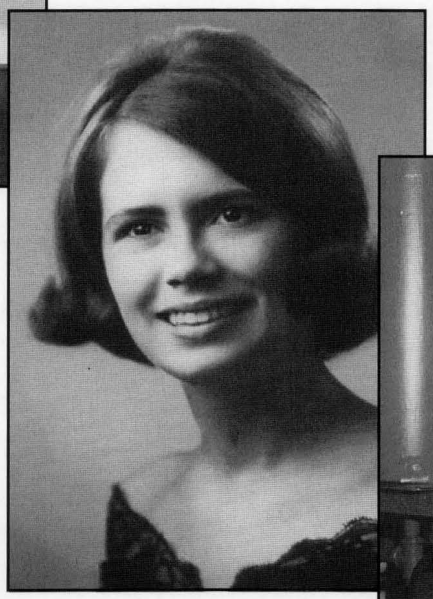
# HELEN C. HOLLEIN

## of Manhattan College



***Connie's evolution from ballerina through high school dreamer to college professor.***

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In 1982, *The Quadrangle* (Manhattan College's student newspaper) published an article proclaiming, "Engineering Goes Co-ed." It heralded the arrival of three women faculty members to the School of Engineering, one of whom is the subject of this paper. The college had become coeducational and had admitted women students nine years earlier (a few women engineers graduated from Manhattan prior to 1973 through a cooperative program with neighboring College of Mount Saint Vincent).

Helen Conway Hollein, or Connie as she is known to her friends, family, and colleagues, joined the chemical engineering faculty at MC in 1982 and has since become a role model for female engineering students at Manhattan College as well as for other women across the country. She is currently Professor of Chemical Engineering, Chair of the ChE Department, Director of the Interdisciplinary Biotechnology Program, and one of four women who teach engineering at MC. She is also a licensed professional engineer in New Jersey. Connie was MC's first woman engineer to be promoted to associate professor in 1988 and to professor in 1994. In 1989, she became the first woman at Manhattan to head an engineering department (she is one of only four women who currently chair U.S. ChE departments).

### THE MANHATTAN YEARS

Teaching at Manhattan College means developing a research program with the help of undergraduate students plus an occasional master's student, while teaching three to four classes each semester. Connie says that the best advice she received as a new faculty member dealing with these challenges was "to land on your feet and running." In her first year at Manhattan she did just that, with an Excellence in Teaching Award from the Tau Beta Pi student chapter and an NSF grant from the Engineering Research Initiation Program. The chemical engineering seniors seconded her teaching award with a "Rookie of the Year" award at our annual chemical engineering banquet. Rumor has it that the seniors used to go to the local "watering hole" for "Connie's keg" after process

***As to her philosophy of teaching, Connie says that the most important qualities in teaching are to be organized, to know your material, to respect your students, and to grade fairly.***

control exams. Some students referred to her as the "female Famularo,"—a double-edged compliment since Jack Famularo had a reputation as a great teacher but a really tough so-and-so.

In subsequent years, Connie was recognized with teaching awards from the students in 1986 and again in 1989, and in 1987 she received a Trustees Award from Manhattan College as the outstanding engineering faculty member. This award honored her teaching and scholarly activities, which included external funding of approximately $450,000 for her first five years at the College. She also received national recognition with a Ralph R. Teetor Educational Award from the Society of Automotive Engineers in 1984.

Connie is a popular teacher, and her teaching evaluations are always outstanding. Her favorite courses to teach are "anything during the senior year," including the senior laboratory courses, biochemical engineering, transport phenomena, advanced mass transfer, process control, and polymer engineering. She has also taught a graduate-level biochemical engineering course, the introductory mass transfer course (junior year), and engineering materials lecture and laboratory courses (sophomore year).

