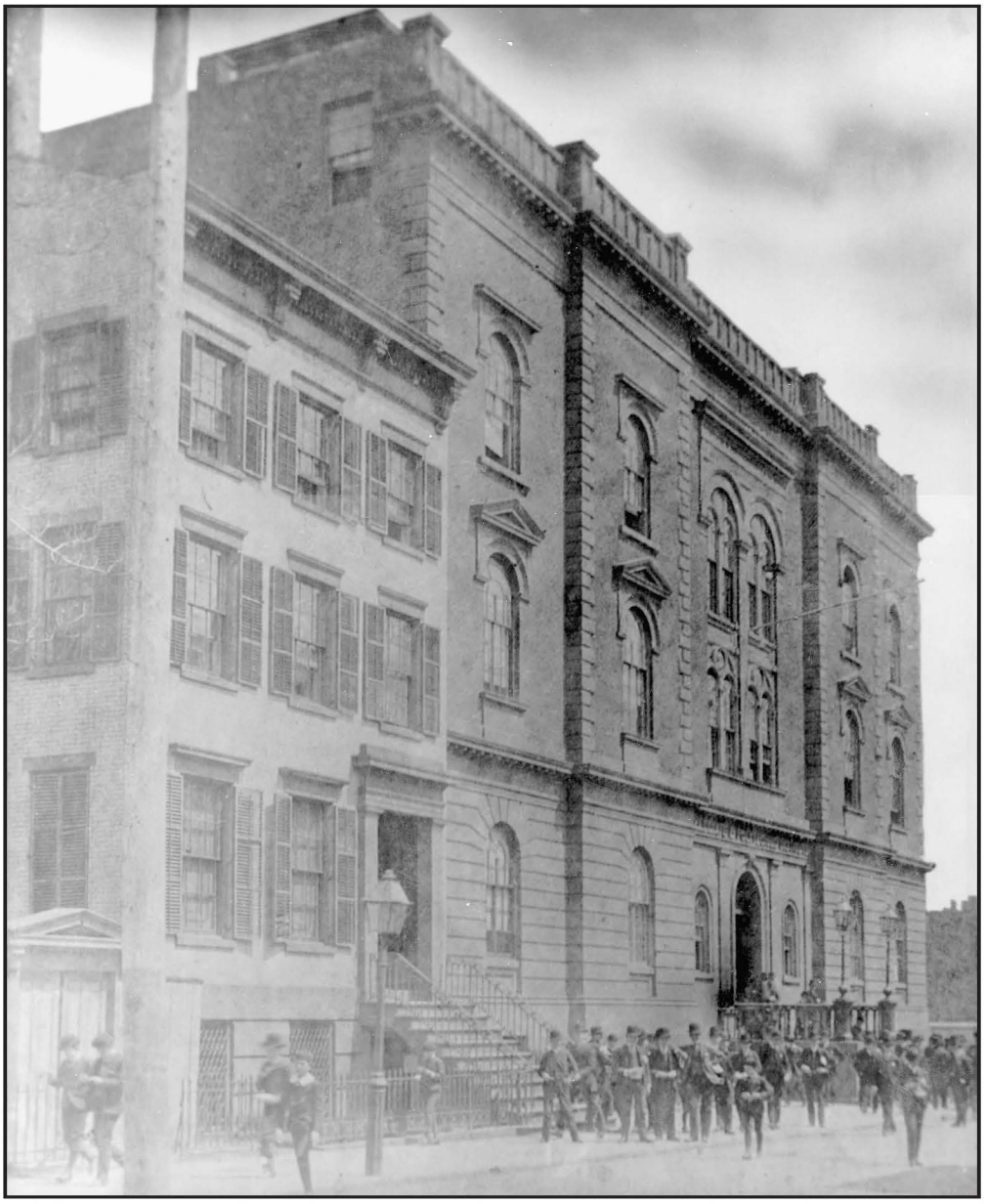
ChE department

# *Chemical Engineering at* **Polytechnic University**

EDWARD N. ZIEGLER AND JOVAN MIJOVIC

The Brooklyn Collegiate and Polytechnic Institute was chartered in 1854, when the city of Brooklyn's rapidly growing population was 30,000 and Brooklyn was separate from New York City. This was roughly 30 years before the completion of the Brooklyn Bridge and prior to the Civil War. The stated purpose of the first Polytechnic Board was to establish "an educational institution in our midst, . . . to give our sons an education as would qualify them in a far higher degree, through an enlarged, liberal, and thorough training in a course of practical, scientific, and classical studies, to enter upon the active pursuits and duties of life," and "that its location should be as central, and as easily accessible as possible by public conveyance, from all parts of the city . . . ." In its earliest years, the college drew students from the mansions and substantial homes of the "Heights," the "Hill," the "Eastern District," and other parts of Brooklyn.

