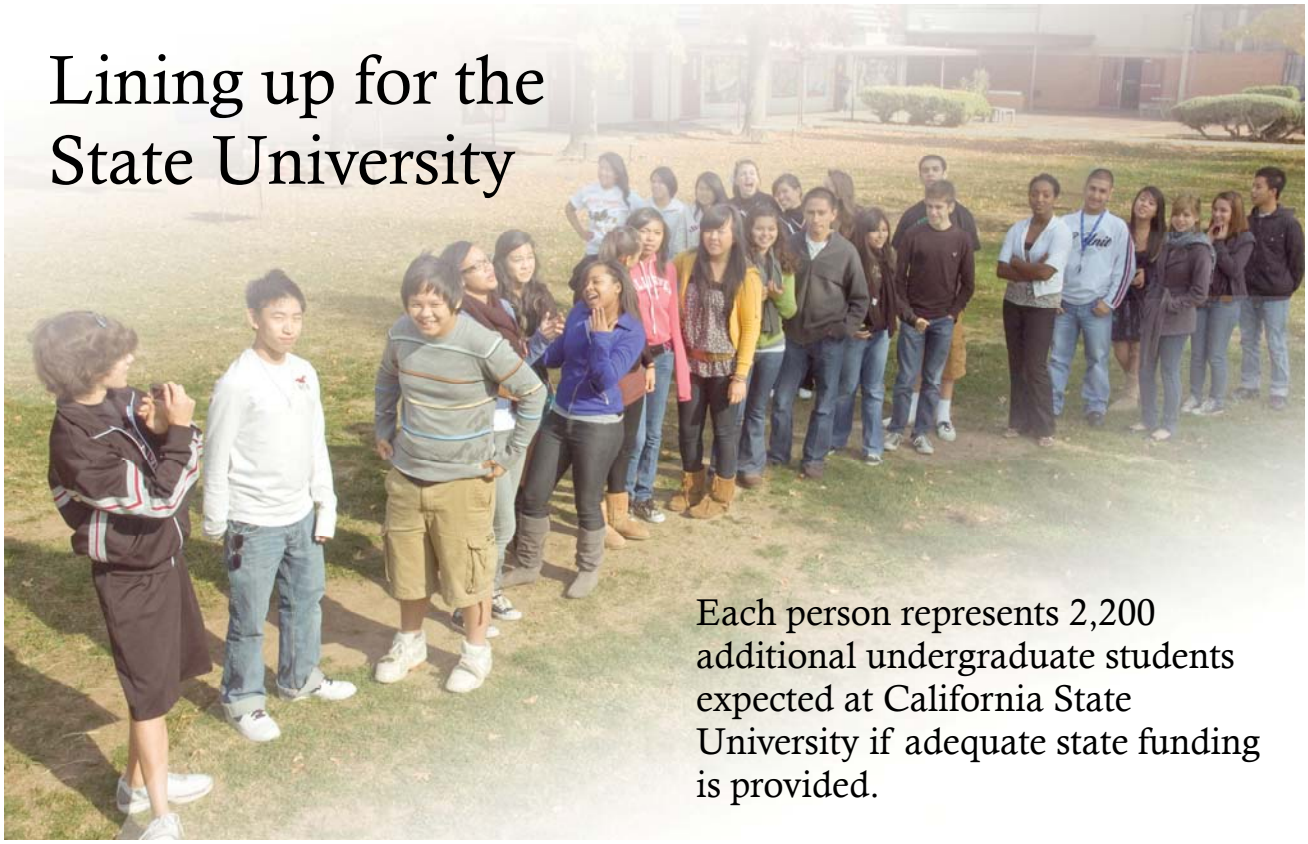
CPEC

California State University Undergraduate Demand Projections, 2009–2019

www.cpec.ca.gov • Report 10-05 • March 2010

by Stacy Wilson, Mallory Newell, and Ryan Fuller

READY OR NOT, HERE THEY COME



CPEC conducts policy research and analysis to support long-range planning and student success. In 1995, CPEC estimated correctly that more than 455,000 additional students would seek enrollment at California public colleges and universities by 2005. During the following seven consecutive years of economic expansion, the state made good on its commitment of providing educational opportunity to all qualified prospective students, many of whom enrolled in California State University, the largest four-year educational system in the nation.

Today, California is confronting unprecedented economic and fiscal challenges, and the state's Master Plan commitment of educational opportunity is being tested again. In this report, CPEC estimates that the state should prepare for 57,000 additional CSU undergraduate students by 2015. Between 2015 and 2019 undergraduate demand is likely to remain virtually unchanged, due in part to projected declines in the number of high school graduates, which will impact freshman enrollments at CSU, and slower community college growth, which will impact transfers.

If CSU reduces enrollment by 40,000 over the next two years because of reduced funding, nearly 56,000 prospective students might be denied access by fall 2011.

Contents

List of Displays

List of Figures

MAJOR FINDINGS

- Undergraduate enrollment demand at California State University is expected to increase from 362,226 students in fall 2008 to 419,572 students in fall 2015, representing an overall 15.8% increase and an annual average growth rate of 2.0% for the seven-year period.
- The state should prepare for 57,000 additional undergraduates by 2015 above the fall 2008 peak enrollment level.
- Beginning in fall 2013, the system will be asked for the first time to serve more than 400,000 undergraduates during each fall term.
- The Legislative Analyst's Office reports that it is unlikely that the state will have sufficient revenue to fund enrollment growth in the near term. This will result in significant pent-up demand. If CSU reduces enrollment by 40,000 over the next two years because of reduced funding, nearly 56,000 prospective students might be denied access to the State University by fall 2011. This latter figure is referred to in this report as the net loss in college opportunity.
- With adequate funding, the state would make significant gains in the representation of Latino and Black students at the university level. CPEC's Mid-Range forecast indicates that between 2008 and 2014, undergraduate demand by Latinos would increase by 44% and Blacks by 18.5%.
- Between 2015 and 2019, undergraduate demand is likely to remain virtually unchanged, due in part to projected declines in the number of public high school graduates, which will impact freshman enrollments at CSU, and slower community college growth during this period, which will slow the growth in CSU annual transfers.

IMPETUS FOR THE REPORT

This preliminary report on California State University undergraduate demand is the second in the *Ready or Not, Here They Come* series. The series updates CPEC's statewide enrollment demand and institutional capacity reports published in 1995 and 2000. It is intended to support higher education long-range planning and assist the Governor and the Legislature during budgetary and policy deliberations. It provides informed and valid projections of the demand for public undergraduate higher education over the next ten years and estimates of classroom lecture and laboratory capacity needed to maximize student success.