As to her philosophy of teaching, Connie says that the most important qualities in teaching are to be organized, to know your material, to respect your students, and to grade fairly. She gives students the rules on their first day, *e.g.,* what material will be covered, how grades will be determined, when major assignments are due, what are the late penalties, and what is the material's value to their engineering future. To make the subject matter more relevant, she supplements the text with current literature, such as issues of chemical engineering journals on process control or articles from news magazines on biotechnology. Connie says, "Joe Reynolds hired me and impressed upon me the importance that the College places on teaching and research. He is our top-rated teacher and publishes with Louis Theodore on environmental management." When she asked Br. Conrad Burris, FSC (former ChE Department Chair and Dean Emeritus of Engineering) about grading practices at Manhattan, he told her, "Teachers don't fail students, they fail themselves."

After completing her dissertation on "Separation of Proteins via pH Parametric Pumping with Electric Field," Connie published several papers related to that body of research in addition to writing a handbook chapter on parametric pumping. At MC, she chose to focus on biological separations instead of continuing as a parametric pumper. She received NSF and NIH grants to work on protein separations using ion exchange chromatography and a grant from the New York State Science and Technology Foundation to study commercial applications of high performance liquid chromatography for bioseparations. She also received an NSF grant under the

***The 1984 Manhattan College faculty. Standing (left to right) are Jamie Chua, Joseph Reynolds, Paul Marnell, Br. Conrad Burris, Jack Famularo, Stewart Slater, Connie Hollein, and Fred Zenz. Connie's husband, Leo, is seated with the other spouses.***

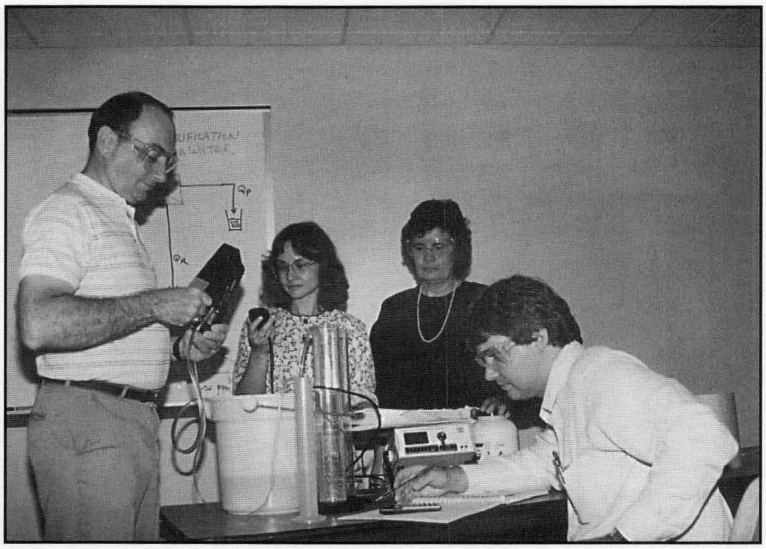
Instrumentation and Laboratory Improvement Program to develop a biochemical engineering laboratory. Each year, she involves two or three students in her research and laboratory development efforts, and many of her students are coauthors of papers and presentations.

When I came to Manhattan College in 1983, Connie and I began a collaborative effort in research and laboratory development that has been mutually beneficial. My research expertise is in the area of membrane separation processes, so we agreed to work on several joint projects involving use of membrane processes for biological separations. Our joint efforts include projects on purification and concentration of proteins and enzymes using several ultrafiltration systems and cell harvesting studies using microfiltration. I worked with her to develop the biochemical engineering laboratory, helping with downstream separation experiments while she focused on fermentation experiments. We also worked together on several NSF grants to develop an advanced separation process laboratory for our students and to conduct an NSF-sponsored workshop on membrane separation processes for chemical engineering faculty.

When Br. Burris retired from full-time teaching in 1989, Connie was the unanimous choice of the ChE faculty to succeed him as Department Chair. She had already proved her administrative talents as chair of the Fischbach Lecture Series, chair of the School of Engineering Curriculum Committee, president of the Manhattan College Chapter of Sigma Xi, and vice chairman of the Council for Faculty Affairs. In addition, she had served as a key player in a 1989 team effort that resulted in New York State approval to

grant an interdisciplinary master's degree in biotechnology. Development of the new program was both a curricular challenge and a nightmare of campus politics because it involved three departments (biology, chemistry, and chemical engineering) and the science departments are cooperative ventures between Manhattan College and the College of Mount Saint Vincent.

