MAPPING THE FUTURE OF CHEMICAL ENGINEERING

Chemical Engineering is changing rapidly from a profession heavily invested in the petroleum and chemical industries, where the majority of graduates have been employed historically, to a field that incorporates biochemical engineering and other disciplines. This paradigm shift in the profession has prompted departments around the country to evaluate their programs for relevance. Some have even changed their names, for example to Chemical and Biochemical Engineering or Chemical and Biomolecular Engineering.

The Clemson ChE faculty have spent considerable time this year addressing ways in which the undergraduate curriculum must adapt to what can be seen as “market influences” that affect our students’ ability to compete for jobs. Data such as the AIChE annual placement survey represented by the pie chart in this article are used in forecasting curriculum revisions.

“Most curricula were designed in the 1950s to reflect the needs of the times. Discussions now taking place on a national level through a series of National Science Foundation-funded workshops will shape the nature of chemical engineering education for the 21st century,” Goodwin said.

One result of the discussions is acknowledging that the foundations of chemical engineering are no longer limited to chemistry, mathematics and physics.

The basic concepts remain the same, with Chemical Engineering firmly grounded in kinetics, thermodynamics and transport phenomena; but the challenge will be how to integrate biotechnology and how to do a better job of integrating polymer science into the curriculum.

“An example of the current disconnect,” Goodwin added, “is that if one wants to study the thermodynamics of organic, polymeric, and biological molecules, it is necessary to go to three different textbooks that utilize three different terminologies. We must do a better job of integrating science for our students.”

Part of Clemson’s discussion is the university’s move to a requirement of 120 to 130 total credit hours without the 10 free electives that students have used to pursue their special interests.

Discussions about the curriculum and the future of the program are not limited to the academic community.

“Some of our most important information will come from our alumni,” Goodwin said. “It is crucial that we hear from those who are dealing with the changes in their industries. We must make the curriculum more relevant as well as flexible enough to reflect the diversity of career options available to our graduates.”

Goodwin urges all alumni to email him their thoughts about what must be included in the curriculum. Contact him at jgoodwi@clemson.edu and read more about the curriculum discussion on page 2.
curriculum needs to recognize these changes and in some fashion provide a means to accommodate the different needs of different students.

Your input is critical to our efforts to revamp the curriculum in any meaningful way. I urge you to email me your thoughts about what should be retained, what should be deleted, and what should be added. Obviously each person’s experience will be somewhat different, but it is this composite view that will allow us to devise an optimum curriculum. Please email me your thoughts at jgoodwi@clemson.edu. For data purposes, please include your job title, company, industry type or profession (chemicals, fiber, electronic materials, medicine, law, etc.), and year of graduation for B.S. and/or any other degrees.

Thanks in advance for helping us move the department and its graduates into the 21st century.

A NOTE FROM THE CHAIR

The front-page article about our efforts to refine the curriculum outlines the challenge we face to make this department as competitive as possible in recruiting, retaining and educating chemical engineers for the future. To paraphrase a once-popular advertising slogan, “It’s not your father’s (or your mother’s) chemical engineering degree.” The profession is changing at a rapid pace, and today’s graduates face many challenges.

In the current competitive job market, students should be able to take advantage of options beyond what they might have considered their original career options. Biotechnology is one of the expanding job market for chemical engineering graduates.

A recent AIChE report on employment trends in 2002, while not addressing the increasing emphasis on biotechnology per se, does offer insight into the kinds of companies that are hiring our students. According to the report, while the greatest percentage of B.S. graduates were hired by industry, the second highest share was claimed by electronics, with fuels following closely. Pharmaceuticals continued its upward trend, and business services, which includes consulting, financial and other aspects of business, did not change appreciably.

Nontraditional companies account for approximately 50 percent of new B.S. jobs. In addition, there is a sizeable group in each graduating class that enters graduate school in ChE, materials, environmental science and engineering, bioengineering, medicine and law. Some graduates also go for their MBA after several years of work experience. Obviously, any ChE B.S. curriculum needs to recognize these changes and in some fashion provide a means to accommodate the different needs of different students.

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EMERITUS
Joseph C. Mullins, Ph.D.

Although he retired officially in 1994, Dr. Joe Mullins continues to pursue his research interests and is a daily presence in the department. His most recent work has been working on tutorials and research on the use of ASPIEN and HYSYS computer programs. As former students will remember, his other passion is tennis; and he continues to play and to coach a fortunate few promising young players.

Professor Amod Ogale was the keynote speaker for a Thermoplastics Symposium at the Japan-SAMPE International Conference November 18-21 in Tokyo. His presentation was based on research results from a Ph.D. study being conducted by his student, S. Cherukupalli. They investigated online monitoring of structure during blown-film extrusion of polyolefin films, and their paper won the symposium’s award for best paper. Prof. Ogale was also invited to present a lecture on the rheostructural studies of liquid crystalline polymers at another polymer symposium organized by Yamagata University in Yonezawa, Japan. Both of the studies are being conducted under the auspices of the Center for Advanced Engineering Fibers and Films (CAEFF), an Engineering Research Center funded by the National Science Foundation.

