# STATUS REPORT

# CHEMICAL ENGINEERING

**The University of Tulsa**
**600 South College Ave.**
**Tulsa, OK 74104**

**SEPTEMBER, 2001 - AUGUST, 2002**

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## GENERAL NEWS

Perhaps the best news we have to report this year is that the freshman undergraduate class is bigger than both the sophomore and junior classes and almost as large as the senior class reversing the downward trend we have noted over the last several years. Though the overall number of undergraduate students declined again this year due to the large size of the graduating class, we expect to see the overall number of undergraduate students increase next year, provided we have another good year recruiting students into next year's freshman class. We must continue to work as hard to recruit undergraduate students as we did last year and work at retaining students. Our entire faculty contributed in some way to helping with these aspects, but Christi Patton and Laura Ford deserve special recognition.

We appreciate the help in teaching classes that Tommy Russell (Gas Plant Design, Fall 2001), Rich Thompson (Engineering Thermodynamics, Fall 2001), and Bert Fisher (Environmental Engineering, Spring 2002) provided last academic year. All of these instructors got noteworthy praise from the students in these courses.

Our faculty continues to publish and is active in getting grants and contracts. Kerry Sublette continues to get significant research support for work at the Tallgrass Prairie and in other areas, Keith Wisecarver's work in Delayed Coking has had funding extended for three years, and Laura Ford has gotten her first national recognition in the research funding arena with an equipment grant from NSF. Laura's poster at the ASEE meeting last summer entitled "Water Day" won second place in the poster contest, and other presentations and publications by the faculty continue. This is clearly not an exhaustive list, but simply gives insight into the scholarship and research endeavors of the faculty.

The Advisory Board should be recognized for its generosity in seeding the Alumni Scholarship Fund for the department. We more than completed the $25,000 goal last year and we continue to get alumni gifts for the fund. Thank you for getting this started. Thanks also to Wayne Rumley who is in the process of endowing a Rumley Scholarship in Chemical Engineering.

Finally, a new focus area for the department in the coming year will be lab automation structured around the acquisition of the Honeywell control system. The Dean of Engineering, Steve Bellovich, helped tremendously with funding this effort along with a notable contribution from a true friend of the department. It will be the students who benefit in the end from the gifts which made the acquisition possible.

## FACULTY ACTIVITIES

**Laura Ford** taught Engineering Science Fluid Mechanics (ES 3003) and graduate Heat and Mass Transfer (ChE 7043) last spring. She is teaching Engineering Science Thermodynamics (ES 3053) and Fluid Mechanics (ES 3003) this fall.

Laura is advising two graduate students. Sumathi Chandrasekaran is studying etching copper indium diselenide in the chemical vapor etching reactor. Kimberly Carter is co-advised with Dr. Sublette and is working on remediation of brine spills. Kim will be graduating this semester with a master's degree.

The Integrated Petroleum Environmental Consortium is considering a continuation of the Remediation of Brine Spills with Hay project. The National Science Foundation has

recently funded a project for Laura to build an ultra-high vacuum chamber for surface studies of etching reactions.

Laura attended the 2002 ASEE Summer School for Chemical Engineering Faculty. She presented a poster, Water Day, in the Strategies for Lecture Courses theme and placed second.

Laura is the academic advisor for the sophomore class and the faculty advisor for the student chapter of the American Institute of Chemical Engineers. The students qualified to race in the national Chem-E-Car Competition in November. Laura is also serving on TU's Fringe Benefits Committee.

Dr. Patton and Laura have been preparing the rules for a high school Chem-E-Car Competition. The rules are simplified, and we will supply each team with a car chassis and motor kit. We have put a page on our ChE web site for information and online registration. The first competition will be April 17, 2003.

**Kraemer Luks** recently completed a three-year grant from the National Science Foundation to study the problem: effect of cosolvents on solute solubility in and separability between liquid phases in liquid-liquid-vapor equilibrium systems. During the last year the paper entitled Partial Miscibility Behavior of the Ternary Mixture Carbon Dioxide + 1-Methylnaphthalene + Acetone appeared in the journal, Fluid Phase Equilibria. Another paper entitled Effect of Cosolvents on Solute Separability Between Liquid Phases in Liquid-Liquid-Vapor Ternary Mixtures was accepted for publication by the same journal. Both of these papers were coauthored with Lydia Gutierrez.

Professor Luks is also working on fundamental classical thermodynamics problems in the area of phase equilibrium computations. Collaboration continued with undergraduate chemical engineering student, Joseph Labadie. Since last year, two more papers coauthored with Mr. Labadie have appeared in the journals: The Continuous Phase Equilibrium Problem: Quadrature Compositional Characterization and Asymptotic Convergence in I&EC Research, and Computing Phase Equilibria: How Gibbs Energy Considerations Reduce the Role of Rachford-Rice Analysis in Chemical Engineering Education. A third paper with Mr. Labadie entitled, Solid-Fluid Phase Equilibria of Compositionally Complex Mixtures: Contrast of Equilibrium and Process Treatments, has been accepted for publication in the journal, Fluid Phase Equilibria. Professor Luks is currently studying (from a theoretical viewpoint) the:

- Thermodynamic phase space topography of n-phase azeotropy,
- Formal and computational disparity between ideal/continuous and real/quasi-continuous systems, and
- Filtration thermodynamics of complex compositional solid-fluid equilibrium systems.

Professor Luks is teaching ChE 7003, "Advanced Fluid Mechanics" and team-teaching ChE 4003, "Chemical Engineering Lab 1" with Dr. Wisecarver this fall.

**Frank Manning** taught 7 courses (3 courses in the fall, 3 in the spring and 1 in the summer) during the calendar year, September 2001 – August 2002. In addition, Frank taught two reviews (Introduction and Thermodynamics, Fluid Mechanics and Engineering Economics) of the eight Saturday morning sessions for the F.E. examination. This F.E.

review was offered in both the fall and spring semesters. Frank also proctored the FE exam in April, 2002.

