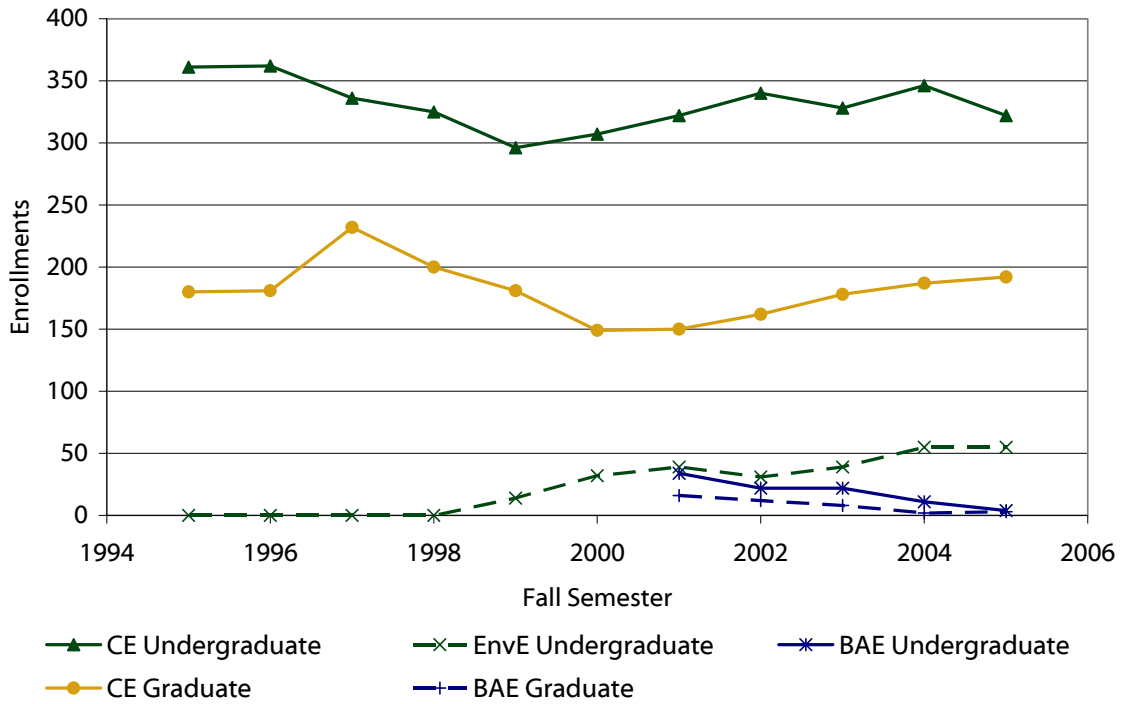


Figure 4.7. Historical ATS Enrollments

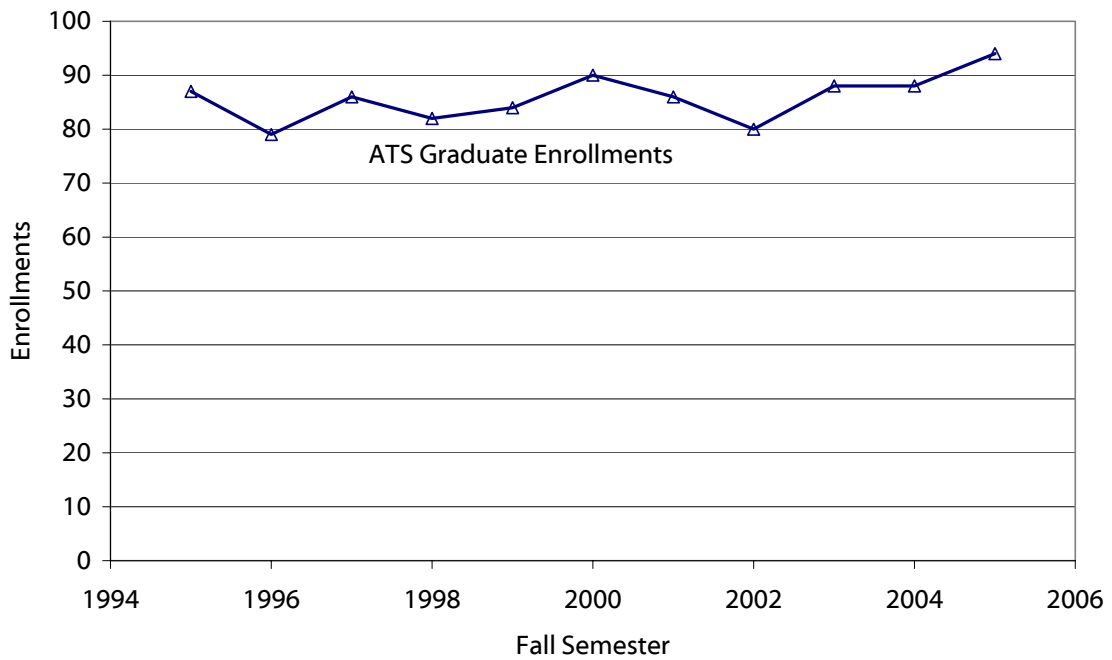