Her first task as departmental administrator was to lead us through a successful ABET accreditation in 1990. When asked what she likes most about being chairperson, Connie says it is the fact that her second and final term will end in 1997. She is looking forward to spending more time on her true loves of teaching and undergraduate research. She finds that her greatest job satisfaction comes from seeing students who worked on her biochemical engineering projects succeed in the food, pharmaceutical, and biotech industries.



***Ralph Buonopane, Nilufer Dural, Connie Hollein, and John Wiencek (left to right) operate a hand-held reverse osmosis experiment during an NSF-sponsored Undergraduate Faculty Enhancement Workshop at Manhattan College (1991).***

Connie is active in ASEE and AIChE and has presented papers and chaired sessions in both organizations. She has served as a director of ASEE's Chemical Engineering Division, and as Secretary-Treasurer and newsletter editor of the Women in Engineering Division. She is also active in the Division of Experimentation and Laboratory-Oriented Studies. She previously served as chairman of AIChE's Group 4, Education, and is currently a member of the Admissions Committee. Connie is a senior member of the Society of Women Engineers and served as moderator of MC's student section from 1984 to 1988. Under her leadership, the section inaugurated our annual "Engineering Awareness Day" (a high school outreach program) in 1986 and won two national awards: the Corning Glass Works Career Guidance Award in 1987, and an Outstanding Activities Award in 1988. She has also served on a number of NSF review panels.

## THE EARLY YEARS

Connie was born in Fort Bragg, North Carolina, to Lt. Arthur Conway Faris and his wife Helen, and is the oldest of five children, all seventh-generation Americans of Scotch-English descent. Ancestors of all four grandparents fought in the Continental Army during the Revolutionary War. Her Faris ancestors immigrated from Scotland to Ireland during the religious persecutions of 1680-1683, and from Ireland to West Virginia in 1763. Her other paternal ancestors, the Houstons, immigrated from Scotland to Virginia in 1652. Her maternal ancestors were early English settlers, one branch settling in the Massachusetts Bay Colony around 1630 and the other arriving in the colonies in the early 1700s.

With the exception of a short period between wars (1947 to 1951) when she lived on a farm near Maryville, Missouri, Connie and her family moved from one army base to another as her father progressed through the ranks to colonel. She did all of the typical "girl things," such as taking dance and piano lessons, and she advanced to Curved Bar in scouting (highest rank in the Girl Scouts). She attended a total of fourteen different schools prior to graduating from Douglas MacArthur High School in San Antonio, Texas, in 1961.

Her father maintained his permanent military residence in South Carolina, so Connie took advantage of in-state tuition costs and enrolled at the University of South Carolina after graduating from high school. She started college as a double major in chemistry and mathematics. In the 1960s, engineering students at Carolina were required to complete one-year courses in calculus, chemistry, and physics before becoming eligible to enroll in the College of Engineering. At the end of her freshman year, when her male counterparts were applying for admission to engineering, some of them told her that since she had the requisite grades, she should also apply.

Connie remembers, "I had asked my father about studying engineering (before entering college), but he told me that it was a man's field. So I made an appointment with the dean of engineering and asked him if girls were allowed to study engineering. He laughed and said that there weren't any regulations against it, but he was somewhat skeptical about my chances to graduate." Three years later, Connie became the first female chemical engineer to graduate from USC and was only their third woman engineering graduate (less than 0.1% of the engineering graduates at that time were women).

Connie's high school and college yearbooks reveal that her administrative talents surfaced at an early age. In high school she was business manager of the yearbook and president of the Pep Club, while in college she was president of the AIChE student chapter, corresponding secretary

of the AIChE Southern Regional Student Conference, and a member of Alpha Order, USC's honor society for women leaders. Her innate talents as a teacher must also have been evident, even in high school, because the senior prophesy foretold that she would become a high school math teacher in New England.