Frank Manning continues to serve as the College's designated representative to the Midwest Section of the American Society for Engineering Education and attended the annual meeting in September, 2002. He also serves as the College's campus representative.

Frank continues to serve as the College's representative to the Faculty Financial Review Committee and chaired the committee in 2001/2002. He is also a member of the Faculty Development Summer Fellowship Selection Committee.

**Christi Patton** continues to teach three classes per semester for the department. This past year she taught ChE 1002 (Introduction to Chemical Engineering), ChE 1012 (Chemical Engineering Problem Solving), ChE 2003 (Principles of Chemical Engineering), ChE 3063 (Equilibrium Thermodynamics), ChE 7213 (Advanced Problem Solving in Chemical Engineering as well as team-taught ChE 4013 (Senior Lab II) with Kraemer Luks.

In addition to teaching, Christi has encouraged children to study science and engineering through visits to several elementary schools and high schools in the area and organizing several events for area scouts. Each semester she organizes SWE-Brownie Science Day, with the most recent one just a few days ago on September 28. Each year more than 300 second and third grade Girl Scouts visit the University of Tulsa to learn about polymers, water treatment plants, environmental clean-up, chemistry, lasers and more. In January she held a Merit Badge Workshop for more than 100 middle school and high school Boy Scouts and Girl Scouts. The day was very successful and the dean has promised his support to repeat the event in 2003. She also was on the Tulsa e-week committee and was the Tulsa coordinator of DiscoverE for 2002.

Christi has spent a large portion of this year studying and constructing fuel cells, along with one of our graduate students, Larry Stapley. They have succeeded at creating electricity from hydrogen and air and are scheduled to demonstrate the fuel cell to a variety of classes in the college as well as to area high schools. Performance tests of a variety of configurations and operating conditions are ongoing. The equipment should be ready for use as a laboratory experiment soon.

Christi has been working with Laura Ford to host a ChE Car Competition for area high schools in the spring. A website has been created and a letter has been sent out to the schools inviting them to participate in the April, 2003. This competition will be a simplified version of the competition our AIChE students have so successfully competed in.

Christi continues working to establish a chapter of Omega Chi Epsilon (the national Chemical Engineering Honor Society) at TU. This year we look forward to petitioning the national organization for our charter.

**Geoffrey Price's** NSF grant on Zeolite Based Automotive Emission Catalysts is expiring early next year, and he has been working closely with General Motors' researchers to get a new grant in the same general area renewed as soon as possible. The first try at getting new funding was not successful, but a revised proposal is almost finished. He also has a proposal on solid-state ion-exchange of zeolites currently undergoing review at NSF.

Geof was honored as a UOP/Honeywell Invited Lecturer, and delivered his lecture in March of 2002 at the UOP Research Headquarters in DesPlaines, IL. He was also invited the University of Oklahoma to deliver a seminar in the Department of Chemical Engineering and Materials Science.

Amit Gujar, Geof's PhD student working with him on Zeolite Based Automotive Emission Catalysts, spent January-July at the GM research center in Warren, Michigan studying the catalysts using GM equipment and working closely with GM personnel. This was a great experience for him and he is currently putting together a paper detailing the work he performed while there. Amit, who is beginning his third year in the PhD program, already has one publication to his credit: A. C. Gujar and G. L. Price, "Synthesis of SUZ-4 in the K+/TEA+ system", Microporous and Mesoporous Materials 54, 201-205 (2002), and one in press: A. Subbiah, B.K. Cho, R.J. Blint, A. Gujar, G.L. Price, and J.E. Yie, "NOx Reduction over Metal-Ion Exchanged Novel Zeolite under Lean Conditions: Activity and Hydrothermal Stability", Applied Catalysis B: Environmental 1296, 1-24 (2002). SUZ-4 is the zeolitic phase which is structurally stable to the high temperature, water-containing environment of automotive exhaust.

Geof's class schedule last year was the same as the previous year. He taught ES 3053 (Engineering Thermodynamics) last spring and ChE 4063 (Kinetics and Reactor Design) this fall. He is scheduled to teach ChE lab next spring to help in the implementation of the Lab Automation Project.

**Chuck Sheppard** is teaching the Graduate Kinetics and Reactor Design course (ChE 7033) and Heat Transfer (ES 3073) this fall. Chuck has been active in the national AIChE/Center for Chemical Process Safety SACHE (Safety and Chemical Engineering Education) committee (meeting quarterly).

**Kerry Sublette** organized and chaired the 8th International Petroleum Environmental Conference held in November 2001 in Houston, TX attended by over 350 industry, regulatory, and academic professionals. As usual eight TU students were provided scholarships to the conference and several presented posters or oral papers. The 9th conference is coming up October 22-25, 2002 in Albuquerque, NM. Kerry has also been leading a major multi-institutional initiative to obtain federal funding for the Integrated Petroleum Environmental Consortium (IPEC). IPEC is a consortium of the University of Tulsa, the University of Oklahoma, Oklahoma State University, and the University of Arkansas. Since 1998 IPEC has operated as an EPA Research Center with $6.75 million in federal funding through the VA/HUD Appropriations Bill, $800,000 in matching state funding, and $2 million in competitive grants. FY03 funding is currently pending in Congress.

In December 1999, Kerry was instrumental in arranging the donation of the Bio-Sep patents from DuPont. Bio-Sep is a unique immobilization matrix for microorganisms with wide ranging applications in biomonitoring and groundwater and waste water treatment. Since acquiring the Bio-Sep technology, the material has undergone several improvements which have led to a new issued patent and one pending patent application both assigned to the University of Tulsa. In August 2002 TU signed its first licensing agreement for applications of Bio-Sep in biomonitoring. TU also has formal agreements in place with the University of Florida, University of Alberta, Dow Chemical Co., and the Swiss Federal Institute of Technology for evaluation of Bio-Sep technology in other applications.

