The Engage Program at The University of Tennessee

Professor Fred Weber of the Chemical Engineering Department is very involved in the implementation of the Engage program here at UT. This innovative new freshman engineering initiative has been fully implemented. This is a comprehensive approach to meeting the educational and developmental needs of our freshmen. It is an integrated approach to the freshman curriculum, with a six-semester hour fall course emphasizing problem-solving, teamwork, design concepts and computer tools (engineering graphics and computer programming), all based around the study of non-calculus based physics. The spring semester consists of another six-semester hour course integrating statics and dynamics, while assuming and using mastery of the material from the fall semester. Details of this program may be found in a paper by Gilliam et al.

The program includes many different forms of learning opportunities to help accommodate the students’ different learning styles. Concepts are first presented in a traditional lecture. Then a hands-on laboratory “physical homework” experience develops student ownership of the concept. This is followed by a recitation-style working session where students learn computer tools by solving problems using the concepts. Homework assignments are used to provide practice in the concepts and the computer tools. The material is integrated around “design, build, and test” team projects, which range from chairs to rubber-band powered vehicles to egg-launching catapults. These team activities introduce students to engineering design and allow them to experience the same decision-making processes as practicing engineers.

Among the noteworthy curriculum features of Engage is a team facilitation course where engineering upperclassmen are trained in team facilitation techniques and placed as coaches with freshman design teams; and the consolidation of freshman coursework facilities, faculty and staff offices and support facilities in an Engineering Freshman Village.

The Engage program was piloted with 60 students during the 1997-98 academic year followed by a transition year with 150 students. Full implementation (464 students) began Fall 1999.

The Engage program has succeeded in improving the three semester retention rates in the College of Engineering and the university in general. The students progress through the engineering curriculum more rapidly, enter their major departments sooner and perform better in the departments. They generally are better prepared to succeed academically.

This study also suggests that in order to continue the retention of students once they enter a department, similar curriculum changes are necessary in departmental courses.
Notes from the Department Head

Staffing changes and curriculum alterations have been occurring since the last newsletter. Elsewhere in this newsletter, you will note articles about the retirements of two long time members of the department, both having been in the department for more than 40 years. Dr. John Prados, Professor and Vice President Emeritus, retired at the end of June and Raymond Bellamy retired at the end of May. Both will be missed, they are members of our “family” and close friends. Fortunately both have agreed to participate in post-retirement fashion, Raymond by continuing his expertise in the mechanical shop and John in the broad sense of a “classroom.” John is going to take the lead in developing web-based versions of our sophomore level courses starting with ChE 200, Engineering Fundamentals. Our goal in this effort is to enable transfer students to arrive with the entire sophomore year accomplished and to ease some student scheduling problems. An endowment in Dr. Prados’ honor has been created and you are encouraged to contribute to it or any other effort related to the department. Dr. Prados is going to help us decide what specific area(s) to which his endowment should be dedicated. More information about the endowment will be available at a later date.

As indicated in an earlier newsletter, Dr. George Frazier retired a year ago and Dr. Brian Edwards was hired and started in the department in January, 2001. Dr. Edwards is highlighted elsewhere in this newsletter.

One of the other undergraduate curricular changes we are exploring is an alternative to the traditional senior level ChE 410, Chemical Engineering Laboratory II. Last spring we allowed five student groups (4-6 students each) to conduct a semester-long, in-depth project under the supervision of a ChE faculty member instead of in the normal rotation of Unit Operations experiments. The faculty and students all felt the trial run was successful and we intend to continue it and expand the opportunities. There was a competition judged by the faculty and by the students in the final presentations. The top two groups selected presented their work to the local section of AIChE, which then selected the first and second place groups. Although the voting in each instance was close, the group advised by Dr. Fred Weber using Lego Mindsprings robotic control equipment on a greenhouse and a tank was selected as first place. Second place went to the group advised by Dr. John Collier that did experimental work at the Textile and Nonwovens Development Center (TANDEC) of the University on industrial scale nonwoven formation equipment. One of the two other groups was advised by Dr. Paul Frymier on conversion of batch pharmaceutical intermediates biochemical processes to continuous operation, and the other, advised by Dr. Duane Bruns, worked on instrumentation of the distillation column.

