

**STATUS REPORT**  
**CHEMICAL ENGINEERING**

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

**SEPTEMBER, 2005 - AUGUST, 2006**

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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:

We had a largely successful ABET visit though some problems with our assessment processes were noted.

Wayne Wilson was inducted in the Engineering & Natural Sciences Hall of Fame. Congratulations, Wayne!

Kerry Sublette was recognized with an Environmental Geosciences Teaching Award from the American Association of Petroleum Geologists. Congratulations, Kerry!

Christi Patton was elected chair of the American Society for Engineering Education Midwest Section for 2006-2007.

Student numbers are also in the good range this year with 27 students in our freshman class. This is the second year in a row with 25 or more in the freshman class.

Kerry Sublette was appointed by Governor Henry, and confirmed by the State Legislature to the Oklahoma Environmental Quality Board for a term expiring January 31, 2008.

ChE Senior Michael DeShazer was named as one of Tulsa University's Top Ten Seniors. Michael was also named as one of the University's Top Ten Freshman in his freshman year.

## FACULTY ACTIVITIES

**Daniel Crunkleton** taught Introduction to Chemical Engineering (CHE 1002) and Heat Transfer (ES 3073) in Fall 2006. In Spring 2007, he will teach Principles of Chemical Engineering (CHE 2003) and Heat Transfer (ES 3073).

Daniel is advising Zhili Qin, a PhD student working to fabricate and characterize novel configurations of Solid Oxide Fuel Cells. Publications are forthcoming. Aravind Krishnamoorthany graduated with 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 3 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. He has also submitted a solicited proposal to study sand interaction with pipe walls in multiphase flow and has received extremely positive feedback from the funders.

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 in EE. One publication has been submitted resulting from his Challenge X participation, with another almost ready. Daniel has also transformed his participation with Challenge X into a research program in biodiesel production and characterization. He currently has three separate research proposals under consideration. One to OCAST for the construction of a portable feedstock characterization system, another to Tulsa Biofuels, LLC, for the establishment of a Biodiesel Research Laboratory at TU, and another with Geof Price for studying various reactor conditions under which biodiesel can be produced.

**Laura Ford** taught both Unit Operations labs and Engineering Science Fluid Mechanics in the 2005/2006 year.

Two new graduate students joined the department in Spring 2005, and seven new students started Fall 2006. Laura is working with Hope Geiger in the Graduate School to produce new promotional material for the graduate programs.

Laura is advising Pravin Utekar, who is working on etching metals with  $\beta$ -diketones. Laura is the chemical engineering advisor for several graduate students working under faculty in other departments.

The TU AIChE Chem-E-Car team placed 2<sup>nd</sup> in the national poster competition in Oct. 2005. The high school Chem-E-Car Competition continues to roll.

The Chemical Switch Competition at the Tulsa Engineering Challenge took off in 2006 with 7 middle school and 6 high school participants. 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,” L. N Stapley and K D Luks *J. AIChE* **52**, 1594-1599 (2006).

“Extending a Classical EOS Correlation to Represent Solid-Fluid Phase Equilibria,” K. Carter and K. D. Luks *Fluid Phase Equil.* **243**, 151-155 (2006).

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 ChE7003 ("Advanced Fluid Mechanics") and ChE3063, ("Equilibrium Thermodynamics"). In the previous semester, Spring 2006, he taught ChE3084 ("Mass Transfer") and ChE7023 ("Advanced Thermodynamics").

**Frank Manning** taught or cotaught 8 courses (3 in Fall 2005, 3 in Spring 2006, and 2 in Summer 2006) during the 2005-2006 academic year. In addition, Frank taught two morning (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 serviced on the College's Teaching Effectiveness Committee and was also a member of the University's Faculty Development Summer Fellowship Selection Committee.