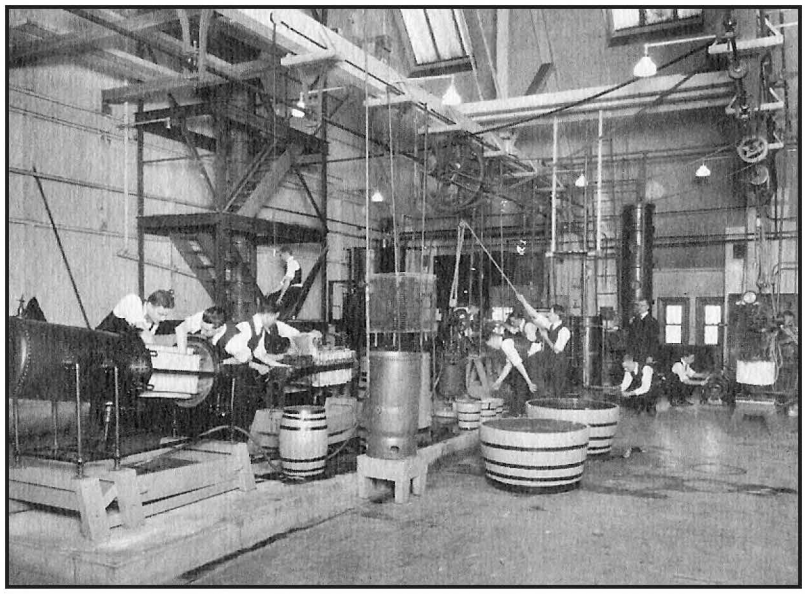


*A preserved picture of life at Polytechnic's main campus at the beginning of last century.*

The Scientific Program leading to the Bachelor of Science degree was established for those bent in the direction of science and engineering, which in addition to theory included more than "200 laboratory experiments, field trips, and exercises." Between 1885 and 1890 the "Scientific" course of study was ultimately divided into three areas of specialization: Engineering (Mechanical and Civil), Electrical Engineering, and Chemistry. The latter had offerings in applied and fundamental areas

In 1898, Brooklyn became a part of New York City. Like Brooklyn, Polytechnic's services and influence have gone far beyond the borders of the Borough, through the university's worldwide contributions to science, engineering, and education. Polytechnic's modern Brooklyn site is still only two blocks from the Brooklyn Bridge, and all three of the city's major subway systems have stations within a few blocks of the Polytechnic, maintaining the spirit of its original charter.

Chemical engineering at Polytechnic University had its formal beginnings more than a century ago when the Department of Chemistry became the Department of Chemistry and Chemical Engineering at the Polytechnic Institute of Brooklyn, or PIB. **I.W. Fay** was the first head of the combined department in 1905, with only one chemical engineer on the staff—**John C. Olsen**. In those days, extensive use was made of eminent professionals in local industries as "consulting professors."



*The Chemical Engineering Laboratory about 1919.*

In 1925, the chemical engineering program at Polytechnic became one of the first engineering programs to receive accreditation by a national professional society, when the American Institute of Chemical Engineers (AIChE) listed it among the first 15 accredited curricula in chemical engineering. In 1931, a separate Department of Chemical Engineering was established, with Olsen as its first head. That same year Olsen was elected president of the AIChE, which he helped found (and for which he served as secretary for its first 23 years). Since then, more than 2,800 bachelor's, 1,000 master's, and 350 doctoral degrees have been awarded in chemical engineering at Poly.

## THE OTHMER YEARS

In 1932, then-28-year-old chemical engineer **Donald F. Othmer** was hired into Olsen's department, after an impressive five years of work at Eastman Kodak in Rochester, N.Y.