On the graduate level we have changed our core courses for a M.S. to consist of five required courses without the options in different categories we had previously required. We are still requiring ChE 531, Advanced Chemical Engineering Thermodynamics, although it is being revised. Both ChE 551, Chemical Reactor Analysis, and ChE 505, Engineering Analysis are required of all students instead of being part of the options. Two transport phenomena courses, based upon the second edition of Bird, Stewart and Lightfoot (due to be published this summer) are now required.

Please keep us in mind and let us know your current employment, addresses and phone numbers and any news you would like to share. Please be as specific in any donations you make; i.e., please specify the ChE department, and if you want to have your contribution added to the Prados endowment account, please so indicate.
Design Internship in Industrial Pollution Prevention  (ChE 488)

Four design teams, involving 16 undergraduate students, completed projects during spring semester 2001. The corporate sponsors were DuPont and Eastman Chemicals. All design teams were involved in conceptual design investigations. This is an honors course that may be substituted for ChE 490 (Process Design and Economic Analysis). This spring projects were (1) quality improvement in nylon salt production with industrial advisors, Chris Bialkowski and Rita W. Heckrotte of the DuPont Chattanooga Plant; (2) utilization of sludge from biological wastewater treatment operations using the Nitric-Hydrolysis process, with industrial advisor Dr. Charles J. Perilloux of the DuPont Sabine River Laboratory; (3) waste recovery from cyclohexanedicarboxylic acid manufacturing with industrial advisor Kevin Ship and Beth Alderson of Eastman Chemicals; and (4) waste utilization from TPA manufacturing, with industrial advisors Mark Williams, Tom Tidwell and Beth Alderson of Eastman Chemicals. All projects were culminated in a presentation to the industrial sponsor and the preparation of a reviewed final report. Academic advisors were Paul R. Bienkowski, R. M. Counce and J. M. Holmes (Emeritus).

Liaison with DuPont is provided by Ronald A. Reimer of the Sabine River Laboratory and Rita W. Heckrotte of the Chattanooga Plant. Liaison with Eastman Chemicals is provided by Beth Alderson. Project advisors and student team members are presented below.

Advisors

<table>
<thead>
<tr>
<th>Sponsors</th>
<th>Industrial</th>
<th>Academic</th>
<th>Team Members</th>
</tr>
</thead>
</table>
| DuPont, Chattanooga Plant | Chris Bialkowski  
Rita W. Heckrotte | R.M. Counce        | Brian Bohanon  
John Cooper  
Jacob Noe  
Russell Warford |
| DuPont, Sabine River Lab | Charles J. Perilloux | P.R. Bienkowski    | John Corn  
Trish Fox  
Whitney Durham  
James McDavid |
| Eastman Chemicals     | Kevin Ship  
Beth Alderson | R.M. Counce        | Clifton Arbogast  
Katie Cobbs  
Jana Brown  
Andy Stewart |
| Eastman Chemicals     | Beth Alderson  
Mark Williams  
Tom Tidwell | J.M. Holmes        | Chin-Yen Chan  
Ed Hicks  
Spencer Oulman  
Andy Ume-Nwagbo |
Department Update

News on Faculty, Staff and Students

GRADUATES

Summer 2000

B.S.
Amy M. Akard
Andrew W. Blankenship
Lindsey M. Clark
Shronda D. Herman
Jawanza Y. Jones
Benjamin C. McIntosh

M.S.
Kenneth R. Givens
Lawrence C. Lasher
Parag D. Patil
Anthony W. Rowe
Sachin U. Sarnobat
Kevin E. Trembath

