

STATUS REPORT
CHEMICAL ENGINEERING

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

SEPTEMBER, 2004 - AUGUST, 2005

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GENERAL NEWS

There are a number of noteworthy items to report this year, and here they are in no particular order:

Laura Ford has been tenured and promoted to Associate Professor. Congratulations, Laura!

Christi Patton has been promoted to Applied Associate Professor. Congratulations, Christi!

The student chapter AIChE won the Chem-E-Car distance competition at the Annual AIChE Meeting in Austin last Fall. They followed that up with a win at the international competition in Glasgow, Scotland over the summer. Congratulations, students!

Christi Patton was named the NSF Outstanding Incoming Faculty Advisor in the ChallengeX competition.

Geof Price was named Fellow of the AIChE.

Brandy Fidler won first place in the University of Tulsa 2005 Student Research Colloquium with her presentation "Hydrogen Sulfide Removal from Natural Gas Using Bioregenerable Selective Sorbents-Continuing Studies".

Fride Vullum who won third place with her presentation "Characterization of Lithium Nanobatteries and Lithium Battery Nanoelectrode Arrays" in the University of Tulsa 2005 Student Research Colloquium.

Student numbers are up significantly in the Freshman year. We will work hard again this year to try to recruit a similar number next year.

FACULTY ACTIVITIES

Daniel Crunkleton taught Introduction to Heat Transfer (CHE 1002) and Graduate Fluid Mechanics (CHE7003) in Fall 2005. In Spring 2006, he will teach the Fluid Mechanics (ES 3003) and Heat Transfer (ES 3073).

Daniel is advising 2 graduate students. Zhili Qin is a PhD student working to fabricate and characterize novel configurations of Solid Oxide Fuel Cells. Publications are forthcoming. Aravind Krishnamoorthany is a master's student working with the Challenge X program to model novel hybrid electric vehicle architectures.

Additionally, Daniel is continuing the establishment of a computational materials science research program. For the last 2 summers, he was a Visiting Scientist at the *Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur* (LIMSI) at the *Université de Paris - Paris Sud*. With his collaborators, he is using the tools of Computational Fluid Mechanics to model Fuel Cells. Additionally, in the summer of 2006, he will be a Visiting Scientist at the *Institute for Nonferrous Metals* in Beijing, China to develop computational quantum techniques for nanoscaled fuel cells.

Finally, Daniel is co-advising the *Challenge X: Crossover to Sustainable Mobility* competition with Christi Patton in ChE, John Henshaw in ME, and Robert Strattan and Doug Jussaume in EE. Approximately fifty TU students, including about 20 ChE students. Over the past year, several important pieces of equipment has been donated to TU, including 2 Ballard Nexa fuel cells, a Cobasys NiMH battery, a Ballard motor controller, and a 2005 Chevrolet Equinox, totaling \$60,000 in support.

Laura Ford was granted tenure and promoted to Associate Professor of Chemical Engineering, effective August 2005.

Laura is starting two new positions this fall. In the department, she will be the graduate advisor, responsible for new student admission, initial advising, advisor selection and assignment, and qualifying examination. She will be phasing out as AIChE advisor to pick up this new duty. She will still be active in AIChE as she will begin a four-year term on the Executive Committee of the Student Chapters Committee. This committee monitors all of the student chapters, manages student awards, and puts together the Annual Student Conference.

In 2005 Laura has co-taught both Unit Operations Labs and taught Engineering Science Fluid Mechanics (ES 3003).

Laura is advising Pravin Utekar and Minwoo Kwon, who are working on different aspects of etching metals with α -diketones. Laura is the chemical engineering advisor for several graduate students working under faculty in other departments.

The TU AIChE Chem-E-Car team did very well at competitions this year. They competed in the first international competition, held at the World Congress of Chemical Engineering in Glasgow, Scotland, in July 2005. Our team won this competition! The students have also qualified at the regional conference to compete again at the national conference in fall 2005 and are third on the wait list to compete.

The high school Chem-E-Car Competition continues to bring students to campus, both for the competition and to apply to TU. Drs. Patton and Ford also developed a Chemical Switch competition that debuted at the Tulsa Engineering Challenge this spring. The objective of the competition is to use a chemical reaction to turn a light bulb off after 20 seconds. The goal of hosting the competition is interesting the middle and high school participants in chemical engineering as a career.