During her junior year as USC, Connie qualified for membership in Tau Beta Pi, but discovered, to her astonishment, that the national engineering honor society did not admit women. She received a Woman's Badge from the society in 1964, an honor that some women refused because they wanted equal recognition or none at all. Tau Beta Pi initiated the first women in 1969, becoming one of the last honor societies to do so. Wearers of the Woman's Badge were offered full membership at that time, and Connie was one of 97 women (out of total of 619) who accepted the offer.

In the 1960s, girls had to wear skirts to class, which presented a problem when it came time to take the unit operations laboratory course in a two-story facility with open grates between the first and second floors. After lobbying at every possible level, Connie finally got permission from the president of the university to wear pants in the laboratory. Permission included the condition that she leave and reenter the dormitory in skirts. These incidents at USC, plus the notoriety resulting from three newspaper interviews and several television news reports, made Connie realize that her choice of major was a bit unusual.

***The Holleins—Kathy, Mike, Connie, Mary, and Leo—at Mary's 1988 graduation from the University of Pennsylvania.***

Connie's first exposure to research occurred during the summer between her second and third years at USC when she worked on an NSF undergraduate research grant supervised by Milton Davis. This was followed a year later by her senior thesis under the direction of Joseph Gibbons (currently Associate Dean of Engineering at USC). She also gained engineering experience with summer internships at Cardinal Chemical Company in South Carolina and the U.S. Navy in Washington, DC.

As graduation approached, Connie's professors encouraged her to apply to graduate school, but she decided to accept an engineering position with Exxon Research and Engineering Company in Florham Park, New Jersey. She liked the idea of working at the Exxon site, where she would be their fourth woman engineer, instead of working for some other companies which interviewed her where she would be the first. Also, the women in the northern states were stereotyped as being more assertive or liberated than "southern belles," so she felt that New Jersey would be a more supportive environment for a female professional.

At Exxon, Connie met her future husband, Leo Hollein. They were married and in due time became the proud parents of three children. Their oldest daughter, Mary, followed in her mother's footsteps and is currently a senior engineer at Exxon, having previously worked as a nuclear engineer at the Savannah River Plant in South Carolina. Mary earned a bachelor's degree in mechanical engineering from the University of Pennsylvania and a master's degree in chemical engineering from Manhattan College. Their second child, Kathleen, completed a baccalaureate degree in sociology at Jersey City State College, and an associate degree in early childhood education at Teikyo Post University. Their son, Michael, is a student at the University of Colorado, where he is majoring in skiing and minoring in chemical engineering.

During her two years at Exxon, Connie worked on a number of projects in the Chemicals Division. After Title VII passed into law, she became the first woman engineer at ER&E to go on a field assignment. This assignment was associated with a project aimed at improving product quality in the isophorone/dihydroisophorone distillation unit at Bayway Refinery (Bayway, New Jersey). Connie had previously worked on a p-xylene licensing proposal that would have resulted in a three-month field assignment at a pilot facility in Connecticut, but a male colleague went on that assignment because women simply did not work in chemical plants in those days. Some thirty years later, her daughter goes on short trips to refineries in Canada, England, Greece, and the U.S. on a routine basis and is looking forward to a three-year assignment at Fawley Refinery in England.

While she was expecting her first child in 1967, Connie agonized over the problems of balancing engineering with family life and decided to change professions. It was clear that to advance in her career at Exxon, she would have to travel much as her daughter does today, and she didn't see how that would be possible with young children. She completed the required educational credits for secondary certification in physical sciences and mathematics at Fairleigh Dickinson University and found a position teaching chemistry and physics at Livingston High School in suburban New Jersey. In the next two years, she discovered that she truly loved teaching.

In 1969, Connie resigned from her teaching position to

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## EDUCATOR: Helen Hollein

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accompany her husband on an assignment to Argentina. The period from 1969 to 1976 included relocations to England, Singapore, and Belgium, plus the birth of her other two children. Connie says that her favorite assignment was Singapore, where she substituted as a mathematics teacher at the American high school and enjoyed the local culture in her spare time.