Fall 2000

B.S.
Gordon L. Bordelon
Michelle B. Kirsch
Daniel S. Mock
Robert J. Wicker

M.S.
Heather L. McNabb

Spring 2001

B.S.
Michael Anderson Jr.
Clifton W. Arbogast
Brian K. Bohanon
Janalyn R. Brown
Chin-Yen Chan
Yu Kien Chua
Susan K. Cobbs
Keri J. Cochran
John T. Cooper
Adia M. Delaney
Brice M. Dougherty
Whitney A. Durham
Nadia D. Ellison
Letitia M. Fox
Matthew G. Gallaher
Donald E. Hicks
Gary M. King
Joh C. Macomber
James A. McDavid
Jeffrey S. Miovech
Jacob A. Noe
Spencer T. Oulman
Eric S. Peppenhurst
Ronnie L. Pickering Jr.
Andrew B. Stewart
Garrick D. Taylor
Ndubis Ome-Nwagbo
Russell O. Warford
Bradley W. White
Courtney G. Woods

M.S.
John H. Hubbard
Larry W. Perkins
Puneet Yadav

STUDENT AWARDS

Brian Bohanon ------------ AIChe Outstanding Junior Award
Khoa Hoang ---------- DOW Chemical Outstanding Junior Award
Brian Bohanon ------- AIChe Baccalaureate Award (Top Senior)
Whitney Durham --------- ACS Outstanding Senior Award
Nathaniel Fout ------- Alpha Chi Sigma Albert Cooper Award
James McDavid -------- AIChe Departmental Service Award
Andrew Stewart ---------------- Kenneth Elliott Scholarship
Lacey Hanson --------------- Kenneth Elliott Scholarship
Jerry Smith ---------------- Kenneth Elliott Scholarship
Jonathan Rawlston ------- Kenneth Elliott Scholarship
Joseph Minutolo ------------- Kenneth Elliott Scholarship
Brock Thomas -------- Kimberly Clark Outstanding Junior Award
Jacob Noe ----------------- Departmental Outstanding Senior

John Prados was chosen as the Outstanding Teacher in the department of Chemical Engineering for the year 2000-2001.

David Keffer was chosen to receive the Outstanding Advisor Award in the department of Chemical Engineering for the 2000-2001 year.

Pete Counce presented a paper entitled “Sustainable Development in Future Process Design Education” at the Mudd Design Workshop III: Social Dimensions of Engineering Design. The paper is co-authored by John M. Holmes (Professor Emeritus), Ronald M. Reimer, Rita Heckrotte, Beth Alderson, Sharon M. Robinson. The conference was held May 17-19 at Harvey Mudd College in Claremont, CA.

John Prados presented the invited keynote address at a retreat dealing with implementation of ABET Engineering Criteria 2000 for faculty of the University of Puerto Rico at Mayagüez in Mayaguez, Puerto Rico on November 3, 2000. The retreat was sponsored by the Raytheon and Microsoft Corporations.
The coming of World War II temporarily slowed development of the fledging chemical engineering programs at The University of Tennessee and Vanderbilt, but provided a source of profound influence on both of these programs, as well as that to be developed in a few years at the Tennessee Polytechnic Institute; this was the establishment of the Atomic Energy Commission facilities in Oak Ridge. The Oak Ridge facilities, operated first by the Du Pont and Monsanto companies and then for many years by the Union Carbide Corporation (initially as the Carbide and Carbon Chemicals Corporation), employed large numbers of chemical engineers in research, development, and production operations involving uranium enrichment, nuclear fuel fabrication and reprocessing, radioactive waste disposal and a host of related areas. These activities provided:

1. A job market for significant numbers of chemical engineering graduates, including those with masters and doctoral degrees;
2. Opportunities for consulting and summer research work for chemical engineering faculty members;
3. A source of contract research support for chemical engineering faculty and graduate students;
4. A supply of well qualified adjunct faculty; in the early 1960s, under Ford Foundation sponsorship, a number of Oak Ridge scientific and engineering staff members received regular part-time faculty appointments in appropriate departments at The University of Tennessee, including chemical engineering. One of these was Dr. J. J. Perona, who later joined the chemical engineering faculty full-time, and in 1984 became the third individual to head The University of Tennessee Chemical Engineering Department in its history;
5. A source of part-time graduate students that could take evening, early morning, or Saturday courses on the Knoxville campus and in Oak Ridge. Some of these could carry out thesis or dissertation projects as part of their Oak Ridge employment, and a few were able to obtain leave from their employer to engage in one- to two-year periods of full-time study on the university campus.