Frank was also a co-investigator with Geof Price and Mauricio Papa on Dr. Sujet 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 the Spring semester of 2006, she taught three courses: ChE 1013 (Introduction to Chemical Engineering Problem Solving) which primarily teaches programming in Excel including the use of Visual Basic; ChE 2003 (Principles of Chemical Engineering, fondly known as Stoich); and ChE 4113 (Process Control). This was the last time for ChE 4113 to be taught with the old curriculum. The course will be resurrected in the Spring 2007 semester with an updated and hands-on approach. For the Fall term, she is teaching three courses in four sections. She has 76 students in two sections of ES 3053 (Engineering Thermodynamics). ChE 3112 (Introduction to Process Control) is a math-intensive blend of transient material and energy balances plus an introductory look at simple feedback control. This is the second time this course has been taught. It will prepare the students for the new and improved ChE 4113 that begins in the Spring. She also is the instructor-of-record for ES 3861 which is our "Special Projects Seminar" class for the Challenge X competition team.

Christi continues as advisor to Omega Chi Epsilon (the ChE Honor Society) and SWE. These groups remain very active. Most recently, 150 second- and third-grade Brownies were on campus for Brownie Day. SWE will be hosting their third High School Girls' Engineering and Science Retreat on October 27 - 28. If you know girls who would be interested in attending this event, further information can be found at [www.orgs.utulsa.edu/swe/](http://www.orgs.utulsa.edu/swe/).

The Tulsa Challenge X team performed very well at our competition in June 2006 in Mesa, AZ. Despite some mechanical problems, we managed to compete in every event and finished in the top half (8<sup>th</sup> place) for the year. This is most impressive since we are new to this level of competition. Christi has been elected to the Faculty Advisory Board to help with structuring the rules of this and future competitions.

This Fall, she has started the TU chapter of Engineers Without Borders. They have selected a first project which will be to build a sustainable power plant in northeast China. The design team will be looking at wind, solar, hydro and geothermal power options and the converters and power blending necessary to make this happen. A technical site survey is planned for Spring 2007 with an eye toward implementing phase one of these power plants in Summer 2007.

Christi is also very involved nationally in two professional organizations. Christi is in the middle of a three year term as chair of the Women's Initiatives Committee (WIC) of AIChE and will serve for the next two years on the Special Interests Operating Council (SIOC) of AIChE. Additionally, Christi has been elected is chair-elect of the Midwest Section of ASEE (The American Society of Engineering Education) and serves as campus representative at TU for this organization.

**Geoffrey Price's** class schedule last year was ChE 7033 Reaction Kinetics (the core graduate class) for fall, ChE 4013 Lab last spring.

Improvements in the undergraduate lab continue. CO<sub>2</sub> monitoring devices which have a range of 0 – 1000 ppm CO<sub>2</sub> (atmospheric CO<sub>2</sub> exists at about 400 ppm) have been added to the inlet and outlet of the packed column experiment so that a mass transfer experiment can be added to the senior lab class. Dilute NaOH solution is circulated in this experiment rather than water, and this solution is capable of reducing the CO<sub>2</sub> to below 50 ppm. A HYSYS simulation is currently being performed by a graduate student so that a suitable experimental procedure can be developed.

A major development in research work this year has been receipt of a \$200k contract with Syntroleum to investigate dehydrogenation of linear paraffins. A new reactor system featuring a Carberry stirred catalytic reactor was constructed last spring in the special projects building at North Campus, and the system was run primarily over the summer to gather kinetic data which Syntroleum needs for design purposes. The system uses a charge of about 10-15 g of catalyst and has a throughput equivalent to about 2 gallons of liquid hydrocarbon per day. Operating pressures to about 1000 psig and operating temperatures of about 1000°F are achievable.

Geof is currently advising two students. Lu Bai is in her third year of study toward a PhD, and she is supported as the ConocoPhillips Fellow for 2006-07. Lu is currently working on synthesis studies of SUZ-4 zeolite. Minwoo Kwon is working on his Master's degree and has been responsible for the operation of the Syntroleum reactor system. He is slated to finish this semester.