More specifically, enrollment and capacity data is used to address the following questions:

- What level of public investment is required to fully fund undergraduate enrollment demand over the next ten years?
- What level of capital outlay investment is needed to expand the physical capacity of institutions to meet enrollment demand?
- What cost-cutting efficiencies should be explored as viable alternatives to constructing new classroom facilities?
- What is the magnitude of the educational opportunity gap that might result if the state is unable or unwilling to fully fund undergraduate enrollment demand in the near term? The implications associated with reduced access will be fully explored.
- If UC and CSU reduce first-time freshman enrollment in the near term, what additional funding would the community college system need to accommodate redirected students?

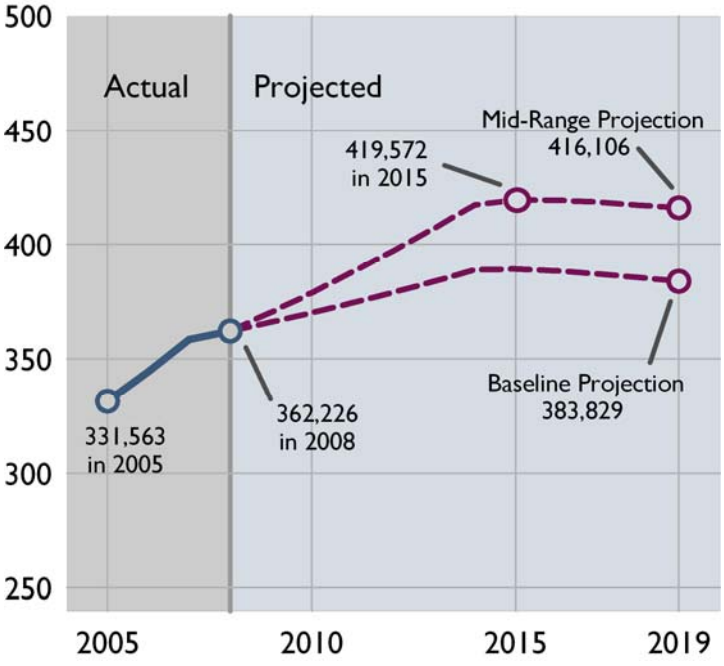
The next several years will be challenging for both the state and public colleges and universities. To say that California's public higher education systems will find it difficult to meet student demand in the near term while faced with reduced state support could be considered an understatement. Although preliminary signs indicate that the national economy is poised to grow again, albeit slowly, those signs are not yet as pronounced in the Golden State, and higher education institutions are being asked to stretch dollars to compensate for reduced public funding.

The October 2009 budget update released by the Legislative Analyst's Office indicates that the $10.4 billion in state higher education support for 2009–10 is approximately $1.3 billion less than provided in 2007–08. Because of the decline, and because of uncertainties in the amount of federal stimulus funds forthcoming from the American Recovery and Reinvestment Act, fees were increased 32% at UC and CSU, and 30% at the community colleges.

In addition to raising fees, the higher education systems are furloughing faculty and staff, reducing course offerings, accepting fewer students, and reducing overhead costs by eliminating or consolidating staff positions. While the challenges are enormous, they are not entirely new. Higher education institutions faced similar challenges and circumstances during the recessions of the early 1990s and 2000s. CPEC believes that attention to the enrollment and capacity questions outlined above is the best way to promote student success, as California recovers from the current recession.

CSU UNDERGRADUATE ENROLLMENT DEMAND ANALYSIS

Figure 1 Mid-Range and Baseline Enrollment Demand, 2009–2019



The Mid-Range Forecast continues upward trends in first-time freshman participation rates for the first three projection years and then holds rates constant for the remaining years. Transfer rates were generally held constant, consistent with historical trends.

As discussed in the report, the state should plan on the basis of the Mid-Range Forecast.

The Baseline Forecast holds freshman and transfer participation rates constant at 2008 levels for the entire projection period.

California State University is the largest four-year public postsecondary system in the nation. In fall 2008 its 22 campuses served 362,226 undergraduate students and 74,783 graduate or post-baccalaureate students in 200 academic disciplines and fields. Just prior to CPEC's 1995 enrollment study, CSU had been hard hit by the recession of the early 1990s that coincided with a loss of 50,000 students and several consecutive years of declines in first-time freshmen enrollments. The Commission predicted correctly that CSU would grow again beginning in 1996.

CSU undergraduate enrollments grew by 9% between fall 2005 and fall 2008, from 331,563 to 362,226. The Mid-Range Forecast, shown in the figure above and in Display 1, indicates that undergraduate enrollment demand is expected to increase to 419,572 students by fall 2015, representing an overall 15.8% increase and an annual average growth rate of 2.0% for the seven-year period. This means that the state should prepare at a minimum for 57,000 additional students above the fall 2008 peak enrollment level.

Beginning in fall 2013, the system will be asked for the first time to serve more than 400,000 undergraduates during each fall term. Between 2015 and 2019, undergraduate demand is likely to remain virtually unchanged, due in part to projected declines in the number of public high school graduates, which will impact freshman enrollments, and slower community college growth, which will slow the growth in the number of transfers to CSU.

Display 1 Mid-Range Forecast – CSU Undergraduate Enrollment Demand by Ethnicity

Fall	American Indian	Asian	Black	Latino	White, Other	Total Demand
2008	2,796	74,174	24,897	101,945	158,414	362,226
2009	2,851	75,544	25,610	107,889	158,477	370,371
2010	2,907	76,940	26,343	114,179	158,541	378,910
2011	2,963	78,362	27,097	120,836	158,604	387,863
2012	3,022	79,810	27,873	127,881	158,668	397,253
2013	3,075	81,284	28,671	135,337	158,731	407,099
2014	3,141	82,786	29,492	143,228	158,795	417,442
2015	3,160	83,780	29,376	146,924	156,332	419,572
2016	2,877	84,278	29,131	149,650	153,469	419,405
2017	3,169	84,769	28,742	150,999	151,051	418,730
2018	3,171	85,637	28,220	152,506	147,775	417,309
2019	3,167	86,345	27,657	154,516	144,421	416,106
pct. change	13.3%	16.4%	11.1%	51.6%	-8.8%	14.9%

Asian includes Filipinos and Pacific Islanders.

