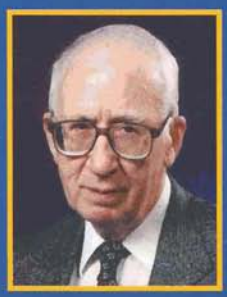
School of Chemical Engineering and Materials Science

OkChE

Spring 2000

OklahomaChemicalEngineer



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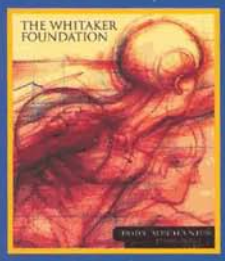

$1 Million Award funds Bioengineering
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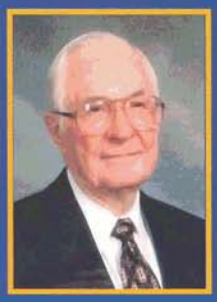

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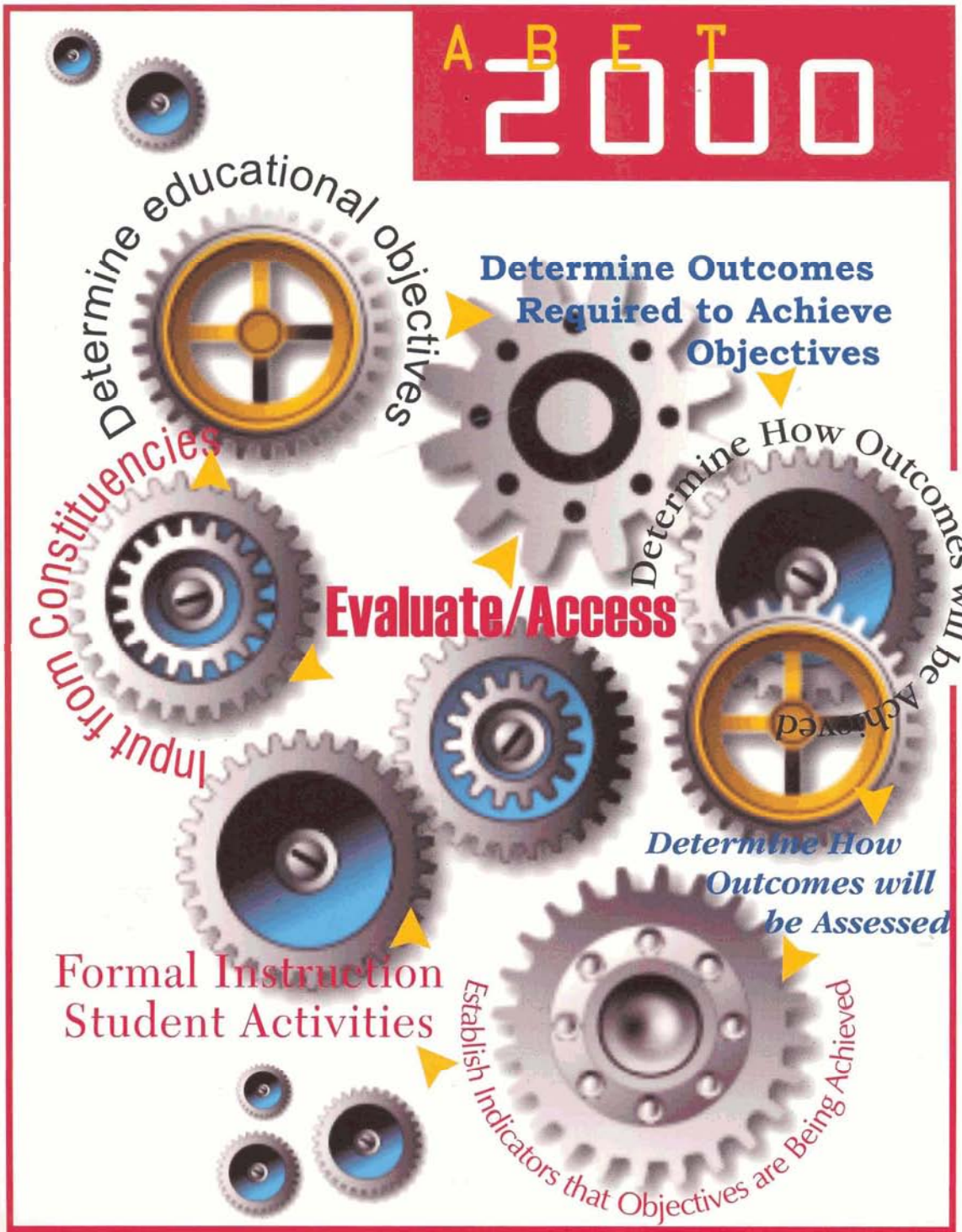