Kerry's recent grant activity has included: 1) the restoration of soil ecosystems following crude oil and brine spills (DOE); 2) development of "smart" proppant materials (DOE); bioreactor design for microbial oxidation of hydrogen sulfide (DOE); and 3) use of

Bio-Sep bug traps to evaluate natural attenuation of hydrocarbons and MTBE in groundwater (EPA/IPEC).

Kerry continues to lead a task force to raise funds for the construction and operation of an ecological research station in the Tallgrass Prairie Preserve in cooperation with The Nature Conservancy. The research station will consist of a 7000-ft$^2$ research and education building featuring two laboratories, two classrooms, a specimen collection room, library and conference room, two offices, and a student commons area as well as an existing structure which will be refurbished as residential housing. Thus far, over $1.7 million has been raised for this project. Another $250,000 is needed to break ground and several substantial gifts are currently pending. Construction is anticipated to begin in spring 2003. An artist's rendering of the research station is below:

**Keith Wisecarver** is continuing his work as co-PI of the Tulsa University Delayed Coking Joint Industry Project. Their Department of Energy proposal has been renewed for another three years, and they currently have 12 member companies in the JIP. More information on this project can be found on the Tulsa University Delayed Coking Project website, www.tudcp.utulsa.edu. Keith's other research interests include fluid catalytic cracking, Fischer-Tropsch processes, and multiphase reactor design in general. On the teaching front, Keith is co-teaching the senior Unit Operations Lab courses this year, as well helping on the design courses wherever HYSYS simulations are involved. He attended a short course last summer on Practical Distillation Technology to brush up on some practical aspects of design.

## UNDERGRADUATE PROGRAM

The quality of our undergraduate students continues to remain excellent. The following seniors were recipients of the Wilbur L. Nelson Award for academic excellence at the annual Awards Ceremony in April, 2002:

| NAME | CURRENT POSITION |
|---|---|
| Leela D. Farr | University of Oklahoma-Public Health Masters Degree Program |
| Joseph A. Labadie | BP - Houston, TX |
| Eric Nelson | ExxonMobil – Houston, TX |
| J. Isaac Owen | University of Tulsa – MBA Program |
| Suzanne D. Sharp | Williams Companies – Tulsa, OK |
| Ryan J. Talley | Still seeking employment |

Undergraduate enrollment in the Department of Chemical Engineering continues to decline but not quite as much. We have 12 fewer students this year than last; our prior year's decline was 14. This decline can be attributed largely to two effects. We are still graduating more students than we recruited into the freshman class, but the margin is closing. We graduated 19 for spring and summer '02 and we have 16 new freshmen this semester. The other problem remains in the middle—the junior and sophomore classes—where we didn't recruit enough and lost too many to other majors. Recruitment and retention of students has been our major focus since then.

Table 1 shows enrollment figures over the past twenty-three years. Figures 1 and 2 show how chemical engineering enrollments and B.S. degrees have changed over the years.

Table 2 shows the demographics of the undergraduate student body. Female students and international students as percentages of the total for recent years are shown in Figure 3. The number of female students and international students are both down, but the percentages are up a point each, 33% and 37% respectively. The Middle East still dominates the countries of origin among international students accounting for 71% of those students. The great majority of international students are male (95%); there is one female student from Malaysia.

Table 3 shows the distribution of jobs for the December 2001 through December 2002 graduates. It was only a fair year for employment for our students, but as you know the economy as a whole is down. As in the past, the majority of job offers were in energy-related fields.

**TABLE 1. Recent Undergraduate Enrollment Data at Census Date**

| | ENROLLMENTS | | | | | | |
|---|---|---|---|---|---|---|---|
| Year | Fr | Soph | Jr | Sr | PT | Total | B.S.Degrees |
| 1980-81 | 31 | 36 | 24 | 32 | 10 | 133 | 30 |
| 1981-82 | 24 | 43 | 34 | 24 | 13 | 134 | 21 |
| 1982-83 | 32 | 36 | 44 | 32 | 12 | 145 | 30 |
| 1983-84 | 32 | 34 | 32 | 45 | 13 | 147 | 33 |
| 1984-85 | 24 | 33 | 27 | 30 | 7 | 114 | 32 |
| 1985-86 | 25 | 24 | 18 | 28 | 7 | 95 | 32 |
| 1986-87 | 21 | 33 | 17 | 16 | 1 | 88 | 13 |
| 1987-88 | 16 | 21 | 18 | 27 | 1 | 82 | 21 |
| 1988-89 | 20 | 23 | 15 | 26 | 0 | 84 | 19 |
| 1989-90 | 25 | 17 | 15 | 29 | 4 | 86 | 25 |
| 1990-91 | 19 | 20 | 17 | 16 | 3 | 72 | 15 |
| 1991-92 | 38 | 33 | 20 | 10 | 1 | 101 | 8 |
| 1992-93 | 38 | 41 | 34 | 22 | 0 | 135 | 16 |
| 1993-94 | 43 | 35 | 51 | 36 | 2 | 167 | 28 |
| 1994-95 | 38 | 38 | 32 | 54 | 1 | 163 | 40 |
| 1995-96 | 44 | 34 | 46 | 52 | 3 | 179 | 49 |
| 1996-97 | 24 | 44 | 30 | 59 | -- | 157 | 51 |
| 1997-98 | 32 | 18 | 41 | 33 | -- | 124 | 25 |
| 1998-99 | 27 | 26 | 20 | 43 | -- | 116 | 32 |
| 1999-00 | 25 | 25 | 25 | 29 | -- | 104 | 23 |
| 2000-01 | 23 | 17 | 21 | 22 | -- | 83 | 21 |
| 2001-02 | 15 | 12 | 15 | 27 | -- | 69 | 26 |
| 2002-03 | 17 | 9 | 12 | 19 | -- | 57 | |