Kraemer Luks is working on fundamental classical thermodynamics as applied to the prediction and correlation of phase equilibria. He has recently submitted three papers in this problem area:

- "Solution technique for pure component phase equilibria near the critical point", coauthored with L. N. Stapley (*J. AIChE*)
- "Extending a classical EOS correlation to represent solid-fluid phase equilibria", coauthored with K. Carter (*Fluid Phase Equilibria*)
- "Representing the complete pure-species phase equilibrium thermodynamics", coauthored with C. L. Patton (*Chemical Engineering Education*)

Professor Luks is currently studying problems on the:

- Optimization of discrete heat exchanger systems within a continuous variable domain. Identification of both local and global minima within a bounded variable domain is sought, using eigenvalue-eigenvector techniques for many variable problems.
- Numerical methods for calculating azeotropy and criticality in two- and higher phase systems. This is an extension of earlier work by KDL in the area of phase equilibrium computation.

Professor Luks is currently teaching ES3053 ("Thermodynamics") and ChE3063, ("Equilibrium Thermodynamics"). In the previous semester, Spring 2005, he taught ChE3084 ("Mass Transfer") and ChE7023 ("Advanced Thermodynamics").

Frank Manning taught or cotaught 7 courses (3 in fall 2004, 3 in spring 2005, and 1 in summer 2005) during the 2004-2005 academic year. In addition, Frank taught two mornings (Thermodynamics and Fluid Mechanics and Engineering Economics) of the eight Saturday morning review for the FE exam. This FE review was offered in both the fall and spring semesters.

Frank Manning continues to serve as the College's designated representative to the Midwest Section of ASCE and also attended the Section's Annual meeting in Pittsburg, Kansas where he received the Section's Outstanding Service Award in September 2004.

Frank served as Chair of the College's Teaching Effectiveness Committee and was also a member of the University's Faculty Development Summer Fellowship Selection Committee.

Frank is also a co-principal investigator with Geof Price and Mauricio Papa on Dr. Sujeet Sheno's Homeland Security Grant "Designing Inherently Secure SCADA Systems for the Oil and Gas Industry".

Christi Patton continues to focus on teaching and community outreach while also advising a team of students in an automotive design project. In 2004 she has taught 6 courses. During the Spring semester she taught ChE 1013 (Introduction to Chemical Engineering Problem Solving), ChE 2003 (Principles of Chemical Engineering) and ChE 4113 (Process Control). This Fall she is teaching ChE 1002 (Introduction to Chemical Engineering), ChE 4063 (Reactor Design) and ES 3073 (Heat Transfer). The ChE 1013 course was revised for 2004 to include a strong focus on programming with Visual Basic for Excel. That change benefits the students by allowing us to incorporate these programming skills in upper level courses and by expanding their curriculum to better focus on process control. One measure of the initial success is that a freshman found a summer internship based on her ability to do VBA-Excel programming.

Christi continues as advisor to the departmental honor society which was formally chartered into Omega Chi Epsilon in April, 2004. She also has returned to the position of SWE advisor this year. Working with these organizations and other local organizations, she has expanded the K-12 community outreach programs for the department and college. The Brownie Science and Math Workshop was held March 27 and again on October 23 and is always fully subscribed. In January, TU and the local SWE chapter will host a badge day for older Girl Scouts. November 12 – 13 the student SWE section will host a lock-in for high

school Juniors and Seniors. The ChallengeX project also is busy with outreach activities in public schools. The focus of these presentations is the future of transportation with an emphasis on fuel cells. Once again, she and Laura Ford hosted the high school Chem-E car competition in May. This event will be repeated in May 2005. Early inquiries indicate that interest in this event continues to grow.

Christi has been very busy this year as advisor (along with Daniel Crunkleton and others from ME and EE departments) to the ChallengeX team. ChallengeX is the premier national competition for automobile design. This three-year competition will provide us with an opportunity to participate in hands-on research and development with leading-edge automotive propulsion, fuels, materials, and emissions-control technologies. The team has completed simulations of the Chevy Equinox using Matlab-based software donated by the competition sponsors and is currently running simulations with the planned modifications to the vehicle. Year 1 of the competition focuses on simulations and developing the control system. The last two years of this competition will see the students physically making the necessary modifications to meet our team goals. This has proven to be an excellent opportunity for our students to work with an interdisciplinary team on a major design project.