Kodak was the world's largest manufacturer of cellulose acetate, a key ingredient in photographic film. A critical step in creating cellulose acetate is concentrating the acetic acid used in production. While in Kodak's employ, Othmer was tapped to find ways to increase the acetic acid concentration in various sources available to the company. Initially knowing little about the subject, but always curious, Othmer designed an experimental device to observe how acetic acid is distilled. The apparatus he built became famous as the Othmer Still and continues to be used to study the properties of mixtures being distilled. The early version of the still was typical of Othmer's hands-on, low-cost approach to science: He not only conceptualized and designed the apparatus, but also learned glass-blowing so that he could build it himself.

The Othmer Still allowed chemists and engineers to measure accurately for the first time concentrations in the vapor and liquid phases in equilibrium.

Othmer also contributed greatly to the science of azeotropic distillation, which introduces a third chemical during the distillation process to improve the purity of the product and reduce energy consumption. Thanks to Othmer, distillation is now a science. His geometrical and mathematical instincts were applied further to devise a figure in which the effects of temperature on vapor pressure of various compounds could be correlated as straight lines on a single sheet of paper, the now-famous Othmer plot.

As a well-known chemical engineer, Othmer succeeded to the chairmanship in 1937 and remained head of the department until 1961, when he stepped down to devote more time to teaching and research. He has authored hundreds of articles and held numerous patents for chemical engineering applications. Around 1945 **Raymond E. Kirk**, head of the Department of Chemistry, and Othmer, heading the Department of Chemical Engineering, decided to embark on a project as co-editors of an encyclopedia that would be a comprehensive guide to industrial chemistry and chemical engineering. The *Kirk-Othmer Encyclopedia of Chemical Technology* is now in its 5th edition and comprises 27 volumes. It is the first place chemists and chemical engineers turn when they are starting a new project. It has everything from the commonplace to the esoteric, from how to make batteries and beer to how to reduce nitrobenzene. A set may be found in the library of virtually every major university in the world.

When Othmer died in 1995 he bequeathed more than $175 million dollars to the Polytechnic, which remains as of today the largest donation ever given to the university. Much of the gift went to improving and expanding the university labora-

tory and classroom facilities, with some to construction of a new dorm and gymnasium. An interesting side note: If the remaining professors had joined Othmer 30 years earlier in the investment club he started at Poly—based on the advice of a family friend named Warren Buffet—they all would've been rich; but even sharing a fraction of the membership fee of $25,000 would have been rather difficult for a faculty member in those days.

Don Othmer supervised and inspired more than 60 doctoral students, many of whom went on to distinguished careers in their own rights. He supervised research in the fields of thermodynamic property estimation, distillative and extractive separations, fluidized bed design, and energy optimization. Having no biological children, he was quoted as saying he regarded himself most fortunate to have been blessed with so many brilliant "academic children" whom he could recognize with almost-paternal pride. One of Othmer's former students was **Ju Chin Chu,** who from 1950 to 1966 supervised fundamental distillation experiments on more than 100 industrially important chemical mixtures. Chu, in turn, must have passed along a high regard for research and genes as well: His son, **Steven Chu**, won the Nobel Prize in Physics in 1997.

Speaking of Nobel Prize winners, a corecipient of the 1995 Nobel Prize in Physics, **Martin L. Perl**, earned his chemical engineering bachelor's at Poly in 1948 (followed by a Ph.D. from Columbia). Perl was honored for the discovery of the tau lepton, one of nature's most remarkable subatomic particles with a mass 3,500 times that of the electron. In 1982, Perl's promise had already been recognized closer to home: That year, he was awarded the Wolf Prize for Physics for the Class of 1948.

In the '50s Othmer was able, through fund raising and departmental equipment gifts from industrial colleagues, to persuade **Warren L. McCabe** to come to Poly and become administrative dean. A leading educator and consultant formerly at Cornell University, McCabe is, of course, famous for the McCabe-Thiele diagrams of binary distillation, as well as being coauthor of *McCabe, Smith, and Harriott's Unit Operations of Chemical Engineering*.