**Figure 1. Chemical Engineering Undergraduate Enrollment**

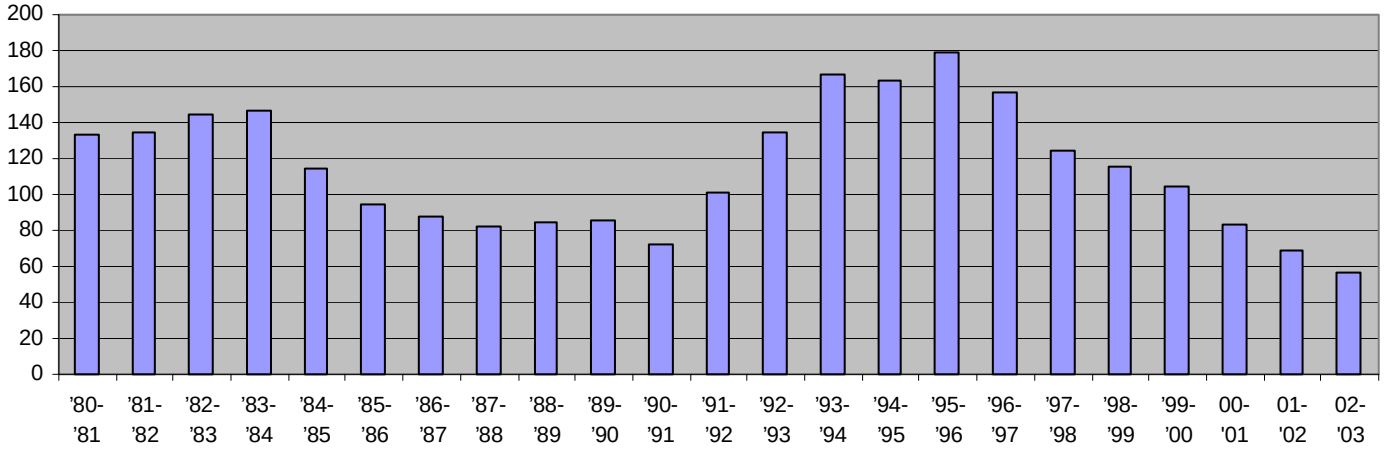
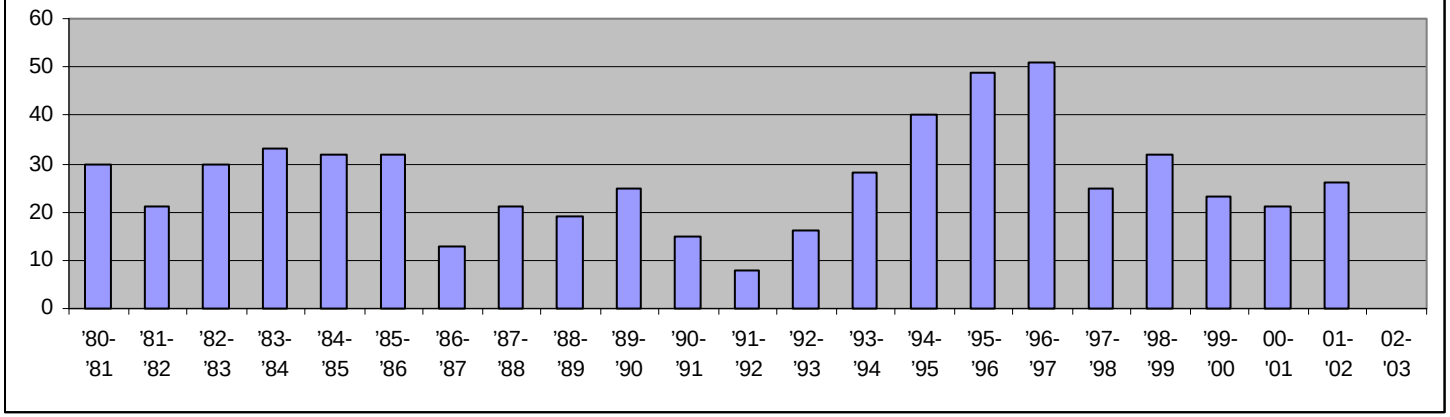



**Figure 2: Chemical Engineering B.S. Degrees**



## TABLE 2. Undergraduate Student Demographics

| Year | Class | Men | Women | International | Total |
|---|---|---|---|---|---|
| 2002-03 | Fr | 13 | 4 | 6 | 17 |
| | So | 6 | 3 | 4 | 9 |
| | Jr | 9 | 3 | 5 | 12 |
| | Sr | 10 | 9 | 6 | 19 |
| | **Total** | **38** | **19** | **21** | **57** |
| | | (67%) | (33%) | (37%) | |

### International Students

| | Fr | So | Jr | Sr | Total |
|---|---|---|---|---|---|
| Abu Dhabi | | 1 | | | 1 |
| Angola | | | | 2 | 2 |
| Ethiopia | | | 1 | | 1 |
| Jordan | | | 1 | | 1 |
| Malaysia | 1 | | | | 1 |
| Oman | | | 1 | | 1 |
| Qatar | | | | 1 | 1 |
| Saudi Arabia | 1 | | 1 | 1 | 3 |
| United Arab Emirates | 3 | 1 | 1 | 2 | 7 |
| Venezuela | 1 | 2 | | | 3 |
| **Total** | **6** | **4** | **5** | **6** | **21** |