Geoffrey Price's class schedule last year was ChE 7033 Reaction Kinetics (the core graduate class) for fall, ChE 4013 Lab last spring and ES 3053 Thermodynamics over the summer. He is teaching ChE 7033 this fall. He is always on call to help out with the Honeywell system for lab and is working on implementation of new experiments.

Geof's graduate student, Amit Gujar, finished his PhD and was hooded in the Spring 2005 graduation ceremony. Amit's thesis was "Experimental and Theoretical Study of Lean NO_x Reductions and NO_x Decomposition using SUZ-4 Zeolite". Amit was supported by NSF and GM in his lab studies and was the ConocoPhillips Fellow in 2004-05.

This year, Geof was elected as an AIChE Fellow.

Geof is currently advising Lu Bai on her PhD studies. Lu is supported as the ConocoPhillips Fellow for 2005-06. Lu is currently working on synthesis studies of SUZ-4 zeolite.

Kerry Sublette organized and chaired the 11th International Petroleum Environmental Conference held in October 2004 in Albuquerque, NM attended by over 300 industry, regulatory, and academic professionals. As usual five TU students were provided scholarships to the conference and several presented posters or oral papers. 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 \$8.1 million in federal funding through the VA/HUD Appropriations Bill, \$800,000 in matching state funding, and \$2 million in competitive grants. FY05 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. This licensing agreement is generating a revenue stream for TU. Kerry has also obtained three new federal grants (2 EPA, 1 DOE) to further develop applications of the Bio-Sep technology.

Kerry's recent grant activity has included: 1) the restoration of soil ecosystems following crude oil and brine spills (DOE); 2) development of "smart" propant materials (DOE); 3) bioreactor design for microbial oxidation of hydrogen sulfide (DOE); and 4) 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. Construction was completed in May 2004 on a 7000-ft² research and education building featuring two laboratories, two classrooms, a specimen collection room, library and conference room, two offices, and a student commons area. An existing structure has also been renovated as residential housing. Thus far, over \$2.4 million has been raised for this project. Fundraising is continuing to provide additional operation and maintenance endowments.

Keith Wisecarver taught the graduate Heat and Mass Transfer course, as well as Natural Gas Plant Design and Chemical Engineering Plant Design (with Frank Manning) and Chemical Engineering Lab I (with Laura Ford). He is continuing work on the Fundamentals of Delayed Coking JIP, which is now entering its seventh year total and its third three-year funding cycle. The project has 10 members, including the DOE. More information on this project can be found on the Tulsa University Delayed Coking Project website, www.tudcp.utulsa.edu. In addition to the Delayed Coking project, Keith also continues to be involved with the Hydrate Flow Performance JIP, which looks at gas hydrate formation and prevention in multiphase flow lines. He is currently advising two Phd students and two Masters students, and graduated one Masters student (Elio Raul Trigo) and one PhD student (Hamad Al-Merri) over the past year.

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, 2005:

NAME	CURRENT POSITION
Hasan Shareef Al-Marzouqi	Graduated May, 2005
Luis Hecht	Graduated May, 2005
Adrienne McVey	Graduated May, 2005
Shereen Norizan	Graduated May, 2005

For the first time in several years the undergraduate enrollment in the Department of Chemical Engineering is on the rise. We graduated 11 for 2004/05 and we have a total of 26 new students which includes 22 new freshmen this semester.

Table 1 shows enrollment figures over the past twenty-five 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 continues to decline as does the number of international students. The Middle East still dominates the countries of origin among international students accounting for 33% of those students.

Table 3 shows the distribution of jobs for the December 2004 through May 2005 graduates. All of students who have shown interest in employment have been employed. Most are in energy or petroleum related fields.

TABLE 1. Recent Undergraduate Enrollment Data at Census Date

<u>Year</u>	<u>ENROLLMENTS</u>						<u>B.S.Degrees</u>
	<u>Fr</u>	<u>Soph</u>	<u>Jr</u>	<u>Sr</u>	<u>PT</u>	<u>Total</u>	
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	18
2003-04	17	12	9	16	--	54	16
2004-05	14	12	14	12	--	52	11
2005-06	23	12	12	14	--	61	