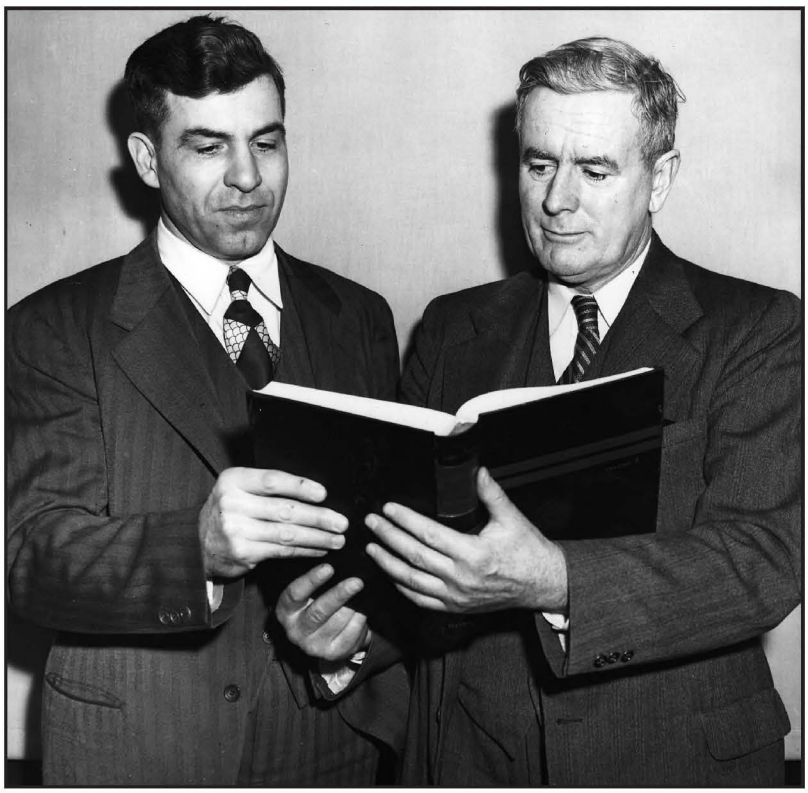
Othmer already had a master craftsman of laboratory equipment on staff, **W. Fred Schurig** (Poly '33, '35, and '46) who constructed one of the finest teaching laboratories in America—Poly's Unit Ops Laboratory. While at Poly and after he retired, Schurig designed and built laboratories for many schools throughout the Americas. Schurig became known for his discipline and attention to detail, which he later attributed to Othmer's influence.

Perhaps the most famous of Othmer's doctoral students, **Joseph J. Jacobs**, also earned all three of his degrees at the Polytechnic, receiving his Ph.D. in 1942. Jacobs developed a system that could manufacture soap in 15 minutes compared to the traditional process that required between three and seven days. Jacobs was an assistant professor at Polytechnic for a while and then headed west to San Francisco to take a position assisting in the engineering of liquid fertilizers. After doing consulting work for two years at Kaiser Aluminum and Chemical Company—at which he helped develop caustic soda—Jacobs started his own business. In 1947, he founded Jacobs Engineering Group Inc., an international firm that *Fortune* magazine ranked No. 1 in 1999 as the most admired engineering and construction company. In addition to authoring numerous articles on chemical engineering and economics, Jacobs made substantial contributions to the study of social issues—including aging parents of adult children—and authored two autobiographies. He was recipient of the United Engineering Society's 1983 Herbert Hoover Medal, which recognizes the civic and humanitarian achievements of professional engineers. The university also established the Joseph J. and Violet J. Jacobs Chair in Chemical Engineering, and in 2002 opened the Joseph J. and Violet J. Jacobs Building on campus, housing a full gymnasium and athletic center as well as state-of-the-art laboratories and classrooms.

Another well-known doctoral student of Othmer, **Gerhard Frohlich**, earned his Ph.D. in chemical engineering at Poly in 1957. He was the second member associated with the Polytechnic to become president of AIChE, elected in 1999. Earlier he had been named corporate vice president and general manager of Central Engineering at Hoffman-La Roche, where for many years he engaged in the development, design, and construction of chemical and pharmaceutical facilities. In commenting on the importance of AIChE, Frohlich said, "We must think globally, accept cradle-to-grave stewardship of products, and strive for sustainable development. Professional societies can lead the way by facilitating dialogue among industry, government, academe, and the public. By working together in new and more flexible ways, using renewable resources, and learning from advances in chemistry and biotechnology, we can make products that enhance the quality of life and protect the environment. If we commit to doing so, the new millennium looks bright indeed."

Yet another of Othmer's students, **Robert F. Benenati**, had a long and successful career as a professor who challenged students to do more than they ever thought possible, particularly in his design class. **Warren Seider**, a Poly graduate now at the University of Pennsylvania, is in turn one of Benenati's former students, and is coauthor of the major design text *Product and Process Design Principles,* now in its 2nd edition.

