

**School of Chemical Engineering
Undergraduates**

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Degree Program Assessed	Assessment Methods Used	Numbers of Individuals Assessed
Bachelor's of Science in Chemical Engineering	Fundamentals of Engineering Exam	69 (5-years)
	Senior Survey in the fall semester	25
	Exit interview fall and spring	21
	End of course survey – student response to objectives	7x25
	End of course evaluation by the faculty	7x25
	Course evaluations	10x25
	Feedback by Celanese visitors on student design problem	1x25
	External academic contests and scholarships	8
	Student participation in School's activities	>100
	AICHE National Data	Many
	Industrial feedback (IAC and recruiters)	~20
	OSU Alumni Survey	28 (96 and 00)
	Employer Survey of Communications	24
ABET Accreditation Visit	1	

Accreditation

The Accreditation Board for Engineering and Technology (ABET) requires a continuous improvement process for engineering education programs. In preparation, during the past five years (and substantially in the past three) the School has explicitly defined Educational Objectives (what we expect graduates to be able to do/have done by two years after graduation); and, from those, Program Outcomes (skills and assets that students have upon graduation), and the topics and skills that define the essence of chemical engineering. We developed a continuous assessment process, and for the past two years, closed the feedback loop. Most of our efforts for the University Assessment of Instruction are within the ABET activities.

In AY04 ABET provided a thorough 3-day inspection of all aspects of our BS ChE program. We remain accredited.

Following are memos and data reporting on assessment activities, post accreditation.

Assessment Overview

Feedback from both our internal alumni phone interview, OSU Alumni phone interview, and our own survey of employers indicates that our program prepared the alumni well for practically all aspects in their diverse careers. Feedback suggests better preparation in computer programming, dealing with ambiguity, integration of business economics, and better preparation for team effectiveness.

Analysis of performance on the Fundamentals of Engineering Exam indicates that OSU ChE student test-takers are significantly better prepared in the science and engineering fundamentals than the average national student test-taker. We have sustained a 96% pass rate, compared to a national pass rate of 84% for the past ten years. In 6 of the past 7 test administrations, our students had a 100% pass rate. Only in one category, mathematics, do we frequently test lower (marginally significant) than the national average. This is a continuing finding, parallels the feedback of most all OSU engineering disciplines, and is part of active efforts of the college to improve the math skill in our graduates.

It is not simply and FE Exam finding. In the past students, faculty, and alumni in graduate school feel that the mathematics ability of our undergraduates needs to be improved. The students want more "practical math" ability; not math theory. They want engineering analysis skill. Faculty has accepted the challenge of integrating such experiences into their classes. Last year was the first year that senior students did not complain about insufficient skill in practical math. This April, our students out-scored or tied the national average in the several math categories on the FE Exam.

Our students and alumni have a strong utilitarian value, and rate the importance of courses to their perceived or actual utility to a professional's life (career as well as personal). This is a very "engineering" characteristic. Changes last year ended the persistence of complaints about ENGL3323 and STAT4033, and we appreciate the help from the two departments. However, students continue to report significant complaints about ENSC2613, because of poor teaching.

This year, also, the persistent, but small and non-specific, past complaints about prejudice, surfaced with explicit, multiple, and independently confirmed complaints about gender preference by a professor in another department. Female students are directly and indirectly targeted for abuse and refusal of help. This has been explicitly reported to the CEAT and other college associate deans for instruction, and implicitly reported to the OSU Committee on Academic Integrity. It is obvious to male and female students, and the word has spread to lower class women who are seeking alternate avenues to taking what remains an important course in the curriculum. The alternate avenues add a year to the student time to graduate. This situation of perceived academic misconduct by a professor is becoming well known, and the university must take action to stop it.

Students, alumni, and IAC members encouraged us (the college) to replace Fortran with VB and prepare students to use Macros in Excel. This fall begins the change.

Computing facilities have improved each year. However, problems persist. The facilities, software, and user instruction on software and hardware are inadequate. There are too few computers, in inconvenient locations. Class use of the "open" labs blocks student use, and is very frustrating. Students need instruction on system and software operation to be proficient. We added a lab section to CHE2033 and have a ChE instructor teaching a lab in ENGR1352 for software training. We need sufficient tabletop workspace in the labs. Students want 24-hr access to EN labs where the reference books are located, and where encounters with professors are likely. Being in the labs for long hours, students would like a coffee/snack shop in Cordell.

We continued using a single ChE advisor this academic year. Data from two years shows it to be an improvement over the use of all faculty for advising, because the academic advising process requires experienced advisors to interpret and locate the convoluted rules and conditions. Students cannot effectively advise themselves because the degree requirements are not clearly stated, and because credit amount and category of transfer courses often requires interpretation, with multiple OSU departments claiming authority. However, as students progress from pre-professional school to professional school, advising shifts from CEAT Student Services to the CHE Faculty, whereupon interpretation of the degree requirements changes. Advisors within any one group give conflicting direction. While this is a continuing finding, the frequency and severity of complaints seem to have lessened.

Students struggle with certain prerequisite material when they enter subsequent courses. Key prerequisite topics that pose subsequent difficulty are computer programming, differential equations, material balances with recycle, and statistical analysis of data. This is a continuing finding.

Maintenance of experimental teaching units in the Unit Operations Laboratory continues as a major problem for the school. UOL experience is fundamental to meeting our educational objectives and accreditation, and to presentation of the School to visitors and prospective students. But, there are about 16 separate units. If one is replaced each year, that means that one-third of the teaching units are 11 to 16 years old. Imagine your personal vehicle being that old - unreliable, a reflection of your personal being to others, and technically irrelevant. This year volunteers from the industrial community, led by Professor ██████████, built a heat exchanger unit for our lab. It has a \$400 to 500k value. While we added one unit this year, we scrapped two. The \$18K per year lab equipment funding barely covers maintenance and replacement of expendables.

ChE enrollment cycles with a 13-year period, and all US schools are in phase. We have been in the downward trend of matriculation, but each of the last three year's data showed a significant increase over the past several cycles.

Instructional changes that have occurred or are planned because of outcomes assessment

We are working well beyond "instructional" changes. This discussion includes all changes.

We have an active Accreditation Committee of three faculty members which acts as a steering committee, digesting data, and preparing for semi-annual faculty meetings and annual IAC meetings for curriculum improvement decisions. As a School, we now have formalized criteria to use in exit interviews and end-of-course assessment, and meet each semester to review assessment data and direct curriculum improvement.

Welcome letters to new matriculates, recruiting letters, response to enrollment inquiries, and the Head's address at the first AIChE Student Chapter meeting address the intensity of the curriculum, the need for commitment, and the importance of extra curricular activities in the development of the entire person. It is important to shape the person's perspective to ensure success within the new environment.

We are making greater use of multi media in teaching.

We are making greater use of simulators and CAD packages for student home assignments. CFX was extended to the reaction class this year. We added a discussion section to CHE2033 for instruction on software (MathCAD, Excel, and ChemCAD) use.

VB is replacing Fortran.

Starting in the spring of 2002, CHE course instructors have been actively looking for ways to integrate "practical math" into the student activities of their courses. Preliminary results appear positive.

Quality of instruction in STAT4033 greatly improved this year.

ENGL3233 was changed from a required to an option as the second ENGL course.

We added an integrated heat-exchanger unit (from industrial donations), re-piped several units, and renovated Unit Operations Lab space to improve safety and functionality. We added two computers to the UOL for student use (there are now 9), with 7 units computer monitored, of which 4 are computer controlled.

Advising materials continue to be carefully edited to provide clear and non-conflicting advice to students. Professional School admission criteria has been simplified.