ABET: Preparing Students for the New Millennium

School of Chemical Engineering and Materials Science

OkChE

Spring 2000

OklahomaChemicalEngineer

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OkChE Magazine

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Managing Editors: Lynette Lobban and Debra Krittenbrink
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A Note from the Director

There are so many things happening in CEMS, the College of Engineering, and the University of Oklahoma right now that it is hard to decide where to start. But perhaps the best place to begin is with the biggest news, so here goes.

I am very pleased to inform you that last spring, CEMS alumnus Francis Winn presented the department with $1million, the largest gift in CEMS history. Francis, you may recall from the last OkChE issue, is a 1943 graduate from Weleetka, OK. After a successful career in the chemicals industries, he created an innovative income tax software and launched his own company.

Today, Computer Language Research, Inc. is the leading processor of business income tax returns.

We are very grateful to Francis for this exceptional gift. Thanks to his generosity, two endowed positions were created: $700,000 for the Francis W. Winn Director's Chair, and $250,000 for the Francis W. Winn Professorship.

Both of these are "in the queue" for matching by the state legislature. Income from the Director's Chair endowment will be used for special projects in CEMS, and the first Professorship will be in the area of bioengineering.

CEMS is also in the process of earning its ABET accreditation. We had our evaluation in November, and based on the informal feedback, we have a very strong program - excellent students, talented faculty, and longstanding alumni support. This last item is as critical to the new accreditation process as it is to the vitality of the department.

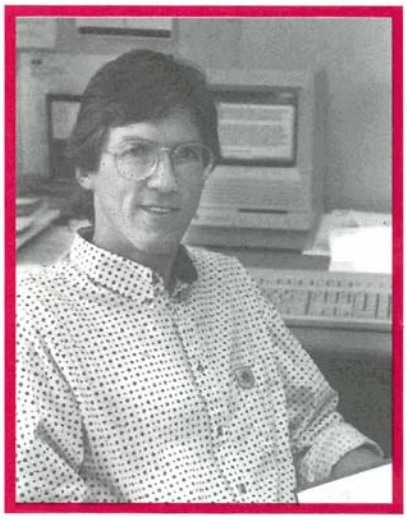
The new accreditation model involves assessment, feedback, and improvement.

This means that CEMS alumni like you are very important to the process. We must improve two-way communication between you and CEMS. We count on your input to learn the strengths and weaknesses of our program and to keep abreast of the rapidly changing requirements in industry for which our new graduates must be prepared.

In order to make communication as easy as possible, we recently included a survey on our CEMS website (http://www.cems.ou.edu/; click on the Alumni Survey). Regardless of when you graduated, please take time to complete this survey to give us your valuable feedback.

In addition to new faculty member Dimitrios Papavassiliou, who joined CEMS in March, 1999 (you can read more about Dimitrios in this issue), we are currently in the middle of recruitment for two new faculty members who will strengthen our bioengineering program. We have a strong pool of candidates and we'd like to have both positions filled by this fall.

Now, I'd like to bring up one more item. I hope you agree that the *OkChE* magazine is interesting, high quality, and informative. In order to continue publication without putting a strain on



the departmental budget, the magazine should become self- supporting. In this issue, you will find a reply card for donations to the *OkChE* magazine. If you enjoy receiving this publication, please let us hear from you.

A last personal note. I have been director for more than a year now, and one of the most enjoyable aspects of the job is having the opportunity to get acquainted with our outstanding alumni. I hope to hear from, and visit with, a lot more of you in the months and years to come. You are certainly one of our most valuable assets, and for all the support you've given, many thanks!

Please send an email, call, or visit whenever you like. I will always be happy to hear from you.

Sincerely,

Lance

Lance Lobban
Director

New ABET Criteria Prepare Students for the New Millennium

Global economy. Information technology. Downsizing and restructuring.

These are just a few of the factors which make the engineering profession dramatically different than it was 50, 25, or even 10 years ago. To respond to these changes and continue to produce top-level graduates, CEMS is working with the Accreditation Board for Engineering and Technology (ABET) to implement sweeping curriculum modifications at OU.