In the '60s and '70s **James J. Conti** (Polytechnic '54, '56, and '59) and **Irving F. Miller** were department heads through a financial crisis, in which PIB merged with the NYU school of engineering to form the Polytechnic Institute of New York, with its main campus remaining at the Brooklyn site. In 1985, the school was renamed Polytechnic University.



*Below, Don Othmer poses with a gold-plated version of the invention he created in 1928, the Othmer Still. Left, Othmer is seen with Raymond Kirk, head of Poly's chemistry department circa 1945 and co-editor of the pair's comprehensive encyclopedia, now in its 5th edition.*

Rounding out the era, **Leonard Stiel** has carried the Othmer tradition into the computer age; his work is cited widely in the literature of thermodynamic and transport properties of fluids and mixtures. Stiel officially retired a few years ago but now as a research professor he's still very active at Poly in education and as a consultant.

## THE POLYMER CONNECTION

In the early part of the 20th century, many prominent chemists dismissed the idea that molecules with molecular weights in the thousands or millions could exist. Today, polymers are everywhere, in everyday materials such as plastics, nylon, and rubber. The year 1939 marked the introduction of a polymers course in the chemical engineering department. That year, chemical engineering professor **Paul F. Bruins** joined Poly from the University of Iowa and offered the first graduate course in polymer technology in the United States, paving the way for what has become one of the most famous polymer programs in the world. Bruins was affectionately called the "walking encyclopedia" of plastics, and he wrote and edited extensively. He was known to take his colleagues for a spin in his small aircraft during the day and return in time to teach his polymer course in the evening.

Much of today's widespread acceptance of polymers, their chemistry, and their engineering is the result of work by the Polymer Research Institute (PRI) of Polytechnic University. **Herman Mark**, a pioneer in the study of giant molecules, established the PRI in 1964. The institute brought together a number of polymer researchers to create the first academic facility in the United States devoted to the study and teaching of polymer science. Many scientists associated with the institute later went on to establish polymer programs at other universities and institutions, contributing significantly to the development and growth of what has become a vital branch of chemistry, engineering, and materials science. Under Mark's leadership, the institute became the premier U.S. destination for polymer chemistry, attracting students from all over the world. But its effect wasn't limited to simply establishing the importance of polymer chemistry and contributing many of its fundamental discoveries—like colonists, PRI alumni went on to found a number of polymer institutions at other locations.

The American Chemical Society (ACS) recognized the institute's pioneering efforts by designating it a National Historic Chemical Landmark. Such designations recognize important places, discoveries, and achievements in the history of chemistry. Other landmarks have included Joseph Priestley's Pennsylvania home, penicillin, and the National Institute of Standards and Technology. PRI holds a special place in ACS Past President **Eli M. Pearce**'s heart, as from 1982 to 1996 he served as its director. Pearce started at Polytechnic in 1973, had a joint appointment in the Departments of Chemistry and Chemical Engineering, and is currently a university research professor. Pearce is confident about PRI's future: "When you read the [National Research Council report 'Beyond the Molecular Frontier'], it's clear that the most exciting developments in science and technology are occurring at the interfaces. Over the years, considerable contributions were made to the engineering side of polymerization research and education."


*Acclaimed alumnus Dr. Joseph Jacobs with a blueprint for one of the many important projects in which he was a participant. In addition to establishing a Joseph J. and Violet J. Jacobs Chair in Chemical Engineering, in 2002 the university opened the Joseph J. and Violet J. Jacobs Building on campus. It houses a full gymnasium and athletic center as well as state-of-the-art laboratories and classrooms.*

Two other Poly engineering faculty who have made long-term contributions to the polymer-engineering field are **Chang Dae "Paul" Han**, a former department head (1974-82), and **Jovan Mijovic**, present department head. Han published widely in polymer and chemical engineering journals, and wrote two books: *Rheology in Polymer Processing* and *Multiphase Flow in Polymer Processing,* both published by Academic Press. Mijovic in the course of his illustrious career has published widely in polymer journals and supervised dozens of doctoral students in the study of polymeric materials properties and states, and more recently has been investigating complex chemical and biosystem dynamics, nanotechnology, and nano-materials. He has led the department into the chemical and biological engineering era while continuing his yeomanlike efforts as a dedicated, distinguished teacher and researcher. He's committed to maintaining Poly's tradition of excellence.