The establishment of the Oak Ridge operations, along with the general post-war development of the U.S. chemical industry, increased the demand for chemical engineering graduates with advanced degrees. In 1949 The University of Tennessee College of Engineering proposed to the Graduate School the establishment of a Ph.D. program in chemical engineering and in metallurgy. The proposal was approved by the University’s Board of Trustees in 1952, and in that same year, Frank S. Chance received a Ph.D. with a major in chemical engineering, the first doctoral degree in engineering conferred in the state of Tennessee. Dr. Chance was employed by the Pfizer Corporation for a number of years and is now retired. It is also worth noting that the first Ph.D. awarded by The University of Tennessee at the Knoxville campus in the 20th Century was in chemistry in 1949 to John F. Fuzek, who had received his bachelor’s degree in chemical engineering from the University in 1943 and who has only recently retired from his position as a research chemist with the Tennessee Eastman Corporation in Kingsport, Tennessee.

The development and implementation of the UT chemical engineering program continued on page 6.
**Alumni Updates**

**Donald B. Bivens** (PhD/ChE ’62) received the 1999 Air Conditioning and Refrigeration Institute Schulze Award for distinguished service to the industry. He joined the DuPont Company in 1966 after receiving a Ph.D. in ChE from Georgia Tech. He is now senior technology fellow in DuPont Fluoroproducts, Wilmington, DE.

**Douglas Crawford** (PhD/ChE ’90) reports that he and his family are enjoying life in Delaware. Doug is with Ciba Specialty Chemicals.

**Hafed Belhadj** (BS/ChE ’88) has been appointed plant manager for the GE industrial breakers business in France. He will be responsible for all manufacturing and sales operations of IEC industrial breakers throughout Europe, Asia and Latin America. Hafed has relocated to France from Barcelona, Spain, where he was GE Industrial Systems Division Due Diligence Manager for Europe and Asia.

**Bill Lawrence** (BS/ChE ’98) of 3M Corporation transferred to the Decatur, AL, facilities. He will be working with polyester coextrusion technology making multilayer optical films.

**Jill Taylor** (BS/ChE ) writes to say she has decided upon another career path and is back in school studying law at the South Texas College of Law in Houston. She plans to concentrate on Intellectual Property and Technology Law.

**Jennifer Herrmann** (BS/ChE ’99) is with Air Solutions, Inc. in Chicago, IL. The company performs air pollution consulting throughout the world calculating emissions from process equipment and then working directly with local, state and national environmental government arms to assure that the necessary laws are being followed.

**Oscar L. Martin** (MS/ChE ’96) recently completed his MBA degree from Tennessee State University, and was promoted to Market Manager for DuPont (Old Hickory, TN). Oscar will be responsible for the North American Medical Specialties business.

**Terry K. Begley** (BS/ChE ’69) has been named vice president of Global Customer Supply for Eastman Chemical Company. He has worldwide corporate responsibility for chemical and energy procurement, logistics, product planning and management, and customer service.

**Stacey Gurley McEwen** (BS/ChE ’91) has joined Reichhold Chemical, Inc. (Research Triangle Park, NC) as a Tech Service Representative for the Construction-Specialty group. Reichhold specializes in resins for use in the composites industry and Stacey will be servicing Reichhold’s pultrusion customers.

**MEMORIALS**

**Miles, Ferdinand W.** (BS/ChE ’43) died November 30, 2000. He was a resident of Knoxville, TN.

**Delmar D. Walker** (BS/ChE ’43) died July 17, 2000. He was a resident of Bloomington, IL. Mr. Walker was commissioned an ensign in the U.S. Navy during WWII. He served in the South Pacific and with the occupational forces in Japan and was a Lt. (j.g.) when discharged in 1946. Mr. Walker attended Bethel College, McKenzie, TN, from 1939 to 1941. In 1943, he received a B.S. in chemical engineering from The University of Tennessee, Knoxville. He earned an MBA from the University of Chicago in 1949. In 1944, he worked as a chemical engineer for Rohm and Haas Co.’s Plexiglas manufacturing plant at Knoxville, TN, and worked from 1946 to 1949 for Corn Products Co. International at Argo. In 1950, he became plant manager for Owensboro Grain Co. at Owensboro, Ky. He came to Funk Seeds at Bloomington in 1951 to supervise construction and operation of the soybean oil extraction plant. He assumed successive duties as assistant to the president, general manager, executive vice president, president and chairman and CEO, retiring from Funk Seeds and Ciba-Geigy in 1978.