Assistant Professor Andrew T. Metters has received the Ralph E. Powe Junior Faculty Enhancement Award presented by Oak Ridge Associated Universities to a first-year faculty member who shows exceptional promise.

James G. Goodwin, Jr., Ph.D.
CU ChE, B.S. ’67

Faculty/Staff News

L-R: Symposium organizers Prof. Ito and Dr. Mizoguchi (Tokyo Institute of Technology), Prof. Kim (Hanyang University, S. Korea), Prof. Liu (Chang Gung University, Taiwan) and Prof. Ogale.
Professor Dan Edie and Dr. Yulia Basova, a post-doctoral researcher in the Center for Advanced Engineering Fibers and Films, attended the International Carbon Conference in Oviedo, Spain, July 6-10. They presented two papers covering their research in activated carbon fibers, one of which was selected as a keynote address at the conference. Prior to the conference Edie attended a workshop on carbon materials at the University of Alicante in Alicante, Spain, where he made an invited presentation entitled “Future Directions in Carbon Fiber Research.”

Associate Professor S. Michael Kilbey II is co-principal investigator on a $1.86-million National Science Foundation-funded project to investigate a novel chemical process to modify and control interfaces with multiply-bound polymer chains (MBPCs). Kilbey joins a multidisciplinary team of researchers from the University of Tennessee, the University of Houston, and the University of Utah. The program will provide a training ground for undergraduate and graduate students; a number of experiments will be carried out at National Laboratories, including the National Institute of Standards and Technology, Oak Ridge National Laboratory, and Sandia National Laboratory. Science teachers from public high schools and junior colleges also will spend four weeks in research laboratories contributing to this project, providing exposure to polymers and polymer research.
REU 2003

For the second consecutive year, eight undergraduate students from chemical engineering programs across the United States spent 10 weeks of their summer break in the department as researchers in the National Science Foundation-funded Research Experience for Undergraduates (REU) in Novel Materials organized by Assistant Professor Graham Harrison. Students participating this year included Kim Abrams, South Carolina State University; Josh Barringer, Louisiana Tech; David Bryson, Georgia Tech; Curran Chandler, University of Southern Mississippi; Brian Figura, University of Pennsylvania; Matt Garrett, University of South Carolina; John Oldham, Rose-Hulman; and Vee Sykes, Norfolk State University.

Each student was assigned to a specific faculty member’s research project. Along with Dr. Harrison, the faculty members who worked with the students were Professors Bruce, Goodwin, Hirt, Husson, and Kilbey. In addition to their laboratory research, the students had to present an oral report, a written report and a research poster to the faculty and graduate students.

"The REU experience is a great opportunity for students who are interested in research to learn all aspects of the process," Harrison said. "It is also a way for the department to showcase its various research programs to potential graduate students. We are looking forward to another great REU program next summer."

Top 10 Reasons Women Choose Chem E

The shirt says it all: Chemical Engineering is not every girl’s idea of fun, but those who pursue the profession reap its many rewards. Just ask the women pictured here about those advantages. During one of many late-night study sessions -- yet another weekend spent in Earle Hall -- they decided to list the many “blessings” of being a female chemical engineering student and, ultimately, a chemical engineer. The list was an instant hit with their female classmates, so they decided to put it on a T-shirt.

A sampling of the Top 10 reasons:

- We can buy our own diamond ring.
- Chances of marrying a rocket scientist increase exponentially.
- You don't have to worry about finding a date for the formal because you don't have time to go.
- Free housing in Earle Hall.
- Getting a 51 on a test means you got more than half the answers right.

CO-OP A Valuable Job Search Tool for Seniors

Those seniors who have taken advantage of the Cooperative Education program are finding it a valuable tool in their job search. The program provides an employment opportunity during the undergraduate years and is an excellent way for students to find out whether or not they are suited to a career in chemical engineering.

Professor Charlie Gooding, a co-op advisor, says the program has been revamped to provide optimum experience for students as well as benefits for employers.

"As the program is designed now, students have their first co-op opportunity after they complete the sophomore year. This gives them a good foundation in the basic chemical engineering course work and a bit more maturity. This is a benefit to the employers, too, since the students have been exposed to the knowledge they need to be productive employees."

Several seniors have already accepted positions with the companies where they spent their co-op time, and others say the experience helped them define their career goals more clearly.

“We are always interested in new opportunities for students, especially as the profession changes and new career opportunities arise. Anyone who has a co-op opportunity for our students can email me at chgdng@clemson.edu and we’ll explore the possibilities.”

Top 10 Reasons Women Choose Chem E

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- Getting a 51 on a test means you got more than half the answers right.

Want one? Know a female chemical engineer who might?