Figure 4.8. Historical ME Enrollments

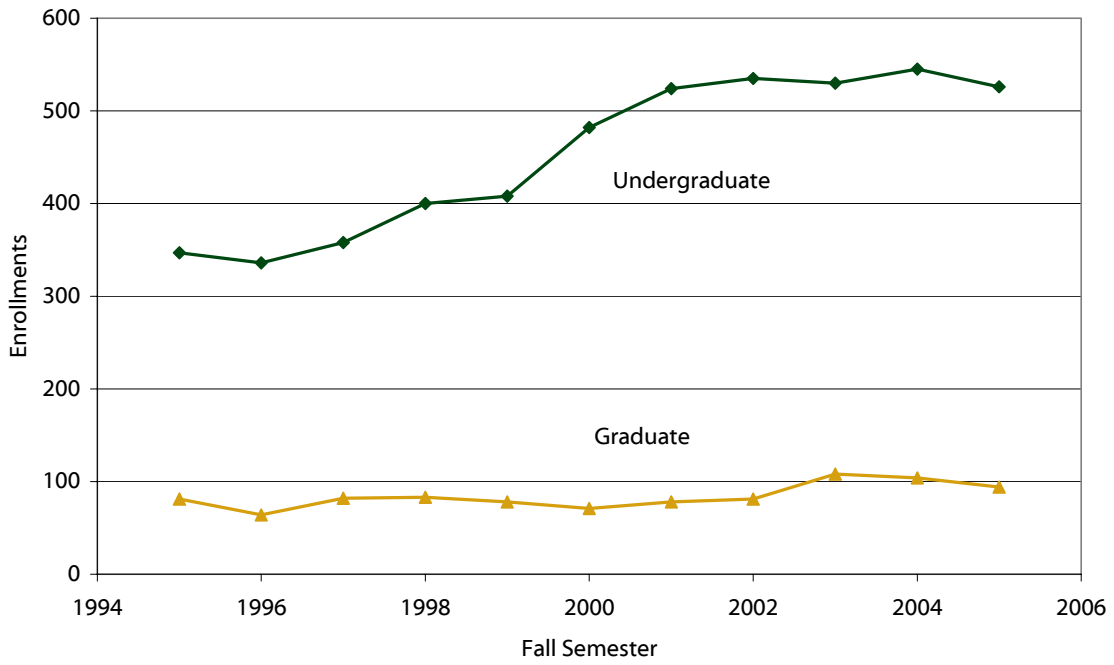