Display 2 Baseline Forecast – CSU Undergraduate Enrollment Demand by Ethnicity

Fall	American Indian	Asian	Black	Latino	White, Other	Total Demand
2008	2,796	74,174	24,897	101,945	158,414	362,226
2009	2,800	74,702	25,405	106,460	156,702	366,068
2010	2,804	75,233	25,924	111,174	155,008	370,142
2011	2,807	75,768	26,453	116,098	153,332	374,459
2012	2,811	76,307	26,993	121,239	151,674	379,025
2013	2,815	76,850	27,544	126,609	150,035	383,853
2014	2,819	77,397	28,106	132,216	148,413	388,951
2015	2,819	77,867	27,858	134,978	145,607	389,129
2016	2,827	78,117	27,567	137,147	142,699	388,357
2017	2,819	78,483	27,163	138,254	140,365	387,084
2018	2,821	79,258	26,672	139,570	137,206	385,527
2019	2,821	79,920	26,155	140,897	134,036	383,829
pct. change	0.9%	7.7%	5.1%	38.2%	-15.4%	6.0%

Asian includes Filipinos and Pacific Islanders.

The Mid-Range Forecast is a product of four principal factors: first-time freshman eligibility rates, freshman participation rates, community college transfer rates, and persistence and graduation rates of enrolled students. Observed changes in those factors are used to derive estimates of future undergraduate demand. The assumptions and rationales associated with those factors are discussed in

the next section. Taken together, the assumptions and rationales provide justification for the Commission's position that the state should plan on the basis of the Mid-Range Forecast.

The Baseline Forecast, shown in Display 2, is considered a low alternative because it holds participation rates for first-time freshmen and community college transfers constant at 2008 levels. It estimates the increase in undergraduate demand due solely to numerical changes in annual public high school graduates and community college enrollments. The Baseline Forecast shows undergraduate demand increasing from 362,226 in 2008 to 383,829 in 2019. The growth represents a 6.0% increase in enrollment demand, or 21,603 additional students. Without adequate enrollment growth funding, CSU will not be able to support even the low alternative level of demand projected in the Baseline Forecast.

If CSU finds it necessary to reduce enrollments by 40,000, as reported by Chancellor Reed, the number of prospective undergraduates not served could top 56,000 by fall 2011. This latter figure is referred to in this report as net loss in college opportunity. To catch up, CSU would need at least 3.0% enrollment growth funding annually until college opportunity is restored.

The Commission expresses appreciation to Dr. Philip Garcia, Director of the CSU Analytic Studies Division, who demonstrated how an actuarial analysis using life tables of persistence and graduation rates could be used reliably to simulate the enrollment behavior of students from initial entry into the CSU system to final departure from the system.

ENROLLMENT DEMAND ASSUMPTIONS AND RATIONALES

Enrollment Demand Defined

Enrollment demand is an estimate of the number of qualified prospective and continuing students that would enroll in the CSU system in a given year if fees were affordable and enrollment growth was not constrained by reduced state funding.

In contrast, an enrollment projection is an estimate of enrollment if the state is able and willing to fund based on budgetary, economic, and fiscal circumstances. When circumstances are favorable, enrollment demand and enrollment projection estimates will yield very similar results. When circumstances are less favorable, as during economic recessions, demand estimates will be higher than projection estimates, because by definition, state resources are insufficient to fully meet demand.

Freshman Participation Assumptions

Between fall 2000 and fall 2008, the number of first-time freshmen from California high schools who had met all CSU admission requirements increased from 32,474 to 48,265, a 49% change. This increase in regularly admissible freshmen as a percentage of total admits is slightly more than CPEC had expected in 1995. Impressive gains were recorded by Black (41%) and Latino students (110%). Before voter approval of Proposition 209 that eliminated affirmative action admission programs, nearly half of Black and Latino freshmen were admitted by special action.

Display 3 Mid-Range Forecast – CSU Annual First-Time Freshman Demand by Ethnicity

Fall	American Indian	Asian	Black	Latino	White, Other	Total Demand
2008	401	10,498	4,156	17,901	21,579	54,535
2009	405	10,773	4,582	19,468	21,318	56,545
2010	437	11,147	4,706	20,916	21,114	58,321
2011	455	11,469	4,834	22,489	20,971	60,218
2012	462	11,514	4,789	22,803	20,509	60,076
2013	459	11,646	4,572	22,728	20,066	59,470
2014	441	11,797	4,383	22,703	19,351	58,675
2015	434	11,810	4,281	22,550	18,577	57,653
2016	438	11,624	4,259	22,694	18,282	57,297
2017	426	11,708	4,147	22,764	17,981	57,027
2018	427	12,462	4,072	23,155	17,595	57,711
2019	419	12,591	3,975	23,410	17,042	57,437
pct. change	4.4%	19.9%	-4.3%	30.8%	-21.0%	5.3%

Asian includes Filipinos and Pacific Islanders.

Public high school graduates account for about 84% of total CSU freshman enrollments, with the remaining 16% of entering freshmen coming from California private schools, out-of-state schools, and foreign schools. This mix of entering freshmen is expected to remain constant throughout the projection period, as it has in the recent past. Of the high school graduating class of 2002, 10.4% entered CSU as freshmen. For the class of 2007, the rate had increased to 12.7%. Given the array of school reform efforts, teacher development efforts, and public policy papers calling for California to boost baccalaureate degree production, the Commission believes that the recent improvements in CSU freshman participation will continue at least in the near future.

CPEC staff calculated the changes in participation by ethnicity, extended those rates over three years and held them constant for the remaining years of the projection period. The methodology used is discussed in Appendix D. The numbers were adjusted upward by 16.0% to account for students from California private schools, out-of-state schools, and foreign schools. As shown above in Display 3, freshman demand is expected to increase by 5.3% over the projection period. If participation rates are held constant, CSU freshman demand is shown in Appendix A to decline 6.0% by 2019. This occurs because, as shown in the graph on page 9, the Department of Finance's Demographic Research Unit projects the number of public high school graduates to decline by about 6% over the next ten years, which affects CSU freshman demand.