"Thirty years ago engineers could expect to graduate, spend one year in training, work for the same company for 25 years, and retire," says Director Lance Lobban.

"Now companies don't want to spend time training engineers. Employees must make an immediate impact. The demands of the global economy are such that engineers may work for four to five companies during their careers. They have to be able to learn things on their own, to self-train to meet new job demands."

In response to the way an engineer's job has changed over time, and to industry feedback

See ABET page 4

OkChE faculty strategize about ABET criteria.

ABET, *continued from page 3*

that schools are producing well-trained professionals who lack interpersonal and communications skills, ABET has mandated a change to outcomes-based assessment in the classroom. This means that the number of hours a student spends in the classroom does not prove that the university is producing good engineers; the measure of the program comes down to what types of jobs students get after graduation, and how their careers progress. "Our challenge is to come up with techniques to measure these factors," says Lobban.

ABET is a federation of 28 engineering, technical and professional societies recognized as the sole agency responsible for the accreditation of programs which lead to engineering degrees. While the College of Engineering at OU, and some other colleges, have internal processes for assessing their programs, an external body is necessary to guarantee uniformity and encourage innovation. Within the last decade, government and industry leaders have challenged ABET to relax its preoccupation with regulations and focus on the challenges facing the engineers of today.

In 1994, ABET convened a workshop of representatives of the engineering professional societies, research and undergaduate engineering education institutions, and engineers in industry and private practice. Participants submitted lists of recommendations which became the basis of Engineering Criteria 2000, a radically new set of criteria for accreditation of US engineering programs.

These eight criteria maintain the traditional core of engineering, math and science requirements, but place equal importance on a new skill set that includes teamwork and global, economic, social and environmental awareness.

At the heart of the plan is an outcomes assessment component which requires that each engineering program being accredited or reaccredited establish its own internal assessment process, which will in turn be assessed by ABET.

The shift in emphasis began in earnest in 1997, when ABET issued a draft of its outcomes-based proposal and asked for industry feedback. Though the new criteria do not go into effect until 2001, in 1998 the College of Engineering opted to begin the process of implementing the new standards. "It is a compliment to our forward-thinking leadership that we began the process early. Our program is evaluated at least every 6 years, and we've always gotten superior ratings. The upcoming evaluation will be the first under the new standards," says Lobban.

> Now companies don't want to spend time training **engineers. Employees must make an immediate impact."**

Lobban explains that it may take at least three years to see how the proposed evaluation tools work out. Never before has there been a formal process that feeds results into programs and elicits changes. "We know that the only constant is change. This method ensures that we continue to change, because ABET now requires the full loop—evaluation, change, evaluation. We believe that we do an excellent job of preparing graduates, but we need a process that shows it," he says.

Over the last year, the Chemical Engineering department has formed committees to work on different parts of the criteria, developing educational objectives for CEMS students, getting input from the Board of Visitors, and initiating modifications in their original program.

The first step was deciding what skills CEMS graduates needed to have. Once decided, committee members identified class activities which would accomplish those objectives and determined how to assess the accomplishments. They are now in the process of examining the results of those assessments to make changes in classes and activities.

Billy Crynes, Dean of Engineering from 1987-1998, provides a unique perspective on the process. He's participated in ABET reviews as a faculty member, as a department head, as a dean, and, for the past 18 years, as an accreditation visitor for ABET.

The difference between the old and new accreditation standards, he says, are sweeping. "We used to have to see if programs were providing credit hours sufficient to meet the minimum requirements of ABET. It was the 'bean counter' mentality," he says.

"Now, we've changed from simply counting hours to having the program tell us how it meets the required material, and prove that it does what it says it does. It's gone from 'show us what we say you do' to 'show us what you say you do.' That's not a subtle change."

Crynes, too, talks about a continuous loop of change and assessment. "Before, the process was very tional, with required courses and required formats. Now, programs have the freedom to change the delivery of the material any way they choose so long as the material is there."

The process is not without its challenges. "Most of our

faculty has been educated the 'old way.' We must first bring ourselves up to speed and use the same self-learning that we require of our students," says Lobban.

Crynes sees other challenges as ABET charts new territory. From the perspective of an evaluator, he presents a hypothetical case of a college with top accreditation marks which hasn't changed to the new method. Upon evaluation, the program is technically not in compliance, yet the product it turns out is of high quality and in great demand. "What will we do about a program like that? Deny them accreditation? I'm sure this will come up, and the ABET board will have to deal with it on a case-by-case basis," he says.

