



CHEMICAL SCIENCE AND ENGINEERING

NEWSLETTER OF THE COLLEGE OF CHEMISTRY, UNIVERSITY OF CALIFORNIA AT BERKELEY
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BERKELEY AND COLLEGE MAKE NATIONAL HEADLINES

Berkeley's graduate program in Chemistry is the best in the nation and its program in Chemical Engineering third-best, according to a major report released by the National Research Council (NRC) in September. In the eyes of many, the study singled out Berkeley as the best overall graduate institution in the country.

"We all felt that our programs ought to be highly ranked," said Dean Alexis Bell.

"It's nice to have that feeling confirmed by the NRC."

News of its first-place ranking spread quickly through the Department of Chemistry, sparking excitement among its members.



"I'm extraordinarily pleased that our department was one of five [at Berkeley] named in first place," Chemistry Department Chair Ken Raymond said. "Thanks in part to federal and private support, we've been able to maintain our program at this level of excellence despite the financial pressures of the last three or four years."

Luckily, according to Raymond, many retired faculty maintained some connection to the department, helping to somewhat smooth the difficult transition.

The Department of Chemical Engineering, which was a close third nationally to the University of Minnesota and
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Scholars Program key to improving ethnic representation

For Berkeley freshman Qiana Washington, learning to balance chemical equations in high school was not merely an arduous homework assignment, but a challenge that may very well have shaped the course of her life. Washington said she found her calling in chemistry after successfully working her way through a set of equations one evening.

"I spent until midnight that night working on it and finally got it," said Washington. "It took so much work and there was such a feeling of fulfillment after understanding the material."

The assignment was not part of her high school coursework, but part of a preparatory class offered by the College of Chemistry Scholars Program. The program sponsors the class as an outreach effort aimed at junior high and high school students from groups traditionally

underrepresented in the sciences.

Had it not been for the College's program, Washington said she may never have given chemistry a second thought.

"I'm really glad that I was exposed to chemistry [in the Scholars Program] because our high school didn't have a really strong chemistry program," said Washington. "I know that if I had taken [chemistry] in high school first I wouldn't really have been interested."

If all goes well, success stories like Washington's will soon become far more common. In the wake of the UC Regents' decision to abandon affirmative action in student admissions, Chancellor Chang-Lin Tien has forged The Berkeley Pledge—a major University program which will strengthen many campus recruitment and academic support efforts.

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Scholars

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“My understanding is that the Scholars Program is the type of program encouraged by the Regents’ resolution and thus fits well into the Chancellor’s new initiative,” said Undergraduate Dean Herbert Strauss.

Tien has promised to create additional programs while boosting money for scholarships and support of existing outreach and retention programs, such as those run by the College.

University funds or some other infusion of monies will be key to saving the Scholars Program, which, despite generous support from private donors, is struggling to stay afloat.

“The need for this kind of program is a long-term need. I hope that it would have support in the long term,” Strauss said.

Monica Jackson-Tribble, coordinator for the outreach component of the Scholars Program, proudly points to Washington, and others like her, as an ideal product of the College’s efforts.

“She symbolizes the connection we are trying to make with underrepresented students who want to go beyond what they are learning in their high schools and learn more about chemistry through our outreach program courses and faculty lectures,” she said.

“Ideally, we would like them to come to Berkeley and major in Chemistry and Chemical Engineering, but we’ll promote and support any type of success that leads to further education, particularly in the sciences.”

The Scholars Program also encompasses a retention component within the College that encourages currently enrolled students in their studies.

Both aspects of the program have been particularly effective during the four years since its creation. In terms of outreach, Jackson-Tribble said the success of the program can be gauged by the popularity of its Precollege Academy and Spring Saturday College classes, which are jointly supported by the Early Academic Outreach Program.

“This summer, there was such an interest in the Chemistry Precollege Academy that we added another section. This is the first time we’ve had three sections,” Jackson-Tribble said. “The demand for the subject is increasing.”

INCOMING STUDENTS FALL 1995

	UNDERGRADUATE*		GRADUATE	
	Chem	Chem E	Chem	Chem E
males	35	78	47	15
females	34	32	19	4
underrep.**	11	13	5	2

*includes transfer students **includes African-American, Hispanic, and Native American

Since the institution of the outreach programs, the College has seen the number of applications from underrepresented students jump from 54 in 1990 to 92 in 1995.

About 160 declared science majors at Berkeley have participated in retention programs since they began in the fall of 1991. An impressive 77% of participating students enrolled in the College of Chemistry are continuing as Chemistry or Chemical Engineering majors.