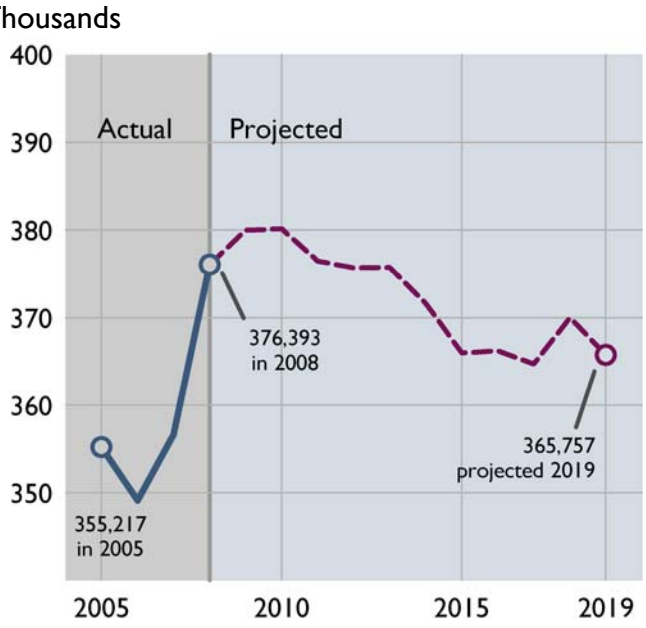
Freshman Persistence and Graduation Assumptions

CSU freshman persistence and graduation rates have improved. Of the 1975 cohort of full-time regularly admissible freshmen, 45.5% persisted to graduation over a 12-year period, with the average time to degree being 5.24 years. For the 1995 cohort, the rate was 58.1%. CPEC used the persistence and graduation results of the 2000 cohort by ethnicity, covering the eight-year period of 2000–2008, to simulate the eight-year persistence and graduation patterns of future cohorts of entering freshmen.

Results of the 1995 cohort were used to simulate persistence and graduation patterns for years nine through twelve. Collectively, the 1995 and 2000 cohort data enabled CPEC to simulate 12-year persistence and graduation patterns for the freshman demand projections.

The assumptions regarding freshman participation, persistence, and graduation are organized by ethnic/racial group in Appendix B. It is useful for anyone interested in replicating CPEC's undergraduate demand projections.

Figure 2 Projected Public High School Graduates, 2009-2019



Source: Department of Finance, California Public K-12 Graded Enrollment and High School Graduate Projections by County, 2009 Series.

Community College Transfer Assumptions

The state regards the transfer function as an important facet of providing educational opportunity leading to the baccalaureate degree. Transfer also provides a second chance at a university level education for students who did not meet freshman admission requirements.

During the economic boom period of the late 1990s, when universities had sufficient funds to support transfer centers and other outreach programs, there were impressive gains in community college transfers to UC and CSU for students that had completed 56 units of transferable course work. More recently, transfer rates have been erratic. However, three ethnic groups — Asian, Black, and White/Other — have experienced modest gains in transfer. Those rates were continued over the first years of the projection period, and then held constant for the remaining years. This is shown in Appendix C. Given the interest of the state and CSU to boost student transfers, it is reasonable to assume that modest improvements would continue if appropriate funding were available.

Display 4 Mid-Range Forecast – Annual Community College Transfer Demand by Ethnicity

Fall	American Indian	Asian	Black	Latino	White, Other	Total
2008	466	9,246	3,085	13,634	23,227	49,658
2009	481	9,752	3,390	14,665	24,310	52,598
2010	498	10,256	3,720	15,864	25,430	55,769
2011	514	10,822	4,059	17,280	26,500	59,174
2012	527	11,146	4,218	18,149	26,804	60,845
2013	536	11,430	4,346	18,969	26,916	62,197
2014	545	11,451	4,328	19,701	26,686	62,711
2015	551	11,498	4,275	20,256	26,293	62,873
2016	557	11,527	4,209	20,626	25,839	62,758
2017	562	11,529	4,136	20,832	25,330	62,388
2018	565	11,491	4,057	20,909	24,833	61,855
2019	568	11,425	3,978	20,945	24,352	61,267
pct change	21.9%	23.6%	29.0%	53.6%	4.8%	23.4%

Asian includes Filipinos and Pacific Islanders.

Display 5 Mid-Range Forecast – Total Annual Transfer Demand by Ethnicity

Fall	American Indian	Asian	Black	Latino	White/ Other	Total
2008	517	10,274	3,428	15,149	25,808	55,176
2009	534	10,835	3,767	16,294	27,011	58,442
2010	553	11,396	4,133	17,627	28,256	61,965
2011	571	12,024	4,510	19,200	29,444	65,749
2012	586	12,385	4,687	20,166	29,783	67,606
2013	596	12,700	4,829	21,077	29,907	69,108
2014	606	12,723	4,809	21,890	29,652	69,679
2015	612	12,776	4,750	22,507	29,214	69,859
2016	619	12,807	4,676	22,918	28,710	69,731
2017	625	12,810	4,595	23,146	28,144	69,320
2018	628	12,768	4,508	23,232	27,593	68,728
2019	631	12,694	4,420	23,272	27,057	68,074
pct change	21.9%	23.6%	29.0%	53.6%	4.8%	23.4%

Transfers from all higher education institutions, including out-of-state and foreign colleges and universities.
Asian includes Filipinos and Pacific Islanders.

Transfer demand increases 23.4%, from 49,658 in 2008 to 61,267 by 2019, as shown in Display 4. Because the community college forecast shows high demand over the first half of the projection period, the number of transfers to CSU will increase as community college enrollments increase, even when transfer rates improve only modestly.

Community college transfers account for about 86% of the entering transfer population. The remaining 14% include students from other California colleges and universities (4.4%), students from out-of-state institutions (7.5%), and students from foreign countries (1.8%). Display 5 includes these latter groups and shows total annual undergraduate transfer demand to CSU increasing from 55,176 in 2008 to 68,074 in 2019. Under more favorable budget circumstances, approximately 67% of the transfer population would be expected to begin matriculation in fall terms, with the remainder entering in the winter and spring terms.

Display 6 Baseline Forecast – Total Annual Transfer Demand to CSU by Ethnicity

Fall	American Indian	Asian	Black	Latino	White/ Other	Total Demand
2008	517	10,274	3,428	15,149	25,808	55,176
2009	534	10,612	3,657	16,294	26,786	57,883
2010	553	10,938	3,893	17,627	27,785	60,796
2011	571	11,316	4,122	19,200	28,709	63,918
2012	586	11,428	4,163	20,166	28,792	65,134
2013	596	11,496	4,174	21,077	28,660	66,003
2014	606	11,518	4,162	21,890	28,393	66,569
2015	612	11,566	4,122	22,507	27,942	66,749
2016	619	11,597	4,069	22,918	27,427	66,630
2017	625	11,603	4,009	23,146	26,858	66,241
2018	628	11,567	3,943	23,232	26,314	65,684
2019	631	11,501	3,875	23,272	25,796	65,075
pct. change	21.9%	11.9%	13.0%	53.6%	0.0%	17.9%

Asian includes Filipinos and Pacific Islanders.