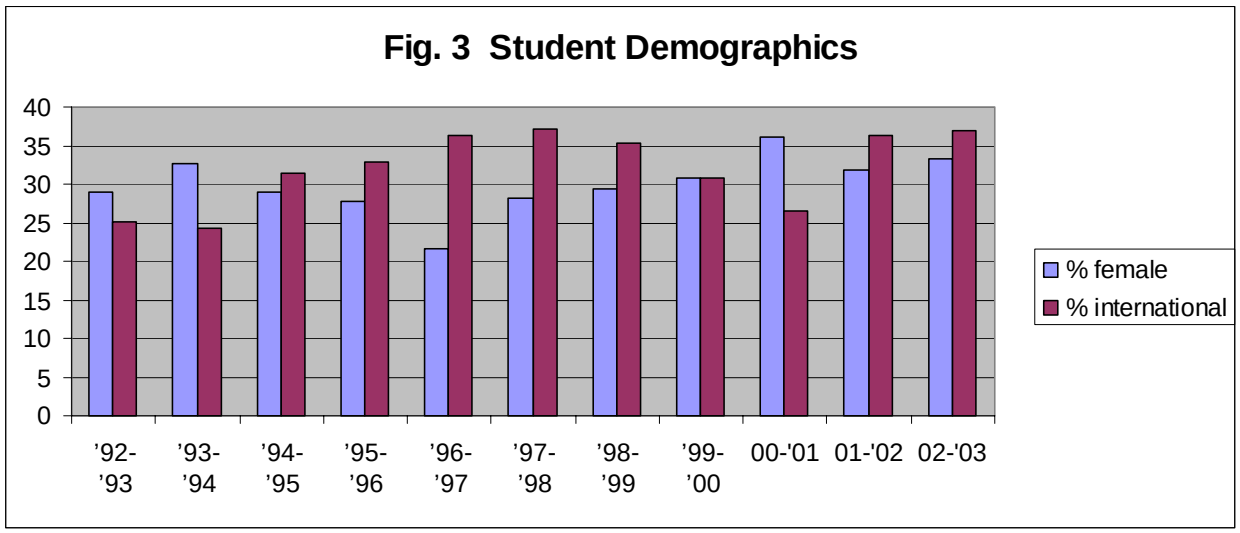


**TABLE 3. December 2001 – December 2002 Chemical Engineering B.S. Graduates**

| NAME | GRAD. DATE | CURRENT PLANS |
|---|---|---|
| Binsomait, Abdulla | Dec. '01 | To Return to the UAE, then later to Grad School |
| Laeger, John | Dec. '01 | ? |
| Murphy, Daniel | Dec. '01 | Comput-a-log, Houston, TX |
| Shrimanker, Amisha | Dec. '01 | Attending TU Graduate School (ChE) |
| Slusarchuk, Karma | Dec. '01 | ExxonMobil Development, Houston, TX |
| Dominguez Guidi, Jacquelyn (Taylor) | Dec. '01 | ? |
| Williamson, Johannie | Dec. '01 | Attending TU Graduate School (MBA) |
| Al-Kathir, Mohamed | May '02 | Returned home to UAE |
| Battle, Terriekka | May '02 | RML Laboratories, Tulsa, OK |
| Bogatko, Joseph | May '02 | ? |
| Farr, Leela | May '02 | Attending OU Graduate School, hopes for med school |
| Hulsey, Kevin | May '02 | Phillips Petroleum, Bellaire, TX |
| Hunter, Brett | May '02 | Conoco (contract work) |
| Kelderhouse, Benjamin | May '02 | ? |
| Labadie, Joseph | May '02 | BP, Houston, TX |
| Nataatmadja, Triaman | May '02 | ? |
| Nelson, Eric | May '02 | ExxonMobil, Houston, TX |
| Orf, Jason | May '02 | BP, Houston, TX |
| Owen, Isaac | May '02 | Attending TU Graduate School (MBA) |
| Sharief, Mubashir | May '02 | Air Hygiene, Tulsa, OK |
| Sharp, Suzanne | May '02 | Williams Companies, Tulsa, OK |
| Sublet, Johnathan | May '02 | Dow Chemical, Freeport, TX |
| Talley, Ryan | May '02 | ? |
| Ali, Faisal | Aug. '02 | ? |
| Pim, Kelly | Aug. '02 | Delphi Catalysts, Tulsa, OK |
| Al-Shamisi, Mohamed | Aug. '02 | ? |
| Martin, Khadija | Dec. '02 | ? |
| Calvert, Errol | Dec. '02 | Ozark Fluorine Specialties, Tulsa, OK |

**TABLE 4. Current Chemical Engineering Seniors**

| NAME | GRAD DATE |
|---|---|
| Calvert, Errol | Dec. ‘02 |
| Martin, Khadija | Dec. ‘02 |
| Adams, Lula | May ‘03 |
| Al-Baloushi, Bader | May ‘03 |
| Al-Ibrahim, Mohammed | May ‘03 |
| Baker, Misha | May ‘03 |
| Dos-Santos, Bernardino | May ‘03 |
| Gime, Aires | May ‘03 |
| Guidroz, Christina | May ‘03 |
| Horn, Susan | May ‘03 |
| Keller, Carey | May ‘03 |
| Oneal, Derrick | May ‘03 |
| Richardson, Carrie | May ‘03 |
| Roberts, Deidra | May ‘03 |
| Scott, Jason | May ‘03 |
| Lansdown, Meredith | May ‘04 |
| Roberts, Emily | May ‘04 |
| Al-Ghaferi, Saeed | Undeclared |
| Al-Meer, Abdulaziz | Undeclared |
| Wilson, Mark | Undeclared |

## GRADUATE PROGRAM

Geoffrey Price has taken over as Graduate Program Director this semester with Keith Wisecarver's assistance in determining suitability for admittance and in matching funding with students. Kraemer Luks has taken over the duties of administering the PhD Qualifying Exam. Graduate enrollment this year remained about the same as the previous year. Those who joined us since the last status report include one U.S. trained student, two Indian students who have a Masters degree from other U.S. universities, two Indian students who have some U.S. training both of whom came last spring, and one Indian student from overseas. Some anticipated Arab supported students could not get VISAs. The enrollment figures are shown in Table 5, while Table 6 lists the recent Masters graduates and Ph.D. graduates. Table 7 shows the graduate student demographics for recent years. As you can see, the percentage of female students has decreased and the percentage of international students has increased due to the influx of Indian students. Table 8 gives the graduate student enrollment at the university's census date. Dr. Wisecarver should be applauded for advising the most graduate students—nine at this time.