He points out the the ABET accreditation process is very time-consuming. The evaluator visit this November was preceded by many hours of staff preparation, and doesn't culminate until the final report in August. "As dean, I once figured that with staff time, department fees, and faculty time, accreditation costs about $50,000 - $60,000," says Crynes.

"But I value the process. It helps us find better techniques for student learning and ways to maximize faculty time. National curricular standards help us see how we measure up," he says.

The primary differences set forth for the ChemE program are within the courses. There are more oral presentations, more simulations, and increased critical thinking exercises. "Soft" topics are addressed in seminars, and course evaluation forms have been modified to reflect the new criteria. If data prove that students are not doing well in meeting the criteria, it indicates a need to change the curriculum again.

"The process is challenging because it requires total quality control," Lobban says. "We've started keeping track of student jobs, interviewing seniors before, during, and after graduation, and requesting feedback from real-world experiences. We've worked with the Board of Visitors and the AICHE student chapter. We've been making these types of changes for over a decade, without formal requirements in place," notes Lobban.

"Now we'll have a way to measure the effectiveness of our curriculum and tailor it accordingly."

Dr. Billy Crynes has worked with ABET as a faculty member, a dean, and as an accreditation visitor.

Currently, faculty are developing materials to document the students' performance in all four educational objectives. Another critical part of the evaluation is an alumni survey, primarily of 1997 graduates, which has been sent out and posted on the Web. The ABET team visit was in November, and initial feedback followed in a few weeks.

"This is simply a way to make sure that improvement always, routinely goes on," says Lobban. ■

Engineering Criteria 2000

Criteria for evaluation includes five parts:

■ Criterion (1) Students
Criterion (2) Program Objectives
Criterion (3) Program Outcomes and Assessment
Criterion (4) Professional Component
Criterion (5) Faculty.

The section which has revolutionized the means of evaluating engineering courses is Criterion (3), Program Outcomes and Assessment. It states that engineering programs must demonstrate that their graduates have:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Each program must have an assessment process with documented results. Evidence must be given that the results are applied to the further development and improvement of the program. The assessment process must demonstrate that the outcomes listed above are being measured. Evidence that may be used includes, but is not limited to the following: student portfolios, including design projects; nationally-normed subject content examinations; alumni surveys that document professional accomplishments and career development activities; employer surveys; and placement data of graduates.

CEMS Program Objectives

Program Objective #1:

For successful professional careers and personal lives and to meet the needs of employers and graduate schools, our graduates will have sound technical skills and core knowledge.

Strategies and Actions	Outcomes	ABET Criterion 3	Assessment Methods/Metrics
Students will take required courses in math, chemistry, physics, engineering fundamentals, and chemical engineering. These courses include chemical engineering laboratory courses.	Graduates will be able to apply scientific and engineering principles to the solution of engineering problems.	a,b,c,e,h,i,k	Faculty evaluations; exit interviews; FE examination; monitor homework performance; demonstration of core knowledge in senior design course reports; ability of students to gain acceptance to advanced degree programs (e.g., medical or graduate schools)
Students will take elective courses in math/science and/or engineering sciences. Electives include undergraduate research.	Graduates will be able to apply in-depth knowledge in particular areas of interest within the engineering field.	a,e,k	Student exit interviews; alumni surveys; presentations at professional meetings or science contests
Students will be advised of the importance of internships to get practical experience.	Students will be more likely to seek internships for practical experience.	f,h,i,j,k	Exit interviews; alumni surveys; tabulate percentage of graduates with internships (e.g., summer jobs or Coop experience)

Program Objective #2:

For successful professional careers and personal lives of our graduates and to meet the needs of employers and graduate schools, our graduates will have strong interpersonal skills, ability for clear communication and sound group/team/leadership skills.