If all transfer rates are held constant, as shown in Display 6, transfer demand would increase by about 18.0%, consistent with the percent change in community college demand (17.2%). Display 7 shows the Mid-Range Projection of total new undergraduate demand by ethnicity (new freshmen + new transfers). If CSU is unable to admit students in the winter and spring terms because of reduced state support, significant pent-up demand and a reduction in college opportunity would emerge, which is the subject of the final section of this preliminary report. The data in the display is used in calculating the net loss.

Display 7 Mid-Range Forecast – Annual First-Time Freshmen and First-Time Transfer Students to CSU

Fall	American Indian	Asian	Black	Latino	White/ Other	Total Demand
2008	918	20,772	7,584	33,050	47,387	109,711
2009	939	21,608	8,349	35,763	48,329	114,987
2010	991	22,543	8,840	38,543	49,370	120,286
2011	1,026	23,493	9,343	41,689	50,416	125,967
2012	1,048	23,898	9,476	42,969	50,291	127,681
2013	1,055	24,346	9,401	43,805	49,972	128,578
2014	1,046	24,521	9,192	44,593	49,003	128,354
2015	1,046	24,586	9,031	45,057	47,791	127,511
2016	1,056	24,432	8,936	45,612	46,992	127,028
2017	1,051	24,519	8,742	45,910	46,125	126,347
2018	1,055	25,230	8,580	46,387	45,187	126,439
2019	1,049	25,285	8,396	46,682	44,100	125,511
pct. change	14.3%	21.7%	10.7%	41.2%	-6.9%	14.4%

Asian includes Filipinos and Pacific Islanders.

REDUCTIONS IN COLLEGE OPPORTUNITY

This section provides an estimate of the loss in college opportunity at the undergraduate level if CSU implements plans to reduce total enrollments by 40,000 students over a two-year period: 20,000 during spring 2010, and another 20,000 during the 2010–11 academic year. Because the enrollment reductions would occur at a time when new student demand (first-time freshmen, transfers, and graduate students) is increasing, the loss in college opportunity would necessarily be greater than 40,000. CPEC staff estimates the loss at the undergraduate level to be nearly 56,000.

To calculate college opportunity, it is necessary first to derive an estimate of continuing students. As shown in Figure 3, continuing students account for about 70% of total enrollments during a given fall term; new undergraduate and graduate students represent the remaining 30%. Students continuing from fall 2008 would total 305,095. This frees up 131,103 seats for new undergraduate and graduate students. If overall enrollments are reduced by 20,000, there would be 111,103 seats available for new students.

Since undergraduates represent 83% of total enrollments, it is reasonable to assume that the university would reserve 83% of the new seats for entering freshmen and undergraduate transfer students. As shown, this translates to 92,215 seats. When this figure is compared with CPEC's 2009–10 projections, there would be a 22,772 loss in college opportunity by spring 2010. If CSU reduces enrollments by 20,000 in 2010–11, there would be 87,235 seats available for undergraduates. When this latter value is compared with CPEC's 2010–11 projection of entering undergraduates, there would be a 33,051 loss in college opportunity. The combined loss in opportunity over two years would be 55,823, resulting in a significant pent-up demand.

Figure 3 Loss in College Opportunity Worksheet

Academic Year 2009–10	
CSU Fall 2008 Total Enrollment	437,008
Continuing Student Estimate (enrollment x 0.70)	305,905
Available seats before reduction (enrollment – continuing students)	131,103
Available seats after 20,000 student reduction	111,103
Undergraduate share of new seats (seats x 0.83)	92,215
CPEC 2009 freshman and transfer demand forecast	114,987
College Opportunity Loss (seats – demand estimate)	–22,772
Academic Year 2010–11	
CSU Fall 2008 Total Enrollment Reduced by 20,000	417,008
Continuing Student Estimate (enrollment x 0.70)	291,906
Available seats before 20,000 student reduction (enrollment – continuing students)	125,102
Available seats after additional 20,000 student reduction	105,102
Undergraduate share of new seats (seats x 0.83)	87,235
CPEC 2010–11 freshman and transfer demand forecast	120,286
College Opportunity Loss (seats – demand estimate)	–33,051
Combined two-year loss (22,772 + 33,051)	–55,823

CSU CLASSROOM AND LECTURE CAPACITY ANALYSIS

Background

Questions regarding the amount of physical capacity needed to support learning and instruction were originally thought to be answerable indirectly through state standards. This was because policymakers of the post-World War II era argued that enrollment capacity should be determined by the availability and usage of classrooms and teaching laboratories alone, and therefore, space standards needed to be crafted and adopted. Such thinking was guided by the assumption that virtually all instruction would take place in those facilities, and that other needs of the physical plant, such as space for administration and plant maintenance, would be built as circumstances dictated.

The standards, last revised in the 1970s, entail certain assumptions on size, hourly usage, and occupancy levels for classrooms, teaching laboratories, and faculty offices.

Other types of facility space, termed non-capacity space, include museums, observatories, cultural centers, hospitals, theatres, student unions, auditoriums, dormitories, auto shops, and childcare centers. Because those facilities are varied, it is difficult to apply a common standard. An institution may have adequate classrooms and teaching laboratories, yet is unable to enroll additional students due to a lack of support facilities, unless good planning has produced a balanced physical plant.

Unlike the post-World War II era, learning, engagement, exploration, collaboration, and discovery now often takes place wherever and whenever students can sign on to the Internet, be it in traditional classrooms, or in a cafeteria, library, or dorm room. Consequently, greater emphasis is being placed on campus capacity as opposed to classroom capacity. Campus capacity planning embraces the realization that the rapid evolution of technology, coupled with a better understanding of pedagogy, requires that not all classrooms and workstations be configured traditionally. Student stations in some lecture rooms might need to average 20 to 25 Assignable Square Feet (ASF), rather than 15 ASF, to allow for laptops, multimedia devices, and other ways to enhance collaboration and learning. The current standards are regarded more or less as benchmarks for capital planning.

Lecture and laboratory standards are based on a desired occupancy. The standards require most lecture classrooms to be in use 53 hours per week, excluding Saturdays. The standards recommend that each student station average 15 ASF and that 66% of the stations are occupied approximately 35 hours per week. The term Weekly Student Contact Hours (WSCH) refers to the number of weekly hours of instruction a student would be engaged in per unit. A full-time student taking 15 semester units is engaged in 15 hours of instruction per week. Every 100 ASF of lecture space supports about 233 WSCH, or 15.5 full-time-equivalent students (FTES).