Figure 4.9. Historical ECE Enrollments

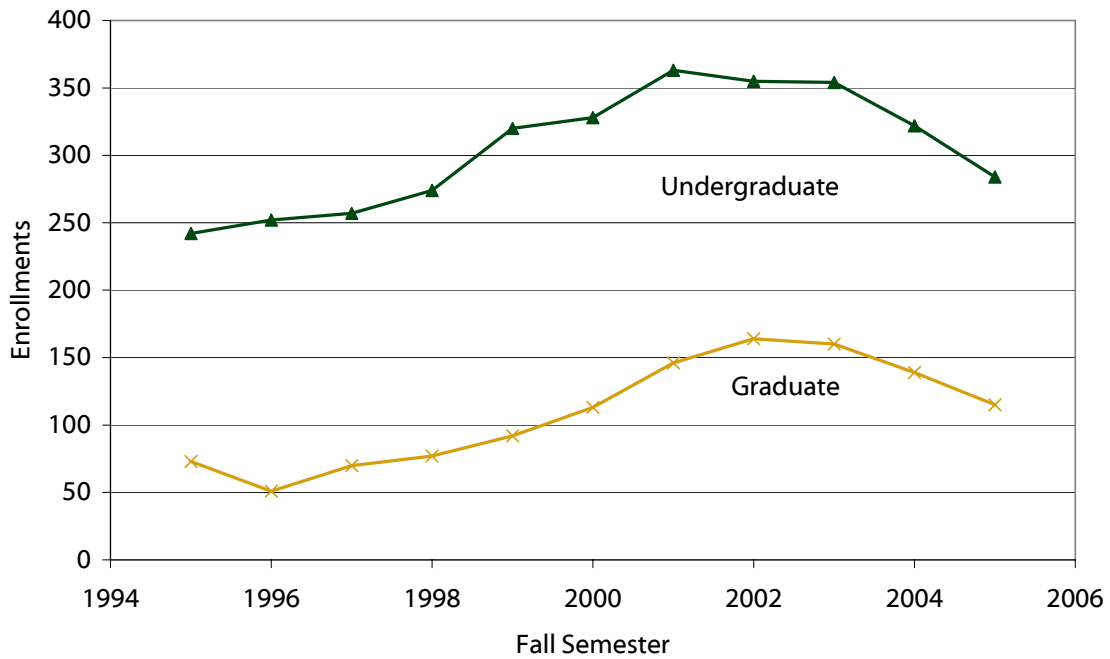
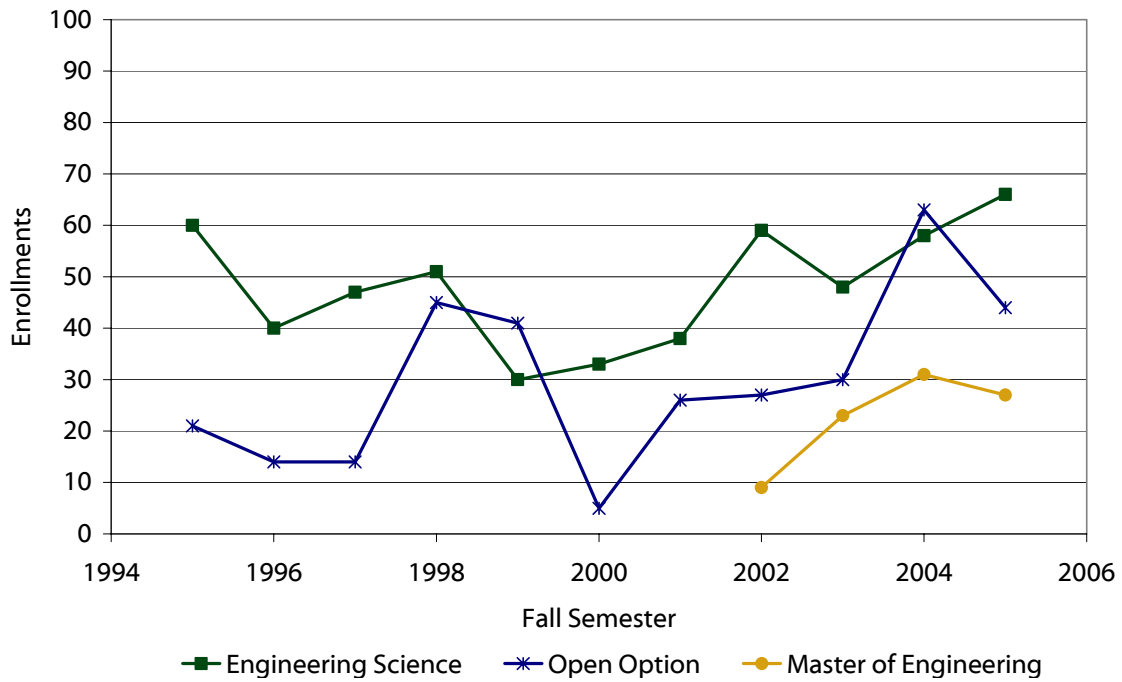