**Kerry Sublette** organized and chaired the 12<sup>th</sup> International Petroleum Environmental Conference held in November 2005 in Houston, TX attended by over 300 industry, regulatory, and academic professionals. As usual several 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 \$10 million in federal funding through the VA/HUD Appropriations Bill, \$800,000 in matching state funding, and \$2 million in competitive grants. FY07 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 two new patents 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 recently obtained three new grants (2 EPA/IPEC, 1 API) 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 (EPA/IPEC); 2) development of ecological indicators of

soil ecosystem restoration (EPA/IPEC); and 3) use of Bio-Sep bug traps to evaluate natural attenuation of hydrocarbons and MTBE in groundwater (EPA/IPEC/API).

Kerry continues to serve on the Facilities Board of the Tallgrass Prairie Ecological Research Station. The Board is currently negotiating with Oklahoma State University regarding their joining the Research Station consortium and their share of fundraising efforts. Kerry was recently recognized by the America Association of Petroleum Geologists with the 2006 teaching award in environmental geosciences and has been appointed by Governor Henry to the Oklahoma Environmental Quality Board.

**Keith Wisecarver** taught graduate Heat and Mass Transfer and co-taught Natural Gas Plant Design, Chemical Engineering Plant Design, Petroleum Refinery Design, and Chemical Engineering Lab I. His research work continues to center around the Fundamentals of Delayed Coking JIP, which is still going strong. More information on this project can be found on the Tulsa University Delayed Coking Project website, [www.tudcp.utulsa.edu](http://www.tudcp.utulsa.edu). In addition to the Delayed Coking project, Keith has been involved with the Hydrate Flow Performance JIP, and with Geof Price on a research grant from Syntroleum. Keith is currently advising three PhD students and two Masters students.

## 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, 2006:

NAME	CURRENT POSITION
Phillip Coghill	Graduated May, 2006
Virginia Luke	Graduated May, 2006

For the first time in several years the undergraduate enrollment in the Department of Chemical Engineering is on the rise. We graduated 12 for 2005/06 and we have a total of 29 new students which includes 27 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.

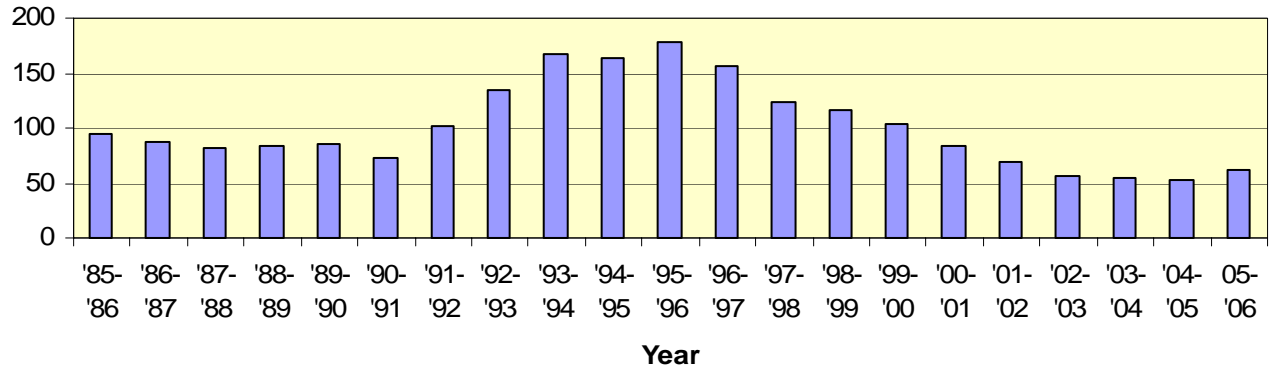
**Table 2** shows the demographics of the undergraduate student body. Female students and international students as percentages of the total for recent years are shown in **Figure 3**. The number of female students continues to decline as does the number of international students. The Middle East still dominates the countries of origin among international students accounting for 31% of those students.