Figure 1. Chemical Engineering Undergraduate Enrollment

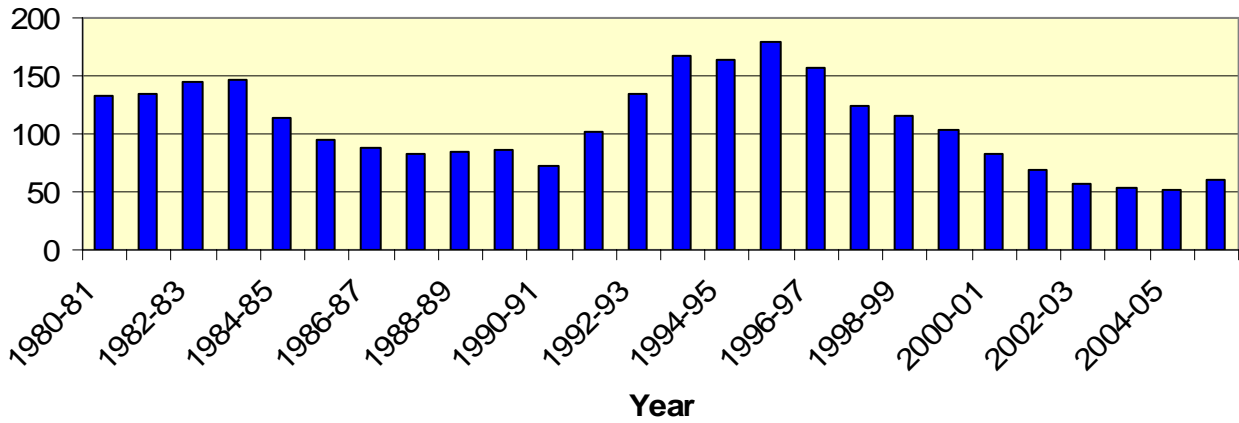


Figure 2. B.S. Chemical Engineering Degrees

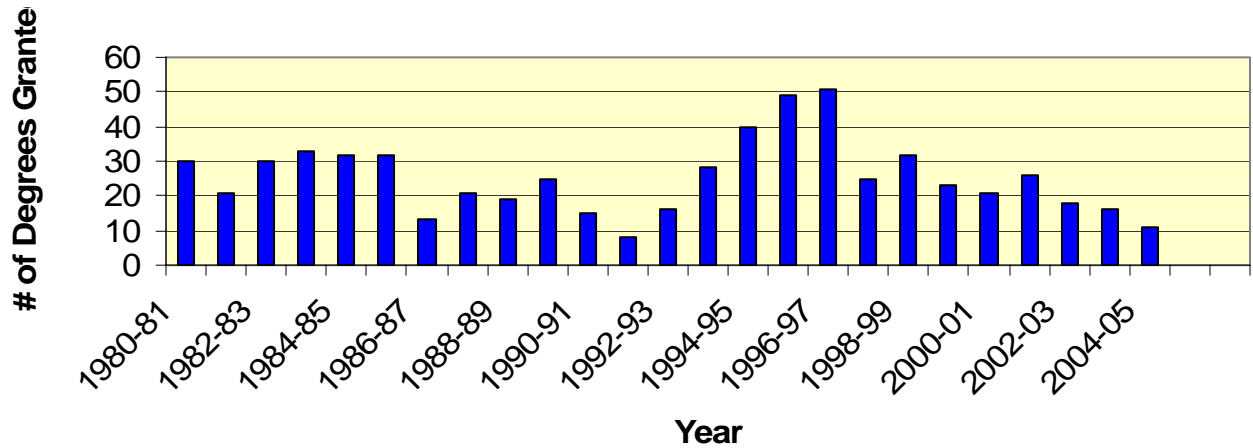


TABLE 2. Undergraduate Student Demographics

<u>Year</u>	<u>Class</u>	<u>Men</u>	<u>Women</u>	<u>International</u>	<u>Total</u>
2004-05	Fr	14	9	4	23
	So	12	0	4	12
	Jr	8	5	5	13
	Sr	<u>11</u>	<u>3</u>	<u>3</u>	<u>14</u>
	Total	44	17	16	62

International Students

	Fr	So	Jr	Sr	Total
Angola			1		1
Canada	1				1
Germany				1	1
Ghana	1				1
India	1				1
Indonesia		1			1
Malaysia				1	1
Qatar		1	2		3
Saudi Arabia		1			1
United Arab Emirates		1			1
Venezuela	1				1
Vietnam			2		2
Total	4	4	5	2	15