## THE ENVIRONMENTAL SCIENCE AND ENGINEERING CONNECTION

The Polytechnic has performed many research investigations concerned with the understanding of fluidized bed fundamentals. Fluidization is used widely in petroleum refining, power generation, and in the chemical industry. **Frederick Zenz** received his Ph.D. at Poly in 1961 and taught a graduate course throughout the '60s entitled "Fluidization," eventually writing and publishing the seminal work *Fluidization and Fluid Particle Systems* with Othmer.

In the early portion of his career, Poly's **Edward Ziegler** earned an international reputation for his research in fluidized bed transport and reaction engineering modeling. His heat transfer model is used in the design of fluidized bed coal combustors. Ziegler, along with former Poly professor **Rutton Patel** (now with ExxonMobil) supervised students in the fluid bed research area, and the two often became members of each other's guidance committees.

Later Ziegler's interests turned toward environmental applications and specifically air pollution engineering control. He has co-edited the 5th Edition of the *Pfafflin-Ziegler Encyclopedia of Environmental Science and Engineering*, published in January 2006, and authored a number of its articles. He started on the encyclopedia's first edition some three decades ago, together with his co-editor **James Pfafflin**—a former member of Poly's Department of Civil Engineering. Over his career Ziegler has taught more than 1,000 students in the undergraduate lab, and more than 800 graduate students, mainly in his Chemical Reactor Design and Air Pollution Engineering Control courses. He's been the thesis and project adviser to numerous master's and doctoral students as well as advising undergrads.

Starting in 1986 **Allan Myerson** headed the department and eventually became dean of the School of Chemical and Materials Science. Myerson encouraged interdisciplinary studies between the engineering and science departments. He also was active in crystallization and nucleation research and edited the *Handbook of Industrial Crystallization.*

## A 'WORLD CLASS' UNIT OPERATIONS LABORATORY, REVISITED

A major renovation of the chemical engineering lab took place in 2001, when **Walter P. Zurawsky**'s considerable transport phenomena knowledge, research experience at AT&T Labs, and equipment construction skills were put into play. Professor Ziegler had been teaching the lab for many years after his mentor Fred Schurig retired. With the help of the Othmer gift to the school, Zurawsky and Ziegler planned a student-friendly, state-of-the-art experimental teaching facility with new distillation columns, process control equipment, a

controlled fermenter, and membrane separations experiments. The new, highly automated distillation experiment is, by the way, currently used to investigate the efficiency of concentrating acetic acid (shades of Donald Othmer?) using sieve trays and packed columns. The senior CBE students perform 20 experiments in their final two semesters. Many of the scaled-down versions of traditional chemical engineering operations were retained and are still used to study classical theories and industrial correlations, but with modern instrumentation. A computation room was fitted with the latest PCs having Lab View, Microsoft, and MatLab software to help store, transmit, and analyze the data. The ASPEN Engineering Suite is available to all CBE students on their local network, primarily for use in the senior design courses.

## NEW PATH: CBE—PRESENT AND FUTURE

Over the past 40 years, chemical engineering curricula have embraced an engineering science paradigm that spans from molecular-level interactions and transformations to large-scale systems. Indeed, it is an appreciation of, and a willingness to work over, many decades of scale that is one of the distinguishing traits of the chemical engineering discipline. This ability to adapt to work on many scales has allowed chemical engineers to have productive interactions with a wide range of other science and engineering disciplines, and will be essential for the application of engineering principles to biologically based processes. The rising need to convert advances in biology into new processes and new industries makes it imperative that we adopt biology as an enabling science.

Interest in integrating biology and chemical engineering, or CBE, is growing nationwide. For example, the number of biologically oriented presentations at the AIChE annual meetings increased from less than 10% to close to 50% in only four years. Many chemical engineering departments across the country have changed names to reflect a growing interest in, and overlap with, biology (examples include Johns Hopkins, Cornell, the University of Pennsylvania, the University of Wisconsin-Madison, Northwestern, and RPI). Many such departments have started to require a biology course as part of their curriculum, but there are still very few that have made a full commitment to developing a curriculum in which biological systems and processes are fully integrated across the curriculum, as we are doing.