**TABLE 5. Recent Graduate Enrollment Data**

| | Fall Enrollment | | | | | Graduates | |
|---|---|---|---|---|---|---|---|
| Year | Full-Time | Part-Time | MS* | PhD | Total | Masters | PhD |
| 1981-82 | 16 | 12 | 20 | 8 | 28 | 9 | 2 |
| 1982-83 | 19 | 14 | 26 | 7 | 33 | 8 | 3 |
| 1983-84 | 24 | 9 | 22 | 11 | 33 | 14 | 2 |
| 1984-85 | 31 | 9 | 25 | 15 | 40 | 9 | 3 |
| 1985-86 | 26 | 6 | 21 | 11 | 32 | 11 | 2 |
| 1986-87 | 24 | 7 | 19 | 12 | 31 | 8 | 3 |
| 1987-88 | 19 | 6 | 11 | 14 | 25 | 3 | 4 |
| 1988-89 | 21 | 9 | 19 | 11 | 30 | 5 | 1 |
| 1989-90 | 19 | 6 | 16 | 9 | 25 | 7 | 1 |
| 1990-91 | 23 | 4 | 18 | 9 | 27 | 2 | 4 |
| 1991-92 | 27 | 3 | 18 | 12 | 30 | 8 | 1 |
| 1992-93 | 35 | 6 | 26 | 15 | 41 | 7 | 4 |
| 1993-94 | 40 | 7 | 33 | 14 | 47 | 8 | 4 |
| 1994-95 | 33 | 8 | 29 | 12 | 41 | 11 | 4 |
| 1995-96 | 33 | 4 | 24 | 13 | 37 | 12 | 4 |
| 1996-97 | 25 | 2 | 16 | 10 | 27 | 4 | 2 |
| 1997-98 | 22 | 1 | 17 | 6 | 23 | 5 | 1 |
| 1998-99 | 21 | 1 | 16 | 6 | 22 | 6 | 0 |
| 1999-00 | 22 | 3 | 16 | 9 | 25 | 5 | 0 |
| 2000-01 | 24 | 2 | 17 | 8 | 25 | 5 | 0 |
| 2001-02 | 28 | 4 | 27 | 5 | 32 | 10 | 2 |
| 2002-03 | 29 | 4 | 27 | 6 | 33 | | |

* Includes M.E. students

**TABLE 6. 2001-02 Chemical Engineering Masters and Ph.D. graduates**

M.S. degree

Cherie Nebel Almeida
Ahmad S. Bu-Naiyan
Deddy Donauw
Claude Hawkins, III
Joshua Hogue
Safwan Nugali
Riza Pasikki
Marco Robles
Chunyang Wei
Tomas Zambrano

Ph.D. degree

Hisham Bamufleh
Shailesh Gadad

## TABLE 7. Nature of Graduate Student Body

| | Full Time | Part Time | Masters | PhD | Male | Female | International |
|---|---|---|---|---|---|---|---|
| 1995-96 | 89% | 11% | 65% | 35% | 84% | 16% | 81% |
| 1996-97 | 89% | 11% | 63% | 37% | 81% | 19% | 70% |
| 1997-98 | 96% | 4% | 74% | 26% | 87% | 13% | 70% |
| 1998-99 | 91% | 9% | 73% | 27% | 95% | 5% | 73% |
| 1999-00 | 88% | 12% | 64% | 36% | 80% | 20% | 72% |
| 2000-01 | 92% | 8% | 68% | 32% | 80% | 20% | 72% |
| 2001-02 | 88% | 12% | 84% | 16% | 72% | 28% | 69% |
| 2002-03 | 88% | 12% | 82% | 18% | 79% | 21% | 73% |

## RESEARCH

Research in the department increased slightly from last year as shown in Table 9.

Table 10 lists the new and continued external grants for the department. New grants were down almost $150,000, but continued grants increased by approximately $235,000.

Table 11 lists pending contracts as of May, 2002. These figures are *not* included in the Total Research Dollars in Table 9. The pending contracts would add a nice sum if the majority are funded.

**TABLE 9. External Funding**
**Department of Chemical Engineering***

| Year | Research Dollars |
|---|---|
| 1985-86 | $407,806 |
| 1986-87 | $142,419 |
| 1987-88 | $524,708 |
| 1988-89 | $558,449 |
| 1989-90 | $806,088 |
| 1990-91 | $927,225 |
| 1991-92 | $1,158,767 |
| 1992-93 | $1,036,617 |
| 1993-94 | $859,285 |
| 1994-95 | $816,841 |
| 1995-96 | $698,085 |
| 1996-97 | $1,080,404 |
| 1997-98 | $1,031,216 |
| 1998-99 | $3,526,292 |
| 1999-00 | $2,977,733 |
| 2000-01 | $2,039,684 |
| 2001-02 | $2,125,337 |

*Numbers based on the University of Tulsa Office of Research 2001-2002 Annual Report, which includes new and continued contracts. Does *not* include pending contracts.