**Table 3** shows the distribution of jobs for the December 2005 through May 2006 graduates. All of students who have shown interest in employment have been employed. Most are in energy or petroleum related fields.

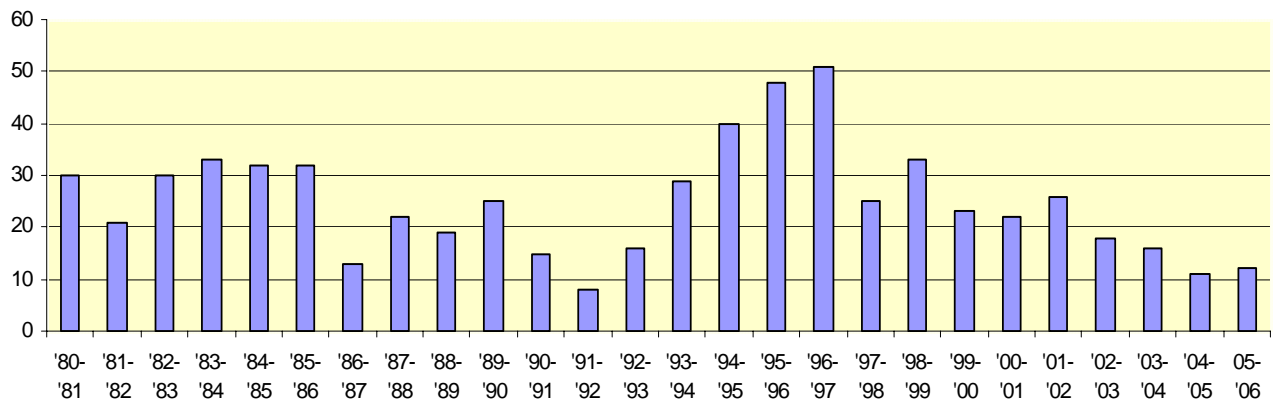
**TABLE 1. Recent Undergraduate Enrollment Data at Census Date**

<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	12
2006-07	27	15	14	12	--	68	

**Figure 1. Chemical Engineering Undergraduate Enrollment**



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



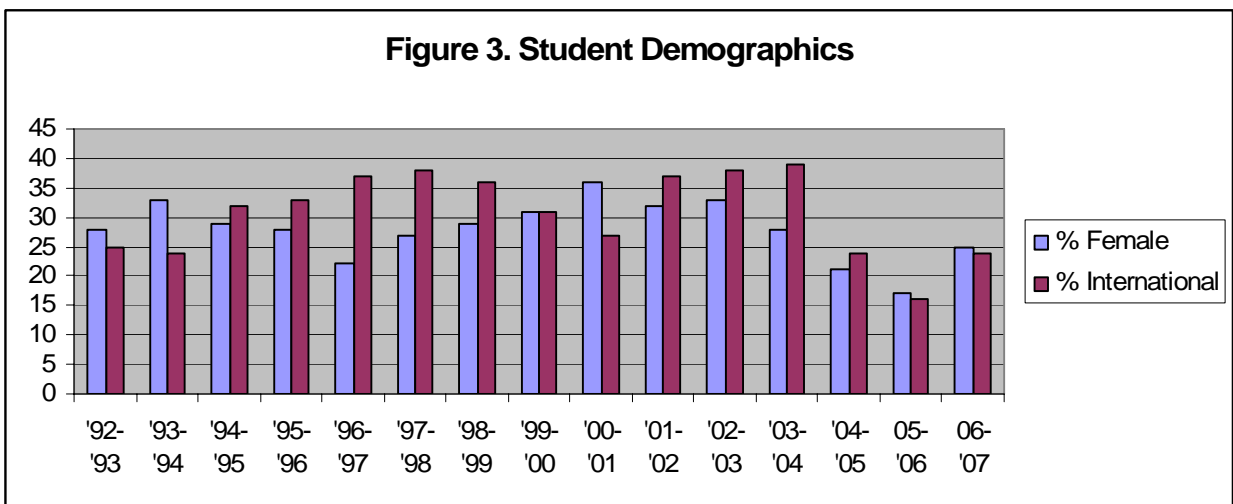
**TABLE 2. Undergraduate Student Demographics**