Laboratory capacity standards allow for various levels of ASF per station, depending on the discipline and course level (i.e., lower division, upper division, graduate). For example, the standards call for 110 ASF per station for a CSU upper division engineering laboratory, whereas 175 ASF per student station is allowed for community college masonry.

CPEC used a weighted mean to derive laboratory capacity. For UC and CSU, work stations average 50 ASF, with 84% of the stations occupied at least 20 hours per week. Given these standards, every 100 ASF of laboratory space will support about 40 WSCH, or 2.7 FTES. For the community colleges, every 100 ASF of laboratory space will support about 22 WSCH, or 1.5 FTES.

Capacity Analysis

Display 7 shows CSU lecture and laboratory ASF by campus as of fall 2008. In Display 8, FTES capacity is compared with fall 2008 FTES enrollment by CSU campus. As shown, 18 of the 23 campuses (78%) appear to be facing capacity pressures, in that they are serving more FTES than recommended by state classroom utilization standards. The remaining campuses seem to have sufficient capacity. CSU capital planners correctly point out, though, that numerous CSU buildings are over 60 years old. Because the average lifespan of educational facilities is about 50 years, many campuses will likely face huge renovation and moderation costs at a time when state capital funds are limited.

The Mid-Range forecast shows that undergraduate demand will exceed 416,000 students by 2019. If CSU graduate enrollments average 30% of total demand over the projection period, undergraduate and graduate demand would reach 493,000 FTES by 2019, presenting CSU with a statewide capacity deficit of 149,000 FTES. CPEC believes, as does CSU, that addressing institutional capacity requires comprehensive planning that focuses on a range of solutions, including:

- New capital projects with an emphasis on shared facility use
- Distance education arrangements and technology-mediated instruction, such as on-line courses
- Evening and weekend course offerings
- Instructional practices that cause students to be more proficient learners so that they can realize their educational aspirations more quickly. Institutional practices that foster student engagement and discovery, time on task, and self-paced learning tend to make students more proficient learners, thereby reducing time-to-degree.

The CSU statewide Capital Planning, Design, and Construction Office submitted a number of cautions and comments regarding the interpretation of campus capital needs based on state capacity standards. Some of those concerns have been woven into the background narrative and CPEC's analysis and discussion in this section. Public officials and policy analysts interested in higher education capital needs are urged to read the entire CSU response, which is provided in Appendix E.

Display 8 State-Adopted Space and Utilization Standards

	Lecture standard All systems	Laboratory standard	
		CSU and UC	Community colleges
Weekly room hours	53	23.8	27.5
Station occupancy	66%	84%	85%
Weekly station hours	35	20	23.4
ASF per station	15	50	106
WSCH per ASF	2.331	0.4	0.22
WSCG per 100 ASF	233.1	40	22
FTES capacity per 100 ASF	15.54	2.67	1.5

Averages by CPEC, for CSU and UC laboratory standards include lower division, upper division, and graduate courses.

Display 9 FTES Capacity and FTES enrollment

	Enrollment	Capacity	Surplus/Deficit
Bakersfield	6,981	5,811	–1,170
Channel Islands	3,271	2,945	–326
Chico	15,963	15,955	–8
Dominguez Hills	8,846	7,341	–1,505
East Bay	12,510	8,713	–3,797
Fresno	19,339	18,077	–1,262
Fullerton	28,362	25,932	–2,430
Humboldt	7,223	7,478	255
Long Beach	30,895	31,220	325
Los Angeles	16,297	13,802	–2,495
Maritime Academy	884	991	107
Monterey Bay	4,129	3,259	–870
Northridge	28,461	26,336	–2,125
Pomona	17,805	18,486	681
Sacramento	23,613	21,640	–1,973
San Bernardino	14,866	12,056	–2,810
San Diego	30,821	29,587	–1,234
San Francisco	24,692	23,677	–1,015
San Jose	26,291	26,178	–113
San Luis Obispo	18,498	24,885	6,387
San Marcos	7,449	6,370	–1,079
Sonoma	8,259	7,368	–891
Stanislaus	6,631	6,254	–377
Totals	362,086	344,362	–17,724
2019 projection	493,383	344,362	–149,021

FTES comparisons use 2008–09 data.

Display 10 Lecture and Laboratory ASF

Campus	Lecture ASF	Lab ASF	Total
Bakersfield	31,431	34,821	66,252
Channel Islands	15,986	17,319	33,305
Chico	80,619	128,722	209,341
Dominguez Hills	42,467	27,914	70,381
East Bay	50,194	34,345	84,539
Fresno	92,776	137,470	230,246
Fullerton	133,261	196,190	329,451
Humboldt	32,234	92,677	124,911
Long Beach	152,643	281,599	434,242
Los Angeles	85,839	17,559	103,398
Maritime Academy	4,151	12,985	17,136
Monterey Bay	18,216	16,112	34,328
Northridge	132,568	215,409	347,977
Pomona	92,788	152,739	245,527
Sacramento	114,993	141,677	256,670
San Bernardino	66,584	64,239	130,823
San Diego	160,064	177,151	337,215
San Francisco	125,061	159,391	284,452
San Jose	123,380	262,997	386,377
San Luis Obispo	93,092	390,917	484,009
San Marcos	38,134	16,762	54,896
Sonoma	40,770	38,828	79,598
Stanislaus	35,801	25,970	61,771
Totals	1,763,052	2,643,793	4,406,845

Appendix A Baseline Forecast of Annual First-time Freshman Demand by Ethnicity, 2009 to 2019

Fall	American Indian	Asian	Black	Latino	White/ Other	Total Demand
2008	401	10,498	4,156	17,901	21,579	54,535
2009	370	10,539	4,201	18,468	20,539	54,117
2010	368	10,677	4,069	18,868	19,618	53,600
2011	355	10,759	4,027	19,339	18,815	53,296
2012	361	10,801	3,990	19,609	18,400	53,160
2013	358	10,925	3,809	19,544	18,002	52,639
2014	344	11,067	3,652	19,523	17,361	51,947
2015	339	11,079	3,567	19,392	16,667	51,043
2016	342	10,905	3,549	19,515	16,402	50,713
2017	333	10,983	3,455	19,575	16,132	50,479
2018	333	11,691	3,393	19,912	15,786	51,114
2019	327	11,812	3,312	20,131	15,290	50,871
pct. change	-18.4%	12.5%	-20.3%	12.4%	-29.1%	-6.7%

Asian includes Filipinos and Pacific Islanders.