Several years ago the engineering faculty within our department reviewed and revised the chemical engineering curriculum to reflect what it felt was the emerging importance of biology. The specific aim was to develop an exemplary educational program (B.Sc.) in chemical and biological engineering that builds on the traditional strengths and paradigms of chemical engineering while embracing biology as a pillar along with mathematics, chemistry, and physics. So substantive are the changes that we, too, undertook a program name change from chemical engineering to chemical and biological engineering. The CBE program was initiated with the freshman class of 2003.

We firmly believe that chemical engineering principles can and must be applied to biological systems and to the development of new processes based on biology. The task we face in implementing this new curriculum is substantial, but we are eminently qualified and confident of the success of the proposed program.

The courses for our new CBE program are shown in Table 1 (next page). The program has been approved by the faculty of our department, by the faculty of Polytechnic University, and by the State of New York. By careful choice of electives and several course substitutions, CBE students can adjust their schedules to satisfy medical school requirements if they have an interest in pursuing medicine as a career.

The task we face is to meld, as seamlessly as possible, systems and processes of biological relevance into our engineering curriculum. We regard the systems-oriented, multiscale approach to problems that is the hallmark of chemical engineering as the primary strength we have to offer. We believe it is essential that our students remain strong in engineering. It is our further belief that by exposing our students to biology and bio-processes in addition to more conventional chemical processes, we will produce better, more versatile engineers.

As part of our new curriculum, we have introduced required courses in biology and biochemistry and are revising virtually all of our engineering courses to include biological applications and examples. Technical electives in the junior and senior year provide opportunities for elective courses, particularly new electives focusing on engineering in biology such as System Biology, Protein Engineering, and Drug Delivery. Although these new elective courses will be primarily aimed at CBE students, they will be open to other engineering and science students.

We are the only chemical and biological engineering program in New York City and we have seen phenomenal growth in our undergraduate enrollment over the past two years: from 41 undergraduates in 2004 to 110 in early 2006—a whopping 150% increase. The CBE program is acknowledged as the most demanding major on campus. A GPA of 2.5 is required to remain in the major (2.0 elsewhere) and the students' response has been hugely enthusiastic. We have had the highest percentage of students on the Dean's List and named as valedictorians in recent years.

## UNIQUE ATTRIBUTES OF THE POLYTECHNIC

Polytechnic provides an important educational opportunity for students who tend to be under represented in engineering. Given our downtown Brooklyn location, our student population has always included a large cross section of the population of Brooklyn and the other boroughs of New York City. As different ethnic groups have immigrated to the United States,

**TABLE 1**
**Chemical and Biological Engineering Curriculum**
**<www.poly.edu/cbe/undergrad/cbe>**

| | | | |
|---|---|---|---|
| **Freshman Fall** | | **Freshman Spring** | |
| MA1014 | Calculus I | MA1114 | Calculus II |
| CM1004 | Gen. Chemistry for Engineers | | Intro to Cell & Molecular Biology |
| EN1014 | Writing & Humanities I | CBE1214 | Intro to Chem & Bio Engineering |
| EG1004 | Intro Engineering & Design | EN1204 | Writing & Humanities II |
| **Sophomore Fall** | | **Sophomore Spring** | |
| MA2012 | Linear Algebra I | MA2112 | Multi-variable Calculus A |
| MA2132 | Ordinary Differential Equations | MA2122 | Multi-variable Calculus B |
| PH1004 | Introductory Physics I | PH2004 | Introductory Physics II |
| CBE2124 | Analysis of Chem & Bio Processes | CS1114 | Intro to Prog. & Problem Solving |
| CM2234 | Industrial Organic Chemistry | CM2514 | Chemical & Biological Equilibria |
| **Junior Fall** | | **Junior Spring** | |
| CM3314 | Biochemistry I | CBE3324 | Chem & Bio Separations |
| CBE3103 | Math Methods for Chem & Bio Eng. | CBE3214 | Chem & Bio Reactor Engineering |
| CBE3314 | Physical Rate Processes | | Technical Elective |
| HI2104 | Modern World History | | HU/SS Elective |
| CBE3622 | Chem & Bio Eng. Thermodynamics | | |
| **Senior Fall** | | **Senior Spring** | |
| CBE4113 | Engineering Laboratory I | CBE4123 | Engineering Laboratory II |
| CBE4413 | Process Dynamics & Control | CBE4623 | Chem & Bio Process Design II |
| CBE4613 | Chem & Bio Process Design I | CBE4713 | Engineering Polymeric Materials |
| | HU/SS Elective | | Engineering Elective |
| | Technical Elective | | HU/SS Elective |

Poly's student population has changed, always mirroring the ethnic mix of the city.