Figure 3. Student Demographics

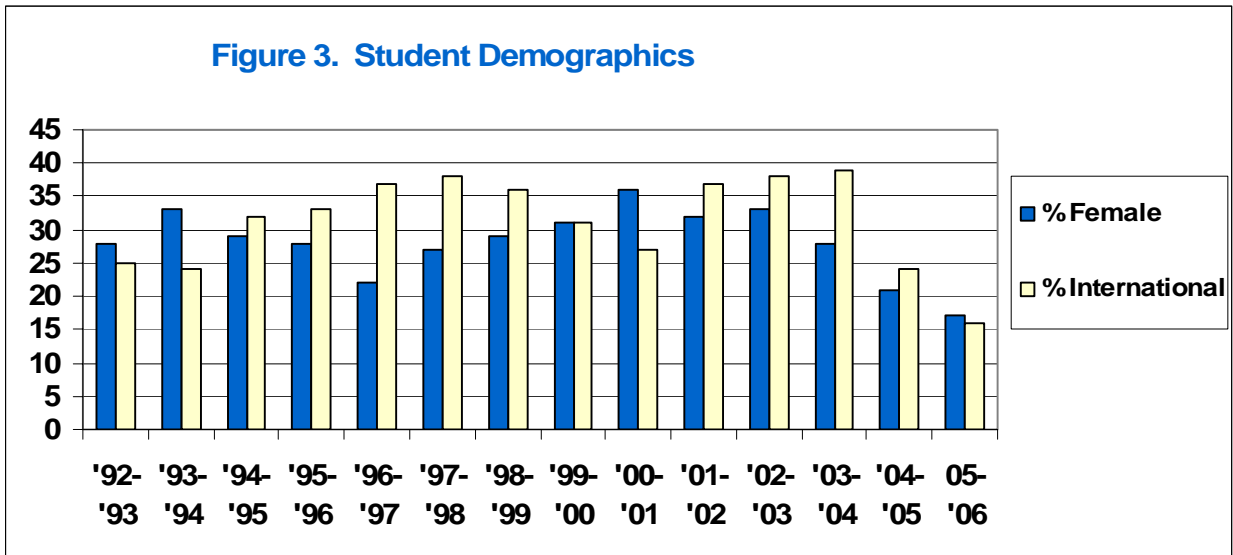


TABLE 3. August 2004 – August 2005 Chemical Engineering B.S. Graduates

NAME	GRAD. DATE	CURRENT PLANS
Al-Dhahri, Abdulla	May 2005	
Al-Mansoori, Khalid	May 2005	
Al-Mansoori, Saeed	May 2005	
Al-Marzouqi, Hasan	May 2005	
Al-Neaimi, Mubarak	May 2005	ADNOC- Abu Dhabi
Bishop, Christina	May 2005	Michelin - Oklahoma
Brown, Remi	December 2005	B.J. Services – Texas
Estrada, Miguel	May 2005	Graduate School – LSU
Hecht, Luis	May 2005	Willbros Engineering – Oklahoma
McVey, Adrienne	May 2005	BP – Alaska
Salemiyan, Abbas	May 2005	

TABLE 4. Current Chemical Engineering Seniors

NAME	GRAD DATE
Al-Mohannadi, Ahmed	December 2005
Bowin, Dane	May 2006
Clagg, Elizabeth	December 2005
Coghill, Phillip	May 2006
Durham, Cory	May 2007
Guldan, Ryan	May 2006
Herriman, Jacob	May 2006
Jackson, Rebecca	May 2007
Kirkland, Jeff	May 2006
Luke, Virginia	May 2006
Norizan, Sheereen	December 2005
Oneal, Timothy	May 2006
Rodriguez, Evangeline	December 2007
Tibbits, Eric	May 2006
Whelan, Matthew	May 2006

GRADUATE PROGRAM

Geoffrey Price continued as Graduate Program Director this year with Keith Wisecarver's assistance in determining suitability for admittance and in matching funding with students. Laura Ford has taken over as Graduate Advisor effective Fall 2005. Kraemer Luks has continued the duties of administering the PhD Qualifying Exam. Graduate enrollment this year is up one student this year. Those who joined us since the last status report include two PhD students from China, four students from India, one student from China and one student from Peru seeking their Masters degrees. 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. **Table 8** gives the graduate student enrollment at the university's census date.