<u>Year</u>	<u>Class</u>	<u>Men</u>	<u>Women</u>	<u>International</u>	<u>Total</u>
2005-06	Fr	19	8	7	27
	So	10	5	3	15
	Jr	10	4	4	14
	Sr	<u>6</u>	<u>6</u>	<u>7</u>	<u>12</u>
	<b>Total</b>	<b>45</b>	<b>23</b>	<b>21</b>	<b>68</b>

**International Students**

	<b>Fr</b>	<b>So</b>	<b>Jr</b>	<b>Sr</b>	<b>Total</b>
Angola				1	1
Canada	1				1
China				1	1
Germany				1	1
Ghana			1		1
India		1			1
Indonesia		1	1		2
Qatar				2	2
Saudi Arabia	5		1		6
United Arab Emirates	1		1		2
Venezuela		1			1
Vietnam				2	2
<b>Total</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>7</b>	<b>21</b>

**Figure 3. Student Demographics**



**TABLE 3. August 2006 – August 2007 Chemical Engineering B.S. Graduates**

<b>NAME</b>	<b>GRAD. DATE</b>	<b>CURRENT PLANS</b>
Dane Bowin	May 2006	Schlumberger
Elizabeth Clagg	December 2005	R.L. Hudson Company
Phillip Coghill	May 2006	Graduate School
Ryan Guldán	May 2006	EnCana
Samuel Herriman	May 2006	Syntroleum
Virginia Luke	May 2006	Calnetics, Inc.
Sheereen Norizan	December 2005	
Timothy Oneal	May 2006	Graduate School
Eric Tibbits	May 2006	ConocoPhillips
Matthew Whelan	May 2006	John Zink Company

**TABLE 4. Current Chemical Engineering Seniors**

<b>NAME</b>	<b>GRAD DATE</b>
Al-Hamadi, Mohammed	December 2006
Bui, Ly	May 2007
Durham, Cory	May 2007
Heitzman, Steve	May 2007
Jacinto, Liures	December 2006
Jackson, Rebecca	May 2007
Kirkland, Jeff	May 2006
Marx, Dorian	May 2008
Ngo, Thu	May 2007
Raffensperger, Valerie	December 2006
Sharida, Rashid	December 2007
Stover, Mark	May 2007
Wang, Xindi	December 2006

## GRADUATE PROGRAM

Laura Ford continued as Graduate Advisor effective Fall 2005. Kraemer Luks has continued the duties of administering the PhD Qualifying Exam. Those who joined us since the last status report include two PhD students one from India and one from the USA, five students from India, one student from Venezuela and one student from USA 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
2006-07	28	0	19	9	28		

**TABLE 6. 2005-06 Chemical Engineering  
Masters and Ph.D. graduates**

M.E. Degree

Zhong Zhong

M.S. Degree

Prashanth Bantwal Rama

Sireesh Boya

Julio Suarez

Suyog Shah

Karthikk Sridharan

Simona Duplat

Aravind Krishnamoorthy

Raul Trigo

Vamsi Jamalapuram

Ph.D. Degree

Chitti Lekkala

Fride Vullum

**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%
2006-07	100%	0%	68%	32%	54%	46%	82%

## RESEARCH

Research in the department had a strong increase from last year, due mainly to new joint projects with petroleum engineering and some new funding sources as shown in **Table 9**.