Email Sandra Woodward at woodwas@clemson.edu for ordering details!
Chem E Family Album

Senior Photo, Class of 2004

Graduate Students, 2004

Shrimp Boil!

Senior girls let off steam at the Upper SC State Fair.

Faculty and graduate students enjoy the annual river rafting trip.

Senior Intramural Coed Softball Team, aka “A Real Hell.”
Francis Sinclair Webster, Jr., B.S. ’42

We were saddened to learn that Francis S. (Frank) Webster, Jr., passed away August 6. A retired executive with 3M, Webster was a resident of Hilton Head, SC. In 2002 Mr. Webster established a $25,000 unrestricted endowment to support the department. The Webster Endowment will play a major role in the future of Chemical Engineering at Clemson, according to Development Officer Sandra Woodward.

“We are very grateful for Mr. Webster’s commitment,” Woodward said. “The proceeds from this gift will be used in ways that will strengthen the department and provide support for our students. Through his generosity, Mr. Webster’s memory will always be honored in this department.”

Paul J. Campbell, Jr. (B.S. ’68) and Vicki G. Campbell Create Endowment

Paul J. Campbell, Jr., B.S. ’68 and Vicki G. Campbell have created a new unrestricted $25,000 endowment for the department. Paul is executive vice president with Alcoa in Charleston. He and Vicki live in Goose Creek, SC. Proceeds from the fund will be used to enhance the educational program.

Endowment

The Gift That Keeps On Giving

The two endowments noted above, and another we expect to announce in the next newsletter, are the most recent examples of the generosity of our alumni. An endowment, which provides a fund from which a portion of the interest earned can be used annually by the department, creates a gift that literally lasts forever, since the principal cannot be spent and will continue to earn interest each year. There are many ways endowments can be established. The gift can be a lump sum or can be spread out over a period of time up to five years.

Development Officer Sandra Woodward can answer questions for those wishing to consider this as a way to make a lasting gift to the department. Contact her by email at woodwas@clemson.edu or by telephone at 864-656-2055.

Sorry, Charlie!

Despite our best efforts, Charlie Miller was omitted from the list of the ChE Class of 56 members who attended a March reunion in Charleston. Miller is pictured here with his wife, Sarah.
ChE Alumni Respond to Solid Orange Challenge

What can we say except THANK YOU?! To everyone who responded to Dr. Goodwin’s letter asking for support, and to those who offered support without being asked, we offer our heartfelt thanks. The response has been very exciting and encouraging, and girls continued to come in as we prepared to go to press. We will offer a detailed report in the next newsletter, but let us offer a few preliminary observations:

• With a couple of notable exceptions, the number or donors increased at every level. Individual giving in the ranges from $0-99 and $100-$249 almost doubled. Many first-time donors will naturally fall into these categories, and we are pleased to welcome them.

• The prompt response to the letter was very heartening. Many of you recognize the serious state of the university budget and understand the importance of your private, unrestricted gift to support the department.

• The honor roll of donors includes many who have not contributed regularly in the past.

• A number of regular donors either increased their annual gift or made a special additional gift in response to the letter.

• The significant increase in the number of individual donors is a very important point for the department and the university overall.

If you did not receive a letter, please email our development officer, Sandra Woodward, at woodwas@clemson.edu.

If you have not yet made your gift, please use the form below and the enclosed envelope to join your classmates along with students, faculty and staff, in showing our commitment to the department. If you prefer, you may make your contribution online at http://www.clemson.edu/itrans/index.cgi.

Because of the increase in the number of donors, we are including our Honor Roll of Donors 2003 as a separate insert. Please review the list and email Sandra Woodward at woodwas@clemson.edu or call her at 843-656-2055 if your name should be listed and is not or if your gift has not been credited appropriately. The dates covered by this list are Nov. 1, 2002-Dec. 1, 2003. If you made a gift toward the end of this period or later, your gift will be noted on next year’s list AND on the list we will be posting soon on the web site and which we will update monthly to reflect the current status of gifts received.

Clemson University Department of Chemical Engineering

Name

Social Security Number  CU Class

Street

City State Zip

Telephone (Home) (Office) Email

Employer (for gift matching)

Gift Amount

□ $25

□ $50

□ $100

□ Other $ ________________

**You may wish to make your gift using your VISA or MasterCard account. Check one:

□ VISA

□ MasterCard

INTERBANK NUMBER

EXPIRATION DATE

Authorization Code

CARDHOLDER’S NAME

Please PRINT above information exactly as it appears on your card.  

(Signature)

Maker authorizes the bank issuing the VISA or MasterCard identified on this item to pay the amount shown and promises to pay the amount stated herein to such bank subject to and in accordance with the agreement governing the use of such card.

The enclosed envelope is provided for your convenience and in order to direct your gift to the appropriate address. If paying by check, please make your check payable to Clemson University Foundation and write Chemical Engineering on the for line. Thank you for your support.
The newly renovated Littlejohn Coliseum.