TABLE 5. Recent Graduate Enrollment Data

<u>Year</u>	<u>Fall Enrollment</u>					<u>Graduates</u>	
	<u>Full-Time</u>	<u>Part-Time</u>	<u>MS*</u>	<u>PhD</u>	<u>Total</u>	<u>Masters</u>	<u>PhD</u>
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	11	0
2003-04	26	3	20	9	29	9	0
2004-05	28	2	17	13	30	10	3
2005-06	30	1	19	12	31	10	3

TABLE 8. Includes M.E. students

**TABLE 6. 2004-05 Chemical Engineering
Masters and Ph.D. graduates**

M.E. Degree

Mike Matteson
Amrellah Saeed

M.S. Degree

Kay Akinmade
Sumathi Chandrasekaran
Mahesh Dabbada
Amit Gujar
Aditya Moralwar
Ashok Pushpalayari
Shailendra Singh
Rajesh Subbiah

Ph.D. Degree

Hamad Al-Merri
Amit Gujar
Chintan Mehta

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%
2003-04	90%	10%	69%	31%	79%	21%	73%
2004-05	97%	3%	58%	42%	78%	22%	90%
2005-06	97%	3%	61%	39%	74%	26%	94%

RESEARCH

Research in the department had a minimal decrease from last year, as shown in **Table 9**. Nonetheless, we have had a good year in funding.

TABLE 9. External Funding
Department of Chemical Engineering*

<u>Year</u>	<u>Research Dollars</u>
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
2002-03	\$3,262,267
2003-04	\$2,692,365
2004-05	\$2,267,510

*Numbers based on the University of Tulsa Office of Research 2004-2005 Annual Report, which includes new and continued contracts. Does *not* include pending contracts.

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

NEW AND CONTINUED GRANTS THROUGH MAY, 2005 *

P.I.	Source	Title	Amount
<i>Daniel Crunkleton Christi Patton John Henshaw Robert Strattan Doug Jaussame Rosanne Gamble</i>	General Motors	Challenge X: Crossover to Sustainable Mobility	\$10,000
<i>Pat Hall Nancy Felts Kerry Sublette</i>	Department of Energy, National Petroleum Technology Office	11 th Annual International Petroleum Environmental Conference	\$24,999
<i>Laura Ford</i>	National Science Foundation	UHV Studies of Metals Dry-etching with β -diketones, Year 2 of 3	\$67,224
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Tools for Schools Implementation Project, Region 9	\$20,000
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Tools for Schools Implementation Project, Region 4	\$40,000
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Demonstration & Special Purpose Activities Relating to the Clean Air Act Implementation of the Tools for Schools Indoor Air Quality Program, Region 8	\$43,000
<i>Kerry Sublette</i>	American Petroleum Institute	Analysis of MTBE and TBA Biodegradation Potential in situ Using a New Generation of Bio-Sep	\$78,279
<i>Kerry Sublette</i>	Enogex, Inc.	Measurement, Analysis and Results Reporting of Enogex Field Operating Data Related to Research on Volatile Organic Compound (VOC) Emissions from Atmospheric Stock Tanks	\$25,000
<i>Kerry Sublette</i>	Bechtel	Development of Reactive (Smart) Propan Systems (Prime: Department of Energy).	\$13,083
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Use of Earthworms to Accelerate the Restoration of Oil and Brine Impacted Sites (Prime: Environmental Protection Agency) Year 2	\$229,854
<i>Kerry Sublette</i>	ConocoPhillips	Use of Earthworms to Accelerate the Restoration of Oil and Brine Impacted Sites (Prime: Environmental Protection Agency) IPEC match, Year 2	\$3,750
<i>Kerry Sublette</i>	Chevron Texaco Energy Research & Technology Co., Environmental Unit	Use of Earthworms to Accelerate the Restoration of Oil and Brine Impacted Sites (Prime: Environmental Protection Agency), IPEC match, Year 2	\$25,000
<i>Kerry Sublette</i>	Environmental Protection Agency, National Center for Environmental Research and Quality Assurance	Integrated Petroleum Environmental Consortium, Year 6 (IPEC)	\$871,900
SUB-TOTAL			\$1,452,089

*Numbers based on the University of Tulsa Office of Research 2004-2005 Annual Report

NEW GRANTS AND CONTRACTS *CONTINUED* THROUGH MAY, 2004

<i>P.I.</i>	Source	Title	Amount
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Use of Earthworms to Accelerate the Restoration of Oil and Brine Impacted Sites (Prime: Environmental Protection Agency). Year 2 (IPEC match)	\$32,351
<i>Keith Wisecarver</i> Mike Volk	Various Companies	Fundamentals of Delayed Coking	\$440,000
<i>Keith Wisecarver</i> Mike Volk	Department of Energy	Tulsa University Fundamentals of Delayed Coking Joint Industry Project, Year 2 of 3	\$340,000
<i>Keith Wisecarver</i> Mike Volk	Baker Petrolite	Tulsa University Fundamentals of Delayed Coking Joint Industry Project (DOE match)	\$3,070
TOTAL			2,267,510