**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
2005-06	\$4,660,574

\*Numbers based on the University of Tulsa Office of Research 2005-2006 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, 2006 \***

<b>P.I.</b>	<b>Source</b>	<b>Title</b>	<b>Amount</b>
<i>Daniel Crunkleton</i>	University of Oklahoma – EPSCoR Travel Grant	Nanoscaled Solid Oxide Fuel Cells (Prime NASA)	\$839
<i>Laura Ford</i>	National Science Foundation	UHV Studies of Metals Dry-etching with □ - diketones, Year 3 of 3	\$69,208
<i>Richard Shaughnessy</i>	Environmental Protection Agency, Region 9	Indoor Air Quality Tools for Schools, Year 2	\$18,000
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Tools for Schools Implementation Project, Region 6	\$31,000
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Tools for Schools Implementation Project, Region 4	\$37,800
<i>Richard Shaughnessy</i>	Environmental Protection Agency	Tools for Schools Implementation Project, Region 8	\$26,000
<i>Richard Shaughnessy</i>	Dallas Independent School District	Tools for Schools Database Development and Training Project	\$20,000
<i>Richard Shaughnessy</i>	Various Companies	Indoor Air Quality and Academic Performance on Public Schools	\$58,260
<i>Richard Shaughnessy</i>	Environmental Protection Agency, Region 6	Tools for Schools Implementation Project and Asthma Outreach Training	\$59,122
<i>Richard Shaughnessy</i>	Air Cleaning Technologies, Inc.	Implementation Proposal Related to the Control of Diesel Exhaust Emissions at a Fire Station in Lawton, Oklahoma	\$17,533
<i>Richard Shaughnessy</i>	Collins and Aikman	Study of Flooring Products and Associated Impacts on IAQ	\$102,249
<i>Kerry Sublette</i>	Environmental Protection Agency	Integrated Petroleum Environmental Consortium, Year 1 of 4	\$1,599,400
<i>Kerry Sublette</i>	The University of Oklahoma	Integrated Petroleum Environmental Consortium (Prime: Environmental Protection Agency), Year 1 of 4, (IPEC Match)	\$95,000
<i>Kerry Sublette</i>	Oklahoma State University	Integrated Petroleum Environmental Consortium (Prime: Environmental Protection Agency), Year 1 of 4, (IPEC Match)	\$116,747
<i>Kerry Sublette</i>	University of Arkansas	Integrated Petroleum Environmental Consortium (Prime: Environmental Protection Agency), Year 1 of 4, (IPEC Match)	\$121,015
<i>Kerry Sublette</i>	The University of Oklahoma	Integrated Petroleum Environmental Consortium (Prime: Environmental Protection Agency), Year 1 of 4, (IPEC Match)	\$167,123
<i>Kerry Sublette</i>	University of Arkansas	Integrated Petroleum Environmental Consortium (Prime: Environmental Protection Agency), Year 1 of 4, (IPEC Match)	\$41,421
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA contaminated Aquifers using a new generation of	\$139,986