Appendix B Summary of Mid-Range Forecast Assumptions for CSU First-Time Freshman Demand

Demographic Group	Assumptions
Black	The public high school participation rate for entering Black freshmen is expected to increase from 13.2% to 15.9% by 2019. Approximately 86.0% are expected to have graduated from California public high schools. About 11.3% are expected to have originated from California private high schools and 2.7% from out-of-state high schools. About 39.0% are expected to persist to graduation.
Asian, Filipino, Pacific Islander	The public high school participation rate for entering Asian freshmen is expected to increase from 16.5% to 17.6% by 2019. Approximately 88.2% are expected to have graduated from California public high schools, while about 10.4% are expected to have originated from California private high schools and 1.4% from out-of-state high schools. About 61.0% are expected to persist to graduation.
Latino	The public high school participation rate for entering Latino freshmen is expected to increase from 10.6% to 12.3% by 2019. Approximately 85.4% are expected to have graduated from California public high schools, while about 13.8% are expected to have originated from California private high schools and 0.8% from out-of-state high schools. About 52.0% are expected to persist to graduation.
American Indian	The public high school participation rate for entering American Indian freshmen is expected to increase from 11.1% to 14.2% by 2019. Approximately 86.7% are expected to have graduated from California public high schools, while about 10.4% are expected to have originated from California private high schools and 2.9% from out-of-state high schools. About 52.0% are expected to persist to graduation.
White, Other	The public high school participation rate for entering White/Other freshmen is expected to increase from 11.7% to 12.3% by 2019. Approximately 82.7% are expected to have graduated from California public high schools, while about 13.7% are expected to have originated from California private high schools and 4.0 percent from out-of-state high schools. About 65.3% are expected to persist to graduation.

Appendix C Mid-Range Forecast – Community College Transfer Participation Rates, per 1,000

	American Indian	Asian	Black	Latino	White, other	Average
Age 14–19						
2008	1	1	1	0	2	1
2009	1	1	1	0	2	1
2010	1	1	1	0	2	1
2011	1	1	1	0	2	1
2012	1	1	1	0	2	1
2013	1	1	1	0	2	1
2014	1	1	1	0	2	1
2015	1	1	1	0	2	1
2016	1	1	1	0	2	1
2017	1	1	1	0	2	1
2018	1	1	1	0	2	1
2019	1	1	1	0	2	1
Age 20–24						
2008	41	45	27	34	60	45
2009	41	46	29	34	60	45
2010	41	47	30	34	60	45
2011	41	49	32	34	60	45
2012	41	50	34	34	60	45
2013	41	51	35	34	60	45
2014	41	51	35	34	60	45
2015	41	51	35	34	60	45
2016	41	51	35	34	60	45
2017	41	51	35	34	60	45
2018	41	51	35	34	60	44
2019	41	51	35	34	60	44
Age 25–29						
2008	23	26	19	21	29	25
2009	23	26	19	21	30	25
2010	23	26	19	21	31	26
2011	23	26	19	21	33	26
2012	23	26	19	21	34	27
2013	23	26	19	21	36	27
2014	23	26	19	21	36	27
2015	23	26	19	21	36	27
2016	23	26	19	21	36	27
2017	23	26	19	21	36	27
2018	23	26	19	21	36	27
2019	23	26	19	21	36	26

	American Indian	Asian	Black	Latino	White, other	Average
Age 30–49						
2008	15	8	14	8	10	10
2009	15	9	14	8	10	10
2010	15	9	14	8	10	10
2011	15	9	14	8	10	10
2012	15	10	14	8	10	10
2013	15	10	14	8	10	10
2014	15	10	14	8	10	10
2015	15	10	14	8	10	10
2016	15	10	14	8	10	10
2017	15	10	14	8	10	10
2018	15	10	14	8	10	10
2019	15	10	14	8	10	10
Age 50 +						
2008	7	2	6	2	2	2
2009	7	2	6	2	2	2
2010	7	2	6	2	2	2
2011	7	2	6	2	2	2
2012	7	2	6	2	2	2
2013	7	2	7	2	2	2
2014	7	2	7	2	2	2
2015	7	2	7	2	2	2
2016	7	2	7	2	2	2
2017	7	2	7	2	2	2
2018	7	2	7	2	2	2
2019	7	2	7	2	2	2

Appendix D CSU Undergraduate Enrollment Demand Methodology

Enrollment demand is an estimate of the total number of qualified prospective and continuing students that would enroll in the CSU system if student fees were affordable and enrollment growth was not constrained by reduced state funding. In contrast, an *enrollment projection* is an estimate of enrollment the state is able and willing to fund based on budgetary, economic, and fiscal circumstances. When funding is adequate, enrollment demand and enrollment projection estimates will yield very similar results. When circumstances are less favorable, as during economic recessions, demand estimates will be higher than projection estimates, because by definition state resources are insufficient to fully meet demand.

To estimate undergraduate demand it was necessary first to drive projections of entering first-time freshmen and community college transfer students. Historical freshmen participation rates were analyzed by ethnicity, and historical community college transfer rates were analyzed by ethnicity and age group. Cases with an unknown ethnicity were prorated proportionately. Within ethnicity, cases with an unknown age group were prorated proportionately. The freshman participation rate is calculated as the number of entering CSU first-time freshmen in a given year divided by the corresponding senior class of public high school graduates. The CSU community college transfer rate is calculated as the number of community college transfers of a given age group in a given term divided by the corresponding community college enrollment of a given age group in a given term.

Rates that showed a clear upward trend were used in a regression analysis. The regression slope represents a linear average change rate and is defined symbolically as:

$$b_{yx} = n \sum xy - (\sum x)(\sum y) / n \sum x^2 - (\sum x)^2$$

where n = number of cases x = year y = participation rate

The change rates were extended over the first three years of the projection period and then held constant thereafter. The freshmen rates were multiplied by the Demographic Research Unit's projection of high school graduates to derive CSU freshman demand. The most current 12-year persistence and graduation rates were used in an actuarial analysis using life tables to simulate the enrollment behavior of freshman from entry into the CSU system to final departure from the system. An example is provided on the next page to illustrate the use of life tables to simulate enrollment behavior.