*Numbers based on the University of Tulsa Office of Research 2004-2005 Annual Report

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

PENDING GRANTS AS OF MAY 2005*

P.I.	Source	Title	Amount
<i>Daniel Crunkleton</i>	American Chemical Society, Petroleum Research Fund	Development of Mixed Scandia-YSZ Electrolytes for Solid Oxide Fuel Cells	\$35,000
<i>Daniel Crunkleton</i>	National Science Foundation, Course Curriculum , and Laboratory Improvement	CCLI: Integration of Fuel Cell Experimentation at the University of Tulsa	\$95,989
<i>Daniel Crunkleton</i>	Department of Energy	Nanostructured Solid Electrolytes Using Ceramic Templates, Preliminary Proposal	\$265,279
<i>Geoffrey Price</i>	National Science Foundation, Chemical Transport Systems	Novel Methods for Ion-Exchange of Zeolites	\$244,570
<i>Richard Shaughnessy</i>	U.S. Environmental Protection Agency	Tools for Schools Implementation Project Region 6	\$31,000
<i>Richard Shaughnessy</i>	U.S. Environmental Protection Agency	Tools for Schools Implementation Project Region 9	\$19,950
<i>Richard Shaughnessy</i>	U.S. Environmental Protection Agency	Tools for Schools Implementation Project Region 8	\$111,398
<i>Kerry Sublette</i>	Department of Energy, INEEL	Development of Smart Proppant Technology for Hydraulic Fracturing	\$34,877
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Developing a Low-cost Approach to the Remediation and Restoration of Historic Brine Scars (Prime: Environmental Protection Agency)	\$90,372
<i>Kerry Sublette</i>	Various Companies	Developing a Low-cost Approach to the Remediation and Restoration of Historic Brine Scars (Prime: Environmental Protection Agency, IPEC match)	\$32,533
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Assessing Biodegradation Potential Using InSitu Microcosms and 13C-labeled Hydrocarbons (Prime: Environmental Protection Agency) pre-proposal	\$61,030
<i>Kerry Sublette</i>	Microbial Insights	Assessing Biodegradation Potential Using InSitu Microcosms and 13C-labeled Hydrocarbons IPEC match pre-proposal	\$30,570
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Nematodes as Ecological Indicators of Soil Ecosystem Restoration at E&P Sites (Prime: Environmental Protection Agency)	\$81,700
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Nematodes as Ecological Indicators of Soil Ecosystem Restoration at E&P Sites (IPEC Match)	\$10,000
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Toward Improved Monitoring and Control of Microbiologically Influenced Corrosion (MIC)	\$12,375
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium (IPEC)	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA contaminated Aquifers using a New Generation of Bio-Sep (Prime: Environmental Protection Agency)	\$209,912
SUB-TOTAL			\$1,366,555
<i>Kerry Sublette</i>	Various Companies	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA	\$58,999

		contaminated Aquifers using a New Generation of Bio-Sep IPEC match pre-proposal	
<i>Kerry Sublette</i>	University of Tennessee Biogeosciences	Collaborative Proposal: Microbially Mediated Carbon Transformation Coupled to Sulfur Cycling in Deep Subsurface Fissure Waters (Prime: NSF)	\$40,650
<i>Kerry Sublette</i>	Environmental Protection Agency	Integrated Petroleum Environment Consortium	\$1,599,300
<i>Keith Wisecarver Mike Volk</i>	Various Companies	The Fundamentals of Delayed Coking – Phase III	\$2,289,042
<i>Keith Wisecarver Mike Volk</i>	Department of Energy	The Fundamentals of Delayed Coking – Phase III (match)	\$135,000
TOTAL			\$5,489,546

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



***W. L. NELSON CHEMICAL ENGINEERING
ALUMNI SCHOLARSHIP ENDOWMENT FUND***

***FINANCIAL REPORT
JUNE 1, 2004 - MAY 31, 2005***

Beginning value	\$79,204.93
Contributions	\$12,546.00
Gains/loss	\$ 1,433.08
Transfers to/from	\$0.00
Unrealized gains/loss	<u>\$31,000.00</u>
Closing value	<u>\$96,284.01</u>

IMPORTANT NOTES REGARDING YOUR ENDOWMENT:

- The book value does not reflect contributions made to the endowment since June 1, 2005.
- For the year ending May 31, 2005, the rate of return for TU's endowment pool was 12.17% and the annualized 10-year return was 10.97%. The rate of return for the previous fiscal year was 19.39% and the annualized 10-year return was 10.81%.