		Bio-Sep (Prime: Environmental Protection Agency) – Redistribution of Funds	
<i>Kerry Sublette</i>	Atlantic Richfield Company	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA contaminated Aquifers using a new generation of Bio-Sep (IPEC match)	\$20,000
<i>Kerry Sublette</i>	Microbial Insights	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA contaminated Aquifers using a new generation of Bio-Sep (IPEC match)	\$12,150
<i>Kerry Sublette</i>	University of Tennessee	Analysis of MTBE and TBA Biodegradation Potential and Remediation of MTBE and TBA contaminated Aquifers using a new generation of Bio-Sep (IPEC match)	\$21,530
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium	Assessing Biodegradation Potential Using In Situ Microcosms and 13C-labeled Hydrocarbons, (Prime: Environmental Protection Agency) – Redistribution of Funds	\$86,986
<i>Kerry Sublette</i>	Atlantic Richfield Company	Assessing Biodegradation Potential Using In Situ Microcosms and 13C-labeled Hydrocarbons, (IPEC match)	\$20,000
<i>Kerry Sublette</i>	Microbial Insights	Assessing Biodegradation Potential Using In Situ Microcosms and 13C-labeled Hydrocarbons, (IPEC match)	\$16,200
<i>Kerry Sublette</i>	University of Tennessee	Assessing Biodegradation Potential Using In Situ Microcosms and 13C-labeled Hydrocarbons, (IPEC match)	\$14,370
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium	Developing a low-cost approach to the remediation and restoration of Historic Brine Scars (Prime: Environmental Protection Agency) – Redistribution of Funds	\$52,155
<i>Kerry Sublette</i>	Atlantic Richfield Company	Developing a low-cost approach to the remediation and restoration of Historic Brine Scars (IPEC match)	\$15,000
<i>Kerry Sublette</i>	Tallgrass Prairie	Developing a low-cost approach to the remediation and restoration of Historic Brine Scars (Prime: Environmental Protection Agency) – Redistribution of Funds	\$805
<i>Kerry Sublette</i>	Integrated Petroleum Environmental Consortium	Nematodes as Ecological Indicators of Soil Ecosystem Restoration at E&P Sites (Prime: Environmental Protection Agency) – Redistribution of Funds	\$104,337
<i>Kerry Sublette</i>	Microbial Insights	Nematodes as Ecological Indicators of Soil Ecosystem Restoration at E&P Sites (IPEC match)	\$12,000
<i>Cem Sarica</i> Keith Wisecarver Michael Volk	United States Department of the Interior, Minerals Management Service	Joint Industry Project to Study Risk-Based Restarts of Untreated Subsea Oil and Gas Flowlines in the GoM	\$255,000
<i>Keith Wisecarver</i> Geoffrey Price	Syntroleum Corporation	Investigation of n-Paraffin Dehydrogenation Kinetics (Prime: Department of Defense)	\$218,548
<i>Keith Wisecarver</i> Cem Sarica Michael Volk	Chevron Corporation (DEEPSTAR)	Database Generation	\$430,000
<i>Cem Sarica</i> Keith Wisecarver Michael Volk	U.S. Department of Energy/National Energy Technology Laboratory	Membership in Tulsa University Hydrate Flow Performance Joint Industry Project, Year 5	\$25,000

<i>Cem Sarica</i> Keith Wisecarver Michael Volk	Department of Interior, Minerals Management Service	Hydrate Flow Performance, Year 5	\$45,000
<i>Cem Sarica</i> Keith Wisecarver Michael Volk	Various Companies	Tulsa University Hydrate Flow Performance Joint Industry Project	\$180,000
<i>Keith Wisecarver</i> Michael Volk	Various Companies	The Fundamentals of Delayed Coking	\$410,790
<b>SUB-TOTAL</b>			<b>\$4,660,574</b>

\*Numbers based on the University of Tulsa Office of Research 2005-2006 Annual Report

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

**PENDING GRANTS AS OF MAY 2006\***

<b>P.I.</b>	<b>Source</b>	<b>Title</b>	<b>Amount</b>
<i>Daniel Crunkleton</i>	Blitz USA	Failure Analysis of Combustible Liquid Storage Containers	\$12,586
<i>Dale Teeters Scott Holmstrom George Miller Geoffrey Price and others</i>	National Science Foundation, Major Research Instrumentation	Collaborative Research: Acquisition of a Field Emission Scanning Electron Microscope and an Electron Beam Lithography System	\$90,835
<i>Richard Shaughnessy</i>	U.S. Environmental Protection Agency	Tools for Schools Implementation Project – Sacramento City Schools, Region 9	\$18,000
<i>Patricia Hall Nancy Felts Kerry Sublette</i>	US Department of Energy, NETL	13 <sup>th</sup> Annual International Petroleum Conference	\$24,999
<i>Kerry Sublette</i>	Environmental Protection Agency, National Center for Environmental Research and Quality Assurance, FY 07	Integrated Petroleum Environmental Consortium	\$1,160,700
<b>TOTAL</b>			<b>\$ 1,307,120</b>

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

\*\*Numbers based on the University of Tulsa Office of Research 2005-2006 Annual Report.

**Table 12. 2005-06 ChE Advisory Board Members**

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