“Since its inception, we’ve doubled the retention ratio in the class of students the program is serving,” said College Dean Alexis Bell, noting that this ratio is comparable to the overall ratio for College students. “We feel, in that respect, that the program has been extremely effective,” he added.

Undergraduate Advisor Gloria Frank, who administers the retention component of the program, says that participating students benefit enormously from intensive study sections offered through the program.

“The teaching techniques are a little different. The instructors use new and inventive ways of getting the information across,” she said, adding that section instructors are carefully screened and selected in terms of their experience and ability.

“Section is really good,” said Washington. “I have a really good TA. We get along really well and relate to each other and that helps. [The section] is smaller and more personal, which I really enjoy. We do extra work which helps with the concepts.”

According to Frank, comments like Washington’s turn up in virtually all of the class evaluations written by participating students. Many students also cite the kinship fostered by the program as one of its strongest attributes.

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Rankings

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the Massachusetts Institute of Technology, was ranked first in the state, beating out other California mainstays such as the California Institute of Technology and Stanford University.

“These ratings are consistent with other studies that place Chemical Engineering at Berkeley in the top handful of programs,” Department Chair Simon Goren said.

Goren noted that the program was second in teaching effectiveness and had the highest percentage of U.S. students (96%)—a fact which he said speaks to the appeal of the department as a first-rate program.

“We can usually fill our desired class size with the best domestic students,” Goren said.

In his informal comparison of the top ten chemical engineering departments, Goren said he found that Berkeley’s Ph.D. program was the most productive on a per faculty member basis in the academic year ‘93-’94.

Aside from feeling satisfaction in the favorable ratings of their departments, College leaders expressed pride in the University as a whole. An impressive 35 of 36 Berkeley programs reviewed in the NRC study were ranked in the top 10.

“One of the great things about this institution is its strength across the board,” Goren said.

“The intellectual life on this campus is extraordinarily rich,” agreed Raymond. “I think it’s much easier to achieve excellence in any one intellectual area when you are surrounded by a matrix of excellence.”

Although the NRC study focused on graduate programs, many felt that the rankings were a direct reflection of the academic merit of the campus as a whole.

“I attribute our overall ranking to the quality of the faculty, more than anything else,...and to the high quality of their research,” Bell said.

Bell added that the NRC report is a powerful publicity tool for the College and for the University in terms of drawing prospective graduate students and aiding fundraisers in their goal to financially sustain the institution.

CHEMISTRY	Scholarly Quality	Effectiveness in Teaching	CHEM. ENG.	Scholarly Quality	Effectiveness in Teaching
Berkeley	4.96	4.72	U of Minnesota	4.86	4.57
Cal Tech	4.94	4.75	MIT	4.73	4.43
Harvard	4.87	4.57	Berkeley	4.63	4.43
Stanford	4.87	4.57	U of Wisconsin	4.62	4.37
MIT	4.86	4.70	U of Illinois	4.42	4.28

Values in tables represent a score from 0 (Not sufficient for doctoral education) to 5 (Distinguished)

Source: National Research Council

ACS Award Winners

Two Berkeley chemists recently learned that they will receive prestigious awards from the American Chemical Society (ACS) in 1996. Professor Robert Bergman will receive the 1996 Arthur C. Cope Award, which recognizes outstanding achievement in the field of organic chemistry. Professor David Chandler was selected as the 1996 recipient of the ACS Award in Theoretical Chemistry, which is sponsored by IBM Corporation.

“One nice thing about this award is that it comes with a \$50,000 research grant which I can use to start innovative projects that would be difficult to support with conventional funds,” Bergman said of the Cope Award, which also includes a \$25,000 prize. Bergman added that he was “pleasantly stunned” by his selection as the recipient.

Bergman’s research is centered on the synthesis of new organic, inorganic and organotransition metal compounds, which are used to develop and study new chemical reactions.

In discussing his award, Chandler was quick to note that of the four times the honor has been bestowed, twice it has been to Berkeley chemistry professors. Professor William Miller won the award in 1994.

“I’m very pleased and honored,” Chandler said. “I’m particularly honored because it is truly my peers who have

made the judgement.”

The award, which includes a \$5000 prize, recognizes his development of the fundamental classical and quantum theories of solvation and kinetics in liquids, and extensions of these developments to the biophysical realm.

Chandler, whose research is conducted with pencils, paper and computers rather than “wet” chemistry, uses statistical mechanics to study complex chemical schemes.

“This award recognizes the work I’ve done with my students,” he added.

Chandler will accept his award on March 26 at the 211th ACS National Meeting in New Orleans. Bergman will receive his award at the August ACS meeting in Orlando.