Strategies and Actions	Outcomes	ABET Criterion 3	Assessment Methods/Metrics
Frequent practice aids in developing group skills. Group activities will be included in all undergraduate departmental courses.	Graduates will be able to function effectively in teams; they will be willing and capable of working together to achieve common goals. Graduating classes may be more diverse.	d,f,g	Peer and self evaluations within groups; faculty evaluations; exit interviews; numbers of presentations; retention of underrepresented populations
Explicit training in team management, team roles, and how to run a meeting aids in developing students' team skills. Introductory material will be incorporated into fundamentals. Include in the two ChemE lab courses explicit training in team management, team roles, and how to run meetings. One faculty member will be trained to hold these sessions.	Graduates will be able to apply specific meeting management techniques, be able to perform in different roles, will understand group dynamics and will know appropriate response to particular situations.	d,f,g	Session evaluations; peer and self evaluations within groups; numbers of team exercise; faculty evaluations; exit interviews; alumni surveys; track extracurricular leadership roles
Oral presentations are important for engineers and are often the basis of important first impressions. We will include training and practice in oral presentations throughout the ChemE curriculum. Presentations will require use of suitable software.	Graduates will be able to design, prepare and deliver effective presentations for a variety of audiences using state-of-the-art information technology.	g,k	Self-evaluations of video tapes; faculty evaluations; evaluations by external examiners (e.g. alumni with industrial experience); peer evaluation
Written reports are important for engineers, and are often the basis of important first impressions. We will include training and practice in written presentations throughout the ChemE curriculum. We will require a technical writing course. We will require network communication.	Graduates will be able to write understandable technical material for a variety of audiences and will be able to prepare effective written reports for hardcopy or network delivery.	g,k	Faculty evaluations; self-evaluations; grades in technical writing course
Chemical engineers need to learn how to work in teams with other disciplines. We will introduce multidisciplinary design projects with group members from other engineering disciplines and/or from business.	Graduates will be able to relate engineering needs to non-engineers, and students will be able to incorporate non-technical aspects into their work.	d,g,h,i,j	Faculty evaluations; exit interviews, number of multidisciplinary interactions; alumni surveys
A large number of non-technical topics can help our graduates get a "fast start" in their careers. We will introduce a chemical engineering seminar series with varied topics such as diversity, management, and entrepreneurism.	Graduates will be exposed to topics of interest and importance to their careers and personal development.	f,h,i,j	Session evaluations; exit interviews; alumni surveys; attendance of seminars

Program Objective #3:

For successful professional careers and personal lives and to meet the needs of employers and graduate schools, our graduates will have proficiency in higher level thinking, including design, synthesis, data interpretation, problem definition, analysis and integration.

Strategies and Actions	Outcomes	ABET Criterion 3	Assessment Methods/Metrics
Strategy: Writing forces students to analyze the situation, synthesize a rational and coherent presentation and communicate their thoughts to others. Action: Incorporate writing assignments in all ChemE courses from the junior level 2nd semester on.	Graduates will be proficient in grasping essential information, integrating that with their engineering knowledge and then explaining their analysis to others.	b,d,g,k	Evaluation by faculty of specific assignments, post-graduate self evaluations
Strategy: Critical thinking means being able to take a poorly defined problem, identify the critical components and find any missing information. Action: Problems will be given in all ChE courses which are open-ended, under-specified or over-specified; and may have more than one satisfactory solution.	Graduates are expected to be able to handle these types of problems when confronted with them in the real world.	a,e	Evaluation by faculty; exit interviews post-graduate self- evaluations
Strategy: Critical thinking means being able to examine material in the context of existing knowledge or fundamental principles and to identify inconsistencies in data of questionable validity. Action: Students will solve or critique problems, which in-corporate information/conclusions which are purposely wrong or violate scientific principles, e.g., 2nd Law of Thermodynamics.	Graduates are expected to be active, vocal participants who do not accept information without question and who continually look for improvements.	d,f,g	Session evaluations; peer and self-evaluations within groups; faculty evaluations; exit interviews
Strategy: Design problems address real-world situations, force critical and creative thinking, synthesis of information, and use of modern engineering tools. Action: Design problems are assigned throughout the ChemE curriculum.	Graduates will be able to design physio-chemical processes. Students will be aware of the interplay of multiple constraints on engineering solutions.	a,c,d,e,j,k	Faculty evaluations; course evaluations; exit interviews; post-graduate self-evaluations
Strategy: Data interpretation in the lab aids students in connecting the real world to idealized textbook material. Imperfections in data lead students to develop judgment in relative importance of information. Action: Students will successfully complete 6 laboratory courses and perform virtual experiments in other courses.	Graduates will be able to apply engineering analysis, statistics and techniques to data and draw conclusions.	a,b,d,k	Course evaluations; evaluations by faculty; exit interviews

Program Objective #4:

For successful professional careers and to help meet the needs of society and for their personal lives, our graduates will possess ancillary knowledge associated with a general education, and understand the needs for life-long learning, ethical and professional behavior, and the necessity to contribute to society.