**TABLE 10. Funded Research Projects**
**Department of Chemical Engineering**

**NEW GRANTS (as of May, 2002) ***

| ***P.I.*** | **Source** | **Title** | **Amount** |
|---|---|---|---|
| *Pat Hall*<br>Nancy Felts<br>Kerry Sublette | U.S. Department of Energy | 8th Annual International Petroleum Environmental Conference | $27,000 |
| *Peter LoPresti*<br>Frank Manning | IPEC, Proof of Concept | Locating Oil-Water in Process Vessels (Prime: EPA) | $19,982 |
| *Peter LoPresti*<br>Frank Manning | North American Transplant Coordinators Organization | Locating Oil-Water in Process Vessels (IPEC match) | $2,100 |
| *Peter LoPresti*<br>Frank Manning | Conoco | Locating Oil-Water in Process Vessels (IPEC match) | $2,100 |
| *Frank Manning*<br>Geoffrey Price | Amoco/BP | Combustion in Synthetic Air | $71,060 |
| *Richard Shaughnessy* | Filtration Group, Inc. | Performance Evaluation of Air Cleaning Device to Remove ETC-Derived Particulate and Gaseous Contaminants (Prime: Philip Morris, Inc.) | $93,549 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Training, Region 9 | $25,000 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Training, Region 8 | $70,000 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Implementation Project, Region 9 | $56,996 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Training, Region 9 (Program Income Supplement) | $43,360 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Kit Region 6 | $70,000 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Training, Region 4 | $50,000 |
| **TOTAL** | | | **$531,147** |

*Numbers based on the University of Tulsa Office of Research 2001-2002 Annual Report

**CONTINUED GRANTS (as of May, 2002) ***

| ***P.I.*** | **Source** | **Title** | **Amount** |
|---|---|---|---|
| *Laura Ford*<br>Tom Harris<br>Kerry Sublette | IPEC | Remediation of Brine Spills with Hay (Prime: EPA) | $900 |
| *Geoffrey Price* | General Motors Corporation | GOALI: High Stability Copper Zeolites for Lean $No_x$ Automotive Catalysis, Supplement | $5,000 |
| *Geoffrey Price* | General Motors Corporation | GOALI: High Stability Copper Zeolites for Lean $No_x$ Automotive Catalysis, Year 2 of 2 | $23,924 |
| *Charles Sheppard*<br>Keith Wisecarver<br>Mike Volk | Various Companies | Fundamentals of Delayed Coking | $480,000 |
| *Kerry Sublette*<br>Laura Ford | U.S. Department of Energy | Risk Reduction & Soil Ecosystem Restoration in an Active Oil-Producing Area in an Ecologically Sensitive Setting, Year 2 (IPEC Collaborators) | $259,734 |
| *Kerry Sublette*<br>Laura Ford | University of Arkansas | Risk Reduction & Soil Ecosystem Restoration in an Active Oil-Producing Area in an Ecologically Sensitive Setting, Year 2 (DOE match) | $22,921 |
| *Kerry Sublette*<br>Laura Ford | Oklahoma State University | Risk Reduction & Soil Ecosystem Restoration in an Active Oil-Producing Area in an Ecologically Sensitive Setting, Year 2 (DOE match) | $10,024 |
| *Kerry Sublette*<br>Laura Ford | The University of Oklahoma | Risk Reduction & Soil Ecosystem Restoration in an Active Oil-Producing Area in an Ecologically Sensitive Setting, Year 2 (DOE match) | $28,724 |
| *Kerry Sublette* | U.S. EPA, National Center for Environmental Research & Quality Assurance | IPEC, Year 4 | $413,673 |
| *Kerry Sublette* | The University of Oklahoma | IPEC (Prime: BP match) | $35,000 |
| *Kerry Sublette* | University of Oklahoma | IPEC (match-Suflita) | $110,000 |
| *Kerry Sublette* | University of Arkansas | IPEC (match-Thoma) | $35,702 |
| *Kerry Sublette* | University of Oklahoma | IPEC (Match-Suflita Admin) | $25,115 |
| *Kerry Sublette* | Oklahoma State University | IPEC (Match-Gasem Admin) | $26,478 |
| *Kerry Sublette* | Oklahoma State University | IPEC (Match-Fathepure) | $9,780 |
| *Kerry Sublette* | University of Arkansas | IPEC (match-Thoma) | $84,215 |

| | | | |
|---|---|---|---|
| *Kerry Sublette* | U.S. DOE, Idaho National Engineering & Environmental Lab | Bioreactor Design & Demonstration for Microbial Oxidation of Sulfides | $23,000 |
| **TOTAL** | | | **$1,594,190** |

*Numbers based on the University of Tulsa Office of Research 2001-2002 Annual Report

**TABLE 11. Pending Research Projects**
**Department of Chemical Engineering**

**PENDING GRANTS (as of May, 2002) ***

| P.I. | Source | Title | Amount |
|---|---|---|---|
| *Laura Ford* | National Science Foundation | Acquisition of an Ultra-high Vacuum Chamber for Etching Studies & Student Training | $140,003 |
| *Laura Ford* Kerry Sublette | Integrated Petroleum Environmental Consortium | Continuation of Remediation of Brine Spills with Hay (Prime: EPA) | $57,609 |
| *Peter LoPresti* Frank Manning | Integrated Petroleum Environmental Consortium | Locating Oil-Water Interfaces in Process Vessels (Prime: U.S. EPA) | $23,998 |
| *Geoffrey Price* | National Science Foundation | GOALI: High Stability Base Metal Zeolites for Urea-SCR Catalysis | $426,746 |
| *Geoffrey Price* | National Science Foundation | Novel Methods for Ion-Exchange Zeolites | $174,116 |
| *Richard Shaughnessy* | U.S. Environmental Protection Agency | Indoor Air Quality Tools for Schools Implementation Project-Region 6 | $70,000 |
| *Richard Shaughnessy* | Reckitt Benckiser, Inc. | Evaluation of Aerosol Spray Products for Airborne Dust Control | $129,514 |
| *Richard Shaughnessy* | Collins & Aikman | Pilot Study of Flooring Products & Associated Impact on IAQ | $67,908 |
| *Charles Sheppard* Michael Volk Keith Wisecarver | Various Companies | Fundamentals of Delayed Coking | $360,000 |
| *Kerry Sublette* | Oklahoma State Regents for Higher Education | Integrated Petroleum Environmental Consortium (U.S. EPA match), Year 4 | $187,500 |
| *Kerry Sublette* | U.S. Environmental Protection Agency, National Center for Environmental Research and Quality Assurance | Integrated Petroleum Environmental Consortium (IPEC), Year 3 | $694,700 |
| *Kerry Sublette* | University of Tennessee | Biostimulating Native Microbial Communities for the in situ Immobilization of Radionuclides (Prime: U.S. DOE) | $315,012 |
| | | | |