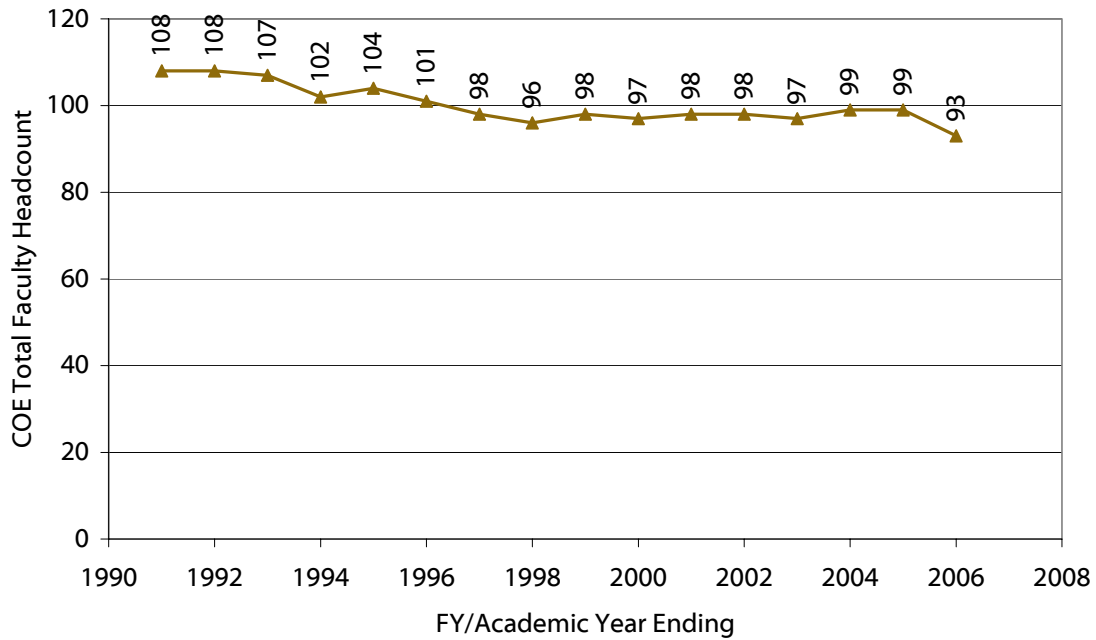
Figure 4.10. Historical COE General Enrollments



Student/Faculty Ratios. Student/faculty ratios in the College of Engineering have increased substantially during the most recent ten-year period. This is due to increases in graduate and undergraduate enrollments coupled with a decline in faculty headcount³ (Figure 4.11). A discussion of student/faculty ratios appears in Chapter 4C.

³ The College of Engineering Fact Book faculty headcount includes all tenured and tenure-track faculty, including those on transitional appointments. Therefore, the headcount reported here is higher than headcounts presented in the official CSU Fact Book.

Figure 4.11 COE Faculty Headcount



Engineering Freshmen. Engineering freshmen are among the best at CSU. During the five year period from FA'01 through FA'05, the mean high school GPA among our freshmen was 3.7; the mean high school percentile rank for the same period was 75. ACT and SAT scores have been fairly steady at an average of 26.1 and 1,190, respectively. These values combine to yield a mean CCHE index score of 120.9. The distribution of undergraduate students in the College of Engineering by index score is shown in Table 4.4.

**Table 4.4 Mean Index Scores by Major and Quartile for
FA'05 College of Engineering Freshman Class**

Major	Lower Quartile: 0-25%	Lower Middle Quartile: 26-50%	Upper Middle Quartile: 51-75%	Upper Quartile: 76-100%	Number of Students
Chemical Engineering (CH01)	112.4	121.6	126.8	135.4	20
Civil Engineering (CE01)	110.7	116.9	122.2	130.7	71
Electrical and Computer Engineering (EE01, EE02)	107.3	115.0	123.1	132.0	54
Mechanical Engineering (ME01)	108.1	114.3	120.3	130.1	120
Environmental Engineering (CE03)	108.0	110.0	117.0	126.3	10
Engineering Science (EG01)	113.5	118.3	121.7	131.5	14
Engineering Open Option (EG12)	93.7	111.3	117.5	129.6	34
Overall COE	108.2	114.9	121.5	131.1	323