Strategies and Actions	Outcomes	ABET Criterion 3	Assessment Methods/Metrics
Students will complete general ed core requirements, which are designed to help students cope with global, societal, and career changes. We will encourage and promote students studying abroad.	Students will learn to think creatively, reason and communicate clearly, and respond quickly to our rapidly changing environment by completing the general ed requirements. Some students will participate in study abroad.	g.h.j	Check transcript for completion of general ed requirements; track study abroad students
Students will learn on their own by doing research papers in senior elective chemical engineering courses. Students are exposed to open-ended, complex design problems in Advanced Design.	Students will have an understanding of the needs for life-long learning.	e,g,i	Senior exit interviews; alumni surveys
Students will be strongly encouraged to agree to abide by an Honor Code when they start taking chemical engineering courses. This Honor Code will help students develop a sense of ethics and social responsibility. Lectures or activities about ethics will be given in Advanced Design and other courses. Students will be encouraged to participate in student professional societies and in design competitions. Students will be required to take the FE exam during their second year. Students will be encouraged to attend professional development seminars.	Students will exhibit ethical and professional behavior.	f,h,k	Senior exit interviews, FE scores, attendance at seminars, alumni surveys
Encourage every student to be involved in at least one community, civic, charitable, or religious project every year. Do at least one philanthropy project each year in the AIChE Student Chapter. Put up a bulletin board with infor-mation and announcements about philanthropic activities an publicize volunteer activities. Give an award each year to a student or students for doing philanthropic projects.	Students will have an understanding of the need to contribute to society.	f,h,j	Track participants in projects; senior exit interviews.

Distinguished Alum

So significant are this man's contributions to the University of Oklahoma, that when F. Mark Townsend was inducted into the Distinguished Graduates Society for the College of Engineering, he was unanimously elected. One of the first graduates to receive a Ph.D. in ChemE from the University of Oklahoma, retired professor Mark Townsend was also a tireless counselor and a superb teacher. He is a man with a curious, inventive mind who has committed a lifetime to the College of Engineering at the University of Oklahoma. "Doc Townsend," as his many students know him, guided other significant graduates through their education with care and compassion for 32 years, 28 as a professor.

Born in Mangum, Oklahoma, he began his journey with OU in 1940 as an undergraduate student in the Chemical Engineering Department. Townsend, an excellent student, was remembered as a fine young man who was so quiet and unassuming that he seemed shy. Also an advanced ROTC student, he was forced to put his degree on hold when he was called into active duty and commissioned during his senior year. He left OU with one semester remaining for completion of his BS degree.

Townsend served as a Captain in the U.S. Army during the Second World War and received a Purple Heart. During the Allied invasion of Normandy, he commanded a tank destroyer group that was hit by German mortar fire. During the attack, his right arm was shattered and fragments hit him in both legs.

After 17 operations and the tedious process of learning to write with his left hand, Townsend returned to OU and completed his degree. He went on to receive his MS and become one of the first University of Oklahoma graduates to receive a Ph.D. in Chemical Engineering.

ChemE graduates have benefited from the rare qualities that Dr. Townsend brought to his students during his professorship at OU. He guided students through their education with care and compassion, inspiring his fellow professors and faculty members by reminding them that the most important aspect of teaching is to reach young minds and hearts by example as well as words.

Townsend exemplified the qualities of a superior instructor and was the personal favorite of many students. So much so, in fact, that the senior class of 1981 established the F. M. Townsend Scholarship to honor his contribution to the education of chemical engineers.

While OU alumni love him because of his legacy as a great teacher, Townsend's accomplishments and contributions to industry are equally significant. One invention which had a major impact on the gas industry is the patented Townsend Process for removing sulfur from natural gas. He also did research for the United States Air Force on the contamination of JP-5 jet fuel, where he discovered the mechanism for detonating contaminated jet fuel-air mixtures in aircraft wing tanks by fuel-generated electrostatic discharges. This put an end to a rash of mid-air explosions of military aircraft flying in rough weather with JP-5 as fuel.

Townsend's fellow professors and faculty members say they are privileged to work with him, and look upon him with great affection. Extremely well respected, he has been honored with most of the teaching awards on campus. He was the recipient of the Regents Teaching Award for Superior Teaching in 1972; the David Ross Boyd Professor of Chemical Engineering in 1976; and the Brandon H. Griffith Award in 1983. Although Townsend taught classes from 1951 until his retirement in 1983, he continues to participate in the life of the ChemE School as an active member of the OkChE Board.