GLOSSARY OF TERMS:

Endowment Account

An endowment account is established when a gift instrument conveying funds to the university requires the funds to be maintained in perpetuity. This means that the university may not expend the principal amount of the gift, but may expend the income and market appreciation derived from investing the funds. The principal amount of the gift is accounted for in an endowment account.

Book Value

The book value of an endowment is equal to the actual cash or securities received for the original gift, plus any additional donations made to the endowment since that time. The additions may come from gifts by donors or from the reinvestment of distributed income. The book value also includes realized and unrealized gains and losses.

Market Value

The market value of an endowment is defined as the amount that a seller may expect to obtain in the open market.

Unrealized Gains

Unrealized gains occur when the value of an investment increases even though the investment has not yet been sold.

Realized Gains

Realized gains occur when an investment is sold for more than the original purchase price.



***W. L. NELSON CHEMICAL ENGINEERING
ALUMNI SCHOLARSHIP ENDOWMENT FUND***

***FINANCIAL REPORT
JUNE 1, 2003 - MAY 31, 2004***

Beginning value	\$30,418.72
Contributions	43,057.66
Gains/loss	936.74
Transfers to/from	0.00
Unrealized gains/loss	<u>4,791.81</u>
Closing value	<u>\$79,204.93</u>

IMPORTANT NOTES REGARDING YOUR ENDOWMENT:

- The book value does not reflect contributions made to the endowment since June 1, 2004.
- In the past TU has reported book and market values for endowments. These figures were not always equal because book values did not include unrealized gains resulting from increases in value even though investments had not yet been sold. Beginning with the 2004-2005 fiscal year, TU is including unrealized gains in the book value of each endowment, which means that the book value is the same as the market value.
- For the year ending May 31, 2004, the rate of return for TU's endowment pool was 19.39% and the annualized 10-year return was 10.81%. The rate of return for the previous fiscal year was -1.17% and the annualized 10-year return was 10.11%.

GLOSSARY OF TERMS:

Endowment Account

An endowment account is established when a gift instrument conveying funds to the university requires the funds to be maintained in perpetuity. This means that the university may not expend the principal amount of the gift, but may expend the income and market appreciation derived from investing the funds. The principal amount of the gift is accounted for in an endowment account.

Book Value

The book value of an endowment is equal to the actual cash or securities received for the original gift, plus any additional donations made to the endowment since that time. The additions may come from gifts by donors or from the reinvestment of distributed income. The book value also includes realized and unrealized gains and losses.

Market Value

The market value of an endowment is defined as the amount that a seller may expect to obtain in the open market.

Unrealized Gains

Unrealized gains occur when the value of an investment increases even though the investment has not yet been sold.



*W.L. NELSON CHEMICAL ENGINEERING
ALUMNI SCHOLARSHIP ENDOWMENT FUND*

OUTSTANDING PLEDGES

\$2,786.24



***W. L. NELSON CHEMICAL ENGINEERING
ALUMNI SCHOLARSHIP ENDOWMENT FUND***

2004-2005 RECIPIENT INFORMATION

<u>RECIPIENT</u>	<u>AWARD</u>	<u>HOMETOWN</u>	<u>MAJOR</u>	<u>CLASS YEAR</u>
Taylor Coleman	\$1,500.00	Jonesboro, LA	Chemical Engineering	Freshman



***W.L. NELSON CHEMICAL ENGINEERING
ALUMNI SCHOLARSHIP ENDOWMENT FUND***

2005-2006 RECIPIENT INFORMATION

<u>RECIPIENT</u>	<u>AWARD</u>	<u>HOMETOWN</u>	<u>MAJOR</u>	<u>CLASS YEAR</u>
Tricia Kaiser	\$ 1,000.00	Albuquerque, NM	Chemical Eng.	Freshman
Kyle Smith	\$ 1,000.00	Owasso, OK	Chemical Eng.	Freshman
Total Award	\$ 2,000.00			

Table 12. 2004-05 ChE Advisory Board Members

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