In addition to the ethnic diversity that is part of Polytechnic, we are proud to note that over the past decade nearly 50% of the students who have graduated from our chemical engineering program are female. We fully expect that this trend will continue with our new program in chemical and biological engineering. Although there have been advances nationwide, women are still grossly underrepresented in engineering.

**TABLE 2**
**Student Family Incomes: Polytechnic and the State University of New York**

| Annual Income | < $20k | $20k to $80k | > $80k |
|---|---|---|---|
| Polytechnic | 28.4% | 51.6% | 20% |
| SUNY | 13.0% | 31.0% | 56% |

Polytechnic is a private university, but our role in the New York region is, de facto, one that would be expected of a public university. As shown in Table 2, we educate a much greater percentage of students from lower-income households than the state university system does. *Washington Monthly* ranked Polytechnic University second in the nation (out of 245 national universities) in social mobility.

Our location in New York provides us with exceptional opportunities. We are in a region with many excellent biomedical institutions including Rockefeller University, Memorial Sloan-Kettering Cancer Institute, SUNY Downstate Medical Center, and Albert Einstein College of Medicine, to mention a few. Adding to the list, a new $700 million science park on the grounds of Bellevue (just across the East River in Manhattan) was announced on the front page of *The New York Times* a few weeks ago. The focus of this new East River Science Park will be the biotechnology industry. The facility is being developed by Alexandria Real Estate Equities, Inc.—whose chairman of the board, **Dr. Jerry Sudarsky**, is a Polytechnic alumnus and a member of the Board of Trustees of Polytechnic. These excellent medical institutions and the new science park will provide our graduates with avenues for continued education, opportunities for collaboration, and potential employment.


*Modern buildings on campus include Dibner Library on Metrotech Commons, far left, and the Othmer Dormitory, left.*

*Edward Ziegler*

## CURRENT FACULTY

The explosive potential of CBE has been recognized by the Polytechnic trustees, our new president, **Jerry MacArthur Hultin**, and the members of the administration. These pivotal individuals have made a major commitment to our department's continuing growth. Three years ago, **Jose M. Pinto** joined our faculty from the University of Sao Paulo in Brazil. Pinto received his Ph.D. from Carnegie-Mellon and is interested in modeling and optimization of chemical and biological processes and systems biology. In fall 2004, **Stavroula Sofou** joined the faculty. Sofou received her Ph.D. from Columbia University in New York City and spent three years as a post-doc at the Memorial Sloan-Kettering Cancer Research Center. Her principal interest focuses on the use of engineering principles for drug delivery for cancer cure.

*Jovan Mijovic*

*Jose Pinto*

*Stavroula Sofou*

We announced two additional faculty positions in fall 2006. **Rasti Levicky**, formerly of Columbia University, was named the Donald F. Othmer Assistant Professor of Chemical and Biological Engineering. Levicky received his Ph.D. from the University of Minnesota and has a strong interest in the field of biological polyelectrolyte systems, nanosized micro array biosensors, and bio-diagnostics. Jin Ryoun Kim is the Joseph J. and Violet J. Jacobs Assistant Professor of Chemical and Biological Engineering. He got his Ph.D. from the University of Wisconsin at Madison. His interest is in the area of protein engineering and particularly those that aggregate and cause Parkinson's and Alzheimer's diseases.

*Jin Ryoun Kim*

*Rasti Levicky*

Finally, we are very proud to announce that on Jan. 1, 2006, our department was officially renamed The Othmer-Jacobs Department of Chemical and Biological Engineering, in recognition of enormous contributions to our discipline made by these two chemical engineering giants. Visit our Web site: <http://www.poly.edu/cbe>.

*Leonard Stiel*

## ACKNOWLEDGMENTS

For practical reasons, this article mentions only a few of the people that are part of the history of chemical engineering at the Polytechnic. We would like to acknowledge those dedicated present and former professors, students and alumni, and their supporters, without whom Polytech would never have attained its successful international reputation.

We thank our colleagues in the department for their help writing this article, and greatly appreciate the efforts of **Christopher Hayes**. ❐

*Walter Zurawsky*