**New Look for the Newsletter**

Thanks to Kim Cowart of the Development Office and Susan Seymour of the ChE Staff for reworking the format and outline for the newsletter.

**Part III**

The new look for the newsletter is possible through the employment of several strongly research-oriented staff members in the years immediately following World War II: Harold J. Garber, Frank S. Riordan, Homer F. Johnson and Stanley H. Jury in chemical engineering, and E. Eugene Stansbury in metallurgy. Of these, all but Johnson had been students and/or faculty at the University of Cincinnati, leading to several quips designating UT as a “Cincinnati Farm Club.”

Around 1960, the Vanderbilt University School of Engineering began the development of doctoral programs in engineering, and the first such degree was awarded in 1969 to a chemical engineer, W.C. Clements, Jr. Dr. Clements now serves on the chemical engineering faculty at the University of Alabama.
Professor John Prados Retires

After 47 years at UT in the department of chemical engineering, Professor John Prados is retiring. An endowment in his name has been established (for more information contact the ChE office at 865-974-2421). John was presented with a rocking chair at his retirement reception on June 8. John gratefully acknowledged the remarks of former students and colleagues at this reception. Bill Snyder, a UT graduate of 1954, cited John’s lifelong commitment to education and his ability to adapt and change; Bill reminded the group that John has touched the lives of many students in his career and is largely responsible for the changes to engineering education that have come about in recent years. He will return to the ChE department in a post-retirement position to develop Web-based chemical engineering courses. Malcolm Colditz, a UT ChE graduate and the president of Sea Lion Chemical, Inc., recalled that John was an excellent advisor, touched a number of students’ lives and made UT a special university.

John was born in Spring Hill, Tennessee, and graduated from high school there in 1947. He received his B.S. degree in chemical engineering from the University of Mississippi in 1951. After spending two years in the Air Force he returned to UT and to part-time research at the Oak Ridge National Laboratory. He received his Ph.D. from UT in 1957. He moved into UT administration as Associate Dean of Engineering in 1969 and held several positions including Vice President for Academic Affairs for the statewide UT system. He returned to teaching in 1989 as Vice President Emeritus and university professor. John says, “Working with the students is what has made me want to stay at the university.”

John’s office is filled with awards and citations. He is a registered professional engineer. He is a member of the American Chemical Society, American Institute of Chemical Engineers (AIChE), American Institute of Chemists, American Society of Engineering Education, Sigma Xi, Tau Beta Pi and the Technical Society of Knoxville. He has contributed tirelessly to professional organizations. To cite just a few of these contributions, President of Sigma Xi (1983 - 84), Editor for Journal of Engineering Education (1995 - present), Treasurer of AIChE (1995 - present).

John does not have a lot of free time, but when he does, he enjoys hiking, fishing and classical music. He sings in a folk group at John XXIII Catholic Center with his wife Lynn. He enjoys spending time with this his three daughters and three granddaughters.

Ray Bellamy Retires

Ray Bellamy was a young man of 17 when he came to work at UT. Now, 45 years later, he is retiring. The Department of Chemical Engineering held a reception in his honor on May 30. Many spoke of his excellent craftsmanship, his great kindness and his talent as a musician. Ray plays four stringed instruments and on occasion plays at area bluegrass festivals and often performs in his church.

He is planning to work on his farm and spend time with his wife, LaVelle. They were married 44 years ago and have a son, Tommy, and two granddaughters, Hannah and Leah.