This example shows cohorts of entering CSU freshmen of a particular ethnicity for 2002 to 2019. Based on current persistence and graduation rates, the number of enrolled students for this ethnic group that entered as first-time freshmen is projected to increase from 45,225 to 52,758 in 2019.

Change rates for community college transfers to CSU were multiplied by CPEC's Mid-Range Community College Enrollment Demand Forecast to derive community college transfer demand. The numbers were adjusted upward to derive total undergraduate transfer demand that includes students from other California colleges and universities (4.4%), students from out-of-state institutions (7.5%), and students from foreign countries (1.8%). Life tables, involving the most recent transfer persistence and graduation rates, were used to simulate enrollment behavior.

Life Table – Cohorts of entering first-time freshmen, 2002 to 2019

year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
0	**8,896**	8,926	9,051	9,930	10,318	10,950	10,498	10,773	11,147	11,469	11,514	11,646	11,797	11,810	11,624	11,708	12,462	12,591
1		**7,428**	7,453	7,558	8,292	8,616	9,143	8,766	8,995	9,308	9,577	9,614	9,724	9,850	9,861	9,861	9,776	10,406
2			**6,734**	6,757	6,852	7,517	7,811	8,289	7,947	8,155	8,438	8,682	8,716	8,816	8,930	8,940	8,940	8,863
3				**6,405**	6,427	6,517	7,150	7,429	7,884	7,559	7,757	8,026	8,258	8,290	8,385	8,494	8,503	8,503
4					**5,089**	5,106	5,177	5,680	5,902	6,263	6,005	6,162	6,376	6,560	6,586	6,662	6,748	6,755
5						**2,562**	2,571	2,607	2,860	2,972	3,154	3,023	3,103	3,210	3,303	3,316	3,354	3,398
6							**1,165**	1,169	1,186	1,301	1,352	1,434	1,375	1,411	1,460	1,502	1,508	1,526
7								**943**	946	959	1,053	1,094	1,161	1,113	1,142	1,182	1,216	1,220
8									**543**	544	552	606	629	668	640	657	680	700
9										**329**	330	335	367	382	405	388	399	412
10											**187**	187	190	209	217	230	220	226
11												**142**	143	145	159	165	175	168
12													**107**	107	109	119	124	131
								45,225	46,421	47,527	48,388	49,216	50,038	50,589	50,827	51,197	52,009	52,758

Estimated number of students who enrolled at CSU, fall 2002 to fall 2019, who originally entered as first-time freshmen.

Appendix E Comments from CSU

The following comments were submitted by California State University Chief of Facilities Planning, Larry Piper in a memorandum dated February 8, 2010. CPEC's assessment of the gap between projected enrollment demand benefited from the points made in this memorandum.

Thanks for sharing your draft CPEC report on CSU FTE capacity versus demand projections. I agree with your conclusion that state standards suggest that CSU is serving more FTES than our current capacity. I also want to note that the reduced enrollment data are internal estimates based on our current budget and not an approved forecast. The amount of state support for CSU has not yet settled, and given where we are in the budget process, these estimates are subject to change.

A few other general comments on the ASF/FTE model are worth considering. CSU has developed the ASF/FTE report as a tool for assessing the relative supply of lecture and lab space to the formulaic space entitlement per FTE in the 23 campus CSU system. This tool is used by the Chancellor's Office to compare the relative status of existing capacity to meet future academic needs both systemwide and at the campus level. One known shortcoming of this tool is that it assumes uniform growth across all disciplines, which clearly does not hold in all cases. Another error is that growth is not accurately recognized for our newer and smaller campuses, such as Channel Islands, that are still adding programs because they initially do not have the full range of discipline offerings to project their growth.

The ASF/FTE model is most useful when judiciously applied to assessing the relative order of magnitude of need versus capacity at a campus wide level and in identifying campus specific capacities in relation to uniform HEGIS level growth or decline over time. The CSU capital outlay program aims to construct new or renovated capacity to meet future FTE needs based on projected enrollments. The more precise planning tool used for this purpose is our Summary of Campus Capacity Report which is updated annually in conjunction with the Five-Year Capital Improvement Program. This tool assesses campus capacity based on existing plus funded projects in the delivery pipeline to estimate future entitlement surplus or deficit, assuming a given multi-year enrollment projection.

Your draft report noted several concerns in attempting to make assumptions about the adequacy of future campus capacity. We would agree. One reason that estimating tools such as the ASF/FTE model tool yield less reliable information is because the system under study, the 43,000 million assignable square feet of academic space, is inherently heterogeneous in terms of classroom and laboratory age, condition, design, and utilization. Lecture and lab space is not a commodity; the rapid evolution of technology and pedagogy have undermined the basic formula defining a workstation and changes in design and teaching mode have significantly altered the utilization and utility of one configuration or vintage of classroom to another.

The differentiation of lecture space is particularly noticeable in large, mature campuses with many older facilities. Utilization rates of new versus older lecture facilities are widely skewed. Whereas the traditional lecture rooms were designed at 15 ASF per workstation, newer, high tech, multimedia, code compliant lecture rooms employ 20–25 ASF or more per station and the trend is ever increasing as laptops abound and case study formats are in high demand.

Modern classroom design has been proven to improve academic performance; however, state entitlements remain as developed to 1960 standards. Antiquated classrooms still abound across the CSU system, a factor that distorts the image of available capacity. Nearly half of all CSU facilities are over 40 years old; 438 academic buildings are over 50 years old. Renovation can breathe new life into

such facilities, but the backlog of capital renovation projects now measures in the billions of dollars. Renovated rooms typically consume far beyond 15 ASF per station in order to comply with current accessibility codes, heating and ventilating needs, and sight lines.

One additional variable worth considering is the size of lecture rooms. Reversing the trend toward smaller class size, recent budget cuts have necessitated multi-section classes of 300 to 500. Campuses over endowed with 20–40 station rooms have little use for this existing capacity and no simple way to adapt to larger classes. Consideration of these variables will encourage a more cautious application of the ASF/FTE model in assessing realistic lecture capacity estimates.

A similar but even more dramatic argument can be made for laboratory facilities, where the application of new technology and the growth in demand for new disciplines such as nursing has far outstripped the capacity to adapt 50-year-old facilities or construct modern labs for science, technology, engineering and math. A glaring omission in current space standards is the lack of entitlement for undergraduate research space, despite the fact that many science disciplines require research for degree completion. Faculty research is similarly absent as a driver of CSU capacity entitlement. The gap between existing building stock supply and present and proposed laboratory capacity needs is thus a number far in excess of what state ASF standards can bridge.