Dennis Galloway

Phoebe Chandler



Professors Robert Bergman (left) and David Chandler (right)

Scholars

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“We’re creating a community environment which includes academic support,” said Frank. “We want to have a scholar-like atmosphere.”

Washington said she witnessed the community being formed within the first weeks of the semester.

“When you have a problem you can go to somebody who’s in the program and they’ll help you without even thinking about it,” Washington said. “That’s really important because it makes you feel as if you’re not alone in the class and there is always a way to get through it.”

According to Jackson-Tribble, some of the most effective outreach efforts are those that spark interest in students early on in their education.

Through the Scholars Program, faculty and student

volunteers donate their time to present chemistry demonstrations that teach local K-12 students “about chemistry and what chemicals are,” said Jackson-Tribble.

“That’s where it starts. To show that there’s some fun, excitement and a sense of mystery to the whole subject,” she added.

Chemistry undergraduate **Jerry Arellano** and Chemical Engineering undergraduate **Jennifer Narvaez** were named ARCO Undergraduate Research Scholars for 1995.

Dean **Alexis Bell** has been appointed a member of the governing board of the Council for Chemical Research, a joint industry-academic organization.

New Assistant Professor of Chemistry **Carolyn Bertozzi** received one of 11 New Faculty Awards from the Camille and Henry Dreyfus Foundation. The \$25,000 award provides funding for young scientists

Chemistry graduate student **Linda Brzezinski** was awarded a fellowship from Eli Lilly and Co. for 1995-96.

Barry Bunin, a graduate student in organic chemistry,

Noteworthy News

was awarded the Roche Award for Excellence in Organic Chemistry in June.

Department of Chemistry Professors **David Chandler** and **Richard Saykally** were named Fellows of the American Academy of Arts and Sciences in April.

Chemistry graduate student **Vicki Colvin** won the American Chemical Society Victor K. LaMer Award for outstanding Ph.D. thesis in the field of Colloid and Surface Chemistry.

Chemical Engineering sophomore **Stacie Cowan** received the American Institute for Chemical Engineers Ray Miguere Award for an outstanding Berkeley sophomore or junior chemical engineering student.

Assistant Professor **James Leahy**, of the Department of Chemistry, was named a Career Awardee (1995-1998) by the National Science Foundation and one of thirteen 1995 Cottrell Scholars by the Research Corporation. Leahy was also the recipient of a Regents' Junior Faculty Fellowship.

Professor of Chemistry **John Newman** was elected to the position of Fellow of the Electrochemical Society. He was honored at a Society meeting on October 10.

Last May, **John M. Prausnitz** became the first Professor of Chemical Engineering to receive an honorary Doctor of Science degree from Princeton University in the 260-year history of the institution.

Department of Chemistry Assistant Professor **Yeon-Kyun Shin** received a \$180,000 grant from the Searle Scholar's Program, which provides research funds for scientists in their first appointments.

Chemical Engineering Ph.D. candidate **Kimberly Wicklund** was awarded the prestigious GE Fund Academic Fellowship for 1995-96, which aims to increase the number of women and minorities in American schools of engineering and science.

Late Breaking

Alumnus **Mario Molina** (Ph.D. '73), who studied with the late George Pimentel, has won the Nobel Prize in Chemistry. Look for more in the upcoming *News Journal*.

Head-Gordon Awarded Packard Fellowship

Assistant Professor of Chemistry Martin Head-Gordon is one of 20 young scientists nationwide who will receive a 1995 David and Lucile Packard Fellowship. The highly competitive five-year fellowship provides a total of \$450,000 for each recipient to support his or her research.

"I'm delighted to get the award. It's a big honor," Head-Gordon said. "It gives us considerable flexibility in expanding the size of the group and purchasing equipment."

Equipment in the Head-Gordon group consists primarily of advanced workstations used to carry out complex computations that form the basis of the group's research.

"We're developing new algorithms for calculating ground and excited states of molecules, that will gradually work their way into mainstream chemistry to be used as

standard tools," he said.

Recently, the group made a significant breakthrough in linear scaling, "a holy grail in the field," according to Head-Gordon. Their new development, termed the Continuous Fast Multipole Method, allows an important class of calculations to scale only linearly rather than as a high power of molecular size. This makes the study of larger molecules feasible, by reducing computation times dramatically.

"Our research combines fundamental problems...with practical concerns," Head-Gordon said. "We're trying to redefine the frontiers of electronic structure theory."

The *NEWSLETTER OF THE COLLEGE OF CHEMISTRY* at Berkeley is published four times each year to support the College's mission of providing excellent teaching, research, and public service in the fields of Chemistry and Chemical Engineering.

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