### GRADUATE STUDIES

By 1976, Leo had advanced to a stage in his career where the overseas assignments could be expected to be fewer in number, so Connie bought a calculator and blue jeans and went back to school. Her initial goal was to earn a master's degree so that she could teach chemistry in a junior college, but she later decided to stay at New Jersey Institute of Technology and complete her doctoral degree in chemical engineering. The next six years were not easy, but she got through them with the help of her husband who was involved in shared parenting long before the Yuppies made it popular. Leo remembers the worst semester as the fall term of 1978 when Connie had classes four nights a week and he was the primary caretaker for their three children.

When she started work on her master's thesis in 1977, Connie decided to work on a molecular spectroscopy project with William Snyder. The project was not associated with any grants and she was working alone, which was perfect at the time because she had young children (ages 3, 7, and 10) and needed a flexible research schedule. She completed her thesis and published two papers with Dr. Snyder. She also taught physical chemistry and general chemistry during her stint at NJIT.

For her doctoral research, Connie chose to work for Hung-Tsung Chen in a more high-pressure environment. He had NSF-funded research projects on polymerization and parametric pumping and offered her a new project where the idea was to modify an electrophoresis column for separation of proteins via parametric pumping. She joined a research group of close to thirty students, most of them from Taiwan, and the faculty at NJIT teasingly observed that she "had joined the Chinese Army." She also started telling people that her name was Helen because "Hai Lin" sounded much better in Chinese than Connie. For the next three years, Connie's morning greeting when she entered the lab was, "Speak English!" Her fellow researchers usually cooperated.

Connie profited from Dr. Chen's mentorship in many of the traditional ways. He invited senior people in their field, like Phil Wankat, Norm Sweed, and Frank Hill, to give seminars at NJIT, introduced all of the students, and invited the senior students to dinner with the speakers. Doctoral candidates also edited papers prior to publication, and helped prepare NSF proposals and reports. Dr. Chen was a prolific publisher, and took his senior doctoral students with him to AIChE meetings to present their work. The first paper on her doctoral research was presented at the 2nd World Congress of Chemical Engineering in 1981.

Connie had completed most of her research by the spring of 1981 and was coauthor on several papers with her advisor before he was killed in an automobile accident in 1981. She feels she was fortunate in that a key paper on her research was completed the day before he died and it was later accepted for publication in *I&EC Fundamentals.* This proved that her work was publishable so that she could complete her parametric pumping research and graduate instead of starting on a new topic with another advisor. Thus, her dissertation was completed in 1982 with Ching-Rong Huang as her advisor and Frank Hill as an external consultant.

### WOMEN'S ISSUES

Connie frequently gives lectures to women's groups and female high school students. In 1989 she spoke about women's issues as part of a panel at an Electro-89 convention in New York's Javits Convention Center. The panel discussions were quoted in *The New York Times* and *The Chicago Tribune* (April 1989) under the title "Difficulties for Women Engineers." She is quoted as saying, "Things haven't changed that much for women in engineering in recent years." She also said that it is still difficult for women engineers who have children and advised young women not to take seven years off the job as she had done. She reports that, "After that article was printed, one of our female graduates called me to dispute my comments. She had recently resigned from an engineering position to stay home with her son, and assumed it would be easy to find another position when the time came to do so."

Connie says, "Conditions have improved for women engineers in industry and academia in the last thirty years, but it is still difficult for young women to balance a career with family life. Many women professionals postpone having children until they are settled in their careers, or even indefinitely. One of our female graduates recently left engineering to teach high school so that she could have more time for her family, and several others have called me because they are considering similar moves. Women are allowed to work in plant environments in the U.S. and other English-speaking countries, but another ChE alumna was recently denied a plant assignment in Italy because the affiliate would not accept a woman engineer. Since our undergraduate classes [in chemical engineering] are close to 50% women, our women engineers are clueless to problems of this type until they go to work in the "real world." ❐