F. Mark Townsend, who will be 82 in December, has touched the lives of a tremendous number of people. He most certainly is the epitome of a distinguished graduate of the University of Oklahoma. ■

Mark Townsend

Research Grants Awarded

Brian Grady, CEMS $75,000.00
Robert Shambaugh, CEMS
National Science Foundation
August 15, 1998 - July 31, 1999
Acquisition of Tensile Rheometer for the Simultaneous Measurement of Viscoelastic and Optical Properties of Polymer Solids

Lance Lobban, CEMS $97,190.00
Jeffrey H. Harwell, CEMS
State of Oklahoma, Center for the Advancement of Science and Technology
July 1, 1998 - June 30, 1999
Application of Photocatalysts in Air Conditioning

Brian Grady, CEMS
Edgar O'Rear, CEMS
National Aeronautics and Space Administration
Microgravity Impregnation of Fiber Preforms

Matthias U. Nollert, CEMS $35,000.00
State of Oklahoma, Center for the Advancement of Science and Technology
Extend to May 31, 1999
Selectin Mediated Adhesion in a Reconstituted System

Richard Mallinson, Energy Center Institute $39,000.00
Lance Lobban, Energy Center Institute
Kenneth Nicholas, Energy Center Institute
Daniel Resasco, Energy Center Institute
U.S. Department of Energy
Extend to May 12, 1999
Novel Catalytic Approaches for Hydrogen Production

$5,423.00
Jerry Newman, CEMS
Surfactant Associates
DOD-AIR FORCE
March 01, 1998 - February 27, 1999
Simulation Modeling and Prototype Development of a System for Cleaning Aircraft Oxygen Converters

$1,069.00
Miguel Bagajewicz, CEMS
OK-SOLUTIONS
September 01, 1998 - December 31, 1998
Energy Savings Horizons of Crude Distillation Units

$15,000.00
Robert Shambaugh, CEMS
Various
July 01, 1998 - June 30, 1999
Center for Polymer and Fiber Research

$61,000.00
Richard Mallinson, CEMS.
Daniel Resasco, CEMS
Kenneth Nicholas, Chemistry & Biochemistry
Lance Lobban, CEMS
U.S. Department of Energy
May 13, 1998 - May 12, 1999
Novel Catalytic Approaches for Hydrogen Production

$150,000.00
Richard Mallinson, CEMS
October 15, 1998 - April 14, 1999
Engineering of Supergas Preparation, Storage and Vehicle Systems

$15,054.00
Lloyd Lee, CEMS
ENDESCO, Service Inc.
December 01, 1998 - February 28, 1998
Extension: Process Simulation and Economical Evaluation of the Hybrid Process with Process Simulators

$107,650.00
Matthias Nollert, CEMS
U.S. Department of Health and Human Services, National Institutes of Health
January 11, 1999 - December 31, 1999
Flow Modulation of Platelet Endothelium Interactions

$45,000.00
X-ray Absorption Spectroscopy of Thermal Behavior in Polymers
Brian Grady, CEMS
National Science Foundation
April 01, 1999 - March 31, 2000

$71,259.00
William Sutton, Aerospace & Mechanical Eng.
Richard Mallinson, CEMS
Science Applications International Corporation
DOD-AIR FORCE
February 08, 1999 - June 08, 1999
Enhanced CNG Prototype

$15,000.00
Center for Polymer and Fiber Research
Robert Shambaugh, CEMS
Various
October 15, 1998 - October 14, 1999

$50,000.00
Brian Grady, CEMS
Edgar O'Rear, CEMS
National Aeronautics and Space Administration
May 16, 1998 - May 15, 1999
Microgravity Impregnation of Fiber Performs

$20,000.00
Daniel Resasco, CEMS
Phillips Petroleum Company
January 01, 1999 - December 31, 1999
Sulfur Resistant Catalysts for Aromatization of C6 and C7

See Scholars page 10

Scholars, *continued from page 9*

$99,918.00
Daniel Resasco, CEMS
State of Oklahoma, Center for the Advancement of Science and Technology
January 01, 1999 - December 31, 1999
Sulfur-Resistant Catalysts for Aromatization of C-6 and C-7