| | | | |
|---|---|---|---|
| *Kerry Sublette* | University of Tennessee | Cost-effective Down-well Assessment of Uranium, Technetium, & Chromium Bioimmobilization Potential by in situ Microbiota using Sterilizable BioTraps (Prime: U.S. DOE, Natural & Bioremediation of Radionuclides) | $16,000 |
| *Kerry Sublette* Laura Ford | Integrated Petroleum Environmental Consortium | Identifying the Signature of Natural Attenuation in the Microbial Ecology of Hydrocarbon Contaminated Groundwater Using Molecular Methods & "Bug Traps" (Prime: U.S. EPA) | $142,047 |
| *Kerry Sublette* Laura Ford | Integrated Petroleum Environmental Consortium | Identifying the Signature of Natural Attenuation of MTBE in Groundwater Using Molecular Methods & "Bug Traps" | $148,887 |
| *Keith Wisecarver* Michael Volk | U.S. Department of Energy | Tulsa University Fundamentals of Delayed Coking Joint Industry Project (pre-application) | $1,020,964 |
| **TOTAL** | | | **$3,975,004** |

*Numbers *not* included in Table 9, External Funding. These are for informational purposes only.

## Table 12. 2002-03 ChE Advisory Board Members

(1) Ellen Boyer
Femgineering
2206 Stafford
Arlington, TX 76012
VOICE: (817) 460-6777
FAX: (309) 273-2848
CELL: (817) 296-3914
Femgineering@sbcglobal.net

(2) Darla Coghill
Tulsa School of Arts & Sciences
5155 E. 51st
Tulsa, OK 74135
VOICE: (918) 828-7727
Darla.Coghill@TSAS.org

(3) Brian Habeck
Dow Chemical Company
West Virginia Operations
P.O. Box 8004, Bldg. 50
South Charleston, WV 25303
VOICE: (304) 747-1757
FAX: (304) 747-3125
PAGER: (304) 341-1889
habeckbd@dow.com

(4) Brenda Habeck
DuPont Corporation
Washington Works
P.O. Box 1217
Parkersburg, WV 26102
VOICE: (304) 863-4561
FAX: (304) 863-4641
brenda.k.habeck@usa.dupont.com

(5) Jay Hawkins
Account Manager
NALCO/Exxon Energy Chemicals, L.P.
605 Robinwood Drive
Robinson, IL 62454
VOICE: (618) 546-1132
jehawkins@nalcoexxon.com

(6) John D. Hottovy
Chevron Phillips Chemical Company, L.P.
101-G PRC
Bartlesville, OK 74004
VOICE: (918) 661-9595
FAX: (918) 661-1709
hottojd@cpchem.com

(7) Dan Lansdown
Domain Engineering Inc.
406 S. Boulder, Suite 234
Tulsa, OK 74103
VOICE: (918) 582-4280, Ext. 11
FAX: (918) 582-4283
dan.lansdown@domain-engineering.com

(8) Reed Melton
President
ThermaTran, Inc.
P.O. Box 35725
Tulsa, OK 74153-0725
VOICE: (918) 748-4406
FAX: (918) 481-5123
thermatran@cox.net

(9) Bob Purinton
Tulsa Heaters, Inc.
1350 S. Boulder, Suite 800
Tulsa, OK 74119-3207
VOICE: (918) 582-9918
FAX: (918) 582-9916
bobpurinton@tulsaheaters.com

(10) Wayne Rumley
President
R&R Engineering Co., Inc.
P.O. Box 700005
Tulsa, OK 74170
VOICE: (918) 252-2571
FAX: (918) 252-2574
WRUMLEY@coolersbyRR.com

(11) Thomas H. Russell
T.H. Russell LLC
4222 E. 72nd Place
Tulsa, OK 74136
VOICE: (918) 481-5682
FAX: (918) 492-7828
t_h_Russell@attglobal.net

(12) Mike Soper, M.D.
Soper Eye Center
329 S. 38th Street
Muskogee, OK 74401
VOICE: (918) 687-9998
FAX: (918) 687-4135
sopereyecenter@hotmail.com

(13) Tom Steiner
Engineering Director
Vapor Recovery Products
John Zink Company
6831 S. 29th W. Avenue
Tulsa, OK 74132
VOICE: (918) 234-2953
FAX: (918) 234-1968
steinert@kochind.com

(14) Kent Van Valkenburgh
Vanco Engineering
7033 E. 40th
Tulsa, OK 74145-4523
VOICE: (918) 627-1920
FAX: (918) 627-6742
kent@vanco-inc.com

(15) W. Wayne Wilson
Manager
Process Technology and Optimization
Conoco, Inc.
P. O. Box 1267
Ponca City, OK 74602-1267
VOICE: (580) 767-3280
FAX: (580) 767-3579
w-wayne.wilson@usa.conoco.com

(16) Stephen Yeretsky
2310 Butler Drive
Friendswood, TX 77546
VOICE: (281) 482-1405
sjyere@houston.rr.com