Ray was an important resource to our students as well as our faculty. The departments will miss his knowledge and talent. We thank him for a job well done.
Contributors to Chemical Engineering

Thanks to the alumni, parents and friends whose generous support makes possible many of the activities described in this newsletter. If you wish to support the Chemical Engineering Department or a particular program within the department, be sure and designate this on your check or gift. Undesignated gifts go to support general university programs. The following is a list of contributors to Chemical Engineering from January 1, 2000 to December 31, 2000.

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Dr. Robert M. Counce  Mrs. Patricia A. House  Proctor & Gamble Fund  Dow Chemical Co. Foundation
Mr. Royce G. Cowan  Dr. James H. Haynes  Mr. Mark B. Prados  Thank you
Mrs. Carolyn Cowan  Mrs. Mary A. Haynes  Mr. Mark B. Prados  8
Robert (Pete) Counce was elected a fellow of the American Institute of Chemical Engineers. He has pioneered techniques for teaching process design. His research and development activities concentrate on industrial pollution prevention.

Pete began his chemical engineering career at Oak Ridge National Laboratory (ORNL) in 1974, in the area of nuclear fuel reprocessing. He used his research at ORNL as the basis for M.S. and Ph.D. degrees from UT. Over his career he has produced more than 100 journal articles, technical reports and meeting presentations. He also consults for several major industries.

He has taught most of the chemical engineering courses at UT. Pete has developed a graduate course in industrial pollution prevention, and an industrially supported capstone design course. In the capstone activity, each student team has an authentic and unique project and is supported by an industrial advisor and an academic advisor who serve as coaches. Over 150 students have participated in that experience at UT.

Pete has been involved in many national AIChE activities, such as chairing numerous sessions for national AIChE meetings, serving as the Environmental Division’s Group Program Chair for the Spring 1989 National Meeting and serving on the Admissions Committee. He was lecturer for AIChE’s Continuing Education course, “Fundamentals of Industrial Gas Absorption and Stripping,” and he reviews submissions for AIChE Journal and Environmental Progress. On the local level, Pete has led AIChE’s Knoxville-Oak Ridge Section.

Among his honors are the 2000 Leon and Nancy Cole Superior Teaching Award from the UT College of Engineering.

Our newest faculty member is Dr. Brian Edwards. He joined us at the beginning of the 2001 Spring Semester. He earned a Bachelor’s Degree with highest distinction from the Chemical Engineering Department at the University of Illinois, graduating Summa Cum Laude in 1986. His bachelor’s thesis involved the investigation of flow-induced phase changes in polymer solutions. He then enrolled directly in the Ph.D. program in the Department of Chemical Engineering at the University of Delaware, where his Ph.D. dissertation investigated the fundamental concepts and application of thermodynamics to the dynamic behavior of materials. He graduated in 1991 and has continued his work on the fundamental basis of non-equilibrium thermodynamics at several institutions since then.

Most recently, he has been Oberassistant at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. In 1994, he and co-author Antony Beris published a monograph based on their research in non-equilibrium thermodynamics through Oxford University Press. He has written over forty articles for technical journals, and now continues his research on non-equilibrium thermodynamics applied to complex fluids through molecular and atomistic simulations in the Chemical Engineering Department at the University of Tennessee in Knoxville.
Chemical Engineering News

Ray Bellamy and Dr. Charlie Brooks
Dr. Brooks brought a sample of Ray’s work and spoke of his craftsmanship.

Ray and his family: Kathy Bellamy, Tommy Bellamy (daughter-in-law and son), LaVelle (his wife), Ray and his granddaughters Hannah and Leah

Sporting his new UT hat
Mrs. Ulie Frazier, Dr. George Frazier and Dr. John Prados

Ray at his retirement reception

Cutting the cake
Mrs. Ulie Frazier and Dr. Frazier
Dr. Prados and his family:
L to R: Laura (daughter), Mary Beth (granddaughter), Dr. Prados, Mrs. Lynn Prados and Beth (daughter)

Below center

Left

Dr. Bill Snyder
Dr. Prados

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Chemical Engineering NEWS
College of Engineering • The University of Tennessee

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