$313,517.00
Robert Shambaugh, CEMS
Hawthorne York International, Ltd.
March 01, 1999 - February 28, 2000
Artificial Hip Replacement

$49,999.00
Daniel Resasco, CEMS
Miguel Bagajewicz, CEMS
U.S. Department of Energy
March 01, 1999 - February 29, 2000
Novel Catalyst Development and Process Optimization for CO2 Reforming of CH4

$50,000.00
Richard Mallinson, CEMS
Lance Lobban, CEMS
U.S. Department of Energy
December 01, 1997 - December 31, 1999
Enhancement of Methane Conversion Using Electric Fields

$100,000.00
Richard Mallinson, CEMS
State of Oklahoma, Center for the Advancement of Science and Technology
January 01, 1999 - December 31, 1999
High Energy Density Alternative Fuels Infrastructure

$50,000.00
Jeffrey Harwell, CEMS
Surbec Environmental, LLC
February 01, 1999 - December 30, 1999
Surfactant-Enhanced Subsurface Remediation of Petroleum Hydrocarbons - McLelland

$40,000.00
Jeffrey Harwell, CEMS
Surbec Environmental, LLC
March 01, 1999 - October 30, 1999
Surfactant-Enhanced Treatability Study at Alameda Point

$36,000.00
Daniel Resasco, CEMS
Jeffrey Harwell, Engineering Dean's Office
Conoco
February 15, 1999 - February 14, 2000
Catalytic Production of Carbon Nanotubes

$550,000.00
National Oil and Natural Gas Exploration and Production Database
Project and Petroleum Information Service for Kazakhstan
Kazakhoil National Oil and Gas Company
April 01, 1999 - October 01, 1999
USTDA

$17,629.00
Jeffrey Harwell, Engineering Dean's Office
John Scamehorn, CEMS
U.S. Department of Defense, Naval Facilities Engineering Command
April 02, 1999 - September 30, 1999
Design and Construction of Micellar-Enhanced Ultrafiltration (MEUF) Units To Concentrate Surfactants from a Dilute Micellar Solution

$62,500.00
John Scamehorn, CEMS
Oklahoma Alliance for Public Policy Research, Inc.
January 01, 1999 - December 01, 1999
Deinking of Plastic Packaging Materials - Phase V

$75,134.00
Lance Lobban, CEMS
National Science Foundation
July 01, 1999 - June 30, 2000
Adventure Engineering: A Creativity-Based, Design-Centered Approach to Secondary School & Introductory Level Undergraduate Education

$1,000,000.00
Intercampus Bioengineering Center at the University of Oklahoma
Matthias Nollert, CEMS
Edgar O'Rear, CEMS
Roger Harrison Jr, CEMS
Jeffrey Harwell, CEMS
Whitaker Foundation
July 01, 1999 - June 30, 2002

$15,000.00
Center for Polymer and Fiber Research
Robert Shambaugh, CEMS
Various
October 15, 1998 - October 14, 1999

Student Spotlight

Bethany Dixon, Chemical Engineering junior, was crowned Miss Black OU 1999 last February during her sophomore year. She also earned the Miss Scholarship award in the pageant, which is a showcase for beauty, intellect and talent for African-American students at the University of Oklahoma. Dixon was told by her Miss Black OU predecessor to "find the definition of a role model and sisterhood. You are the representative of black females on campus."

Dixon added this achievement to her previous honor of being crowned Ebony Homecoming Queen in October 1998, at a pageant hosted by the Black Student Association. She was nominated for the title by the National Society of Black Engineers.

Bethany Dixon

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ATTN: Tricia Tramel

College of Engineering Names Senior of the Year

Jennifer Cocharo, a recent Chemical Engineering graduate with a 4.0 grade point average and extracurricular interests in intramural sports and tutoring, has been named the College of Engineering's Senior of the Year for 1999. The honor comes with a newly-instated $1,000 cash prize from the College of Engineering.

Cocharo was chosen for the honor based on grades, service duties, and involvement in university organizations. In addition to maintaining high marks, she is a former Miss Hispanic OU, founding member of the first Hispanic sorority at OU, and a tutor in the Minority Engineering Program. She has also volunteered with the Hispanic American Student Association and was mens' intramural sports chair.

She is currently employed by the Williams Companies of Tulsa.

CEMS-Sponsored Student Awards

Huy Le , CEMS Outstanding Sophomore Award, $200

Audry Claghorn, American Institute of Chemical Engineers Award to an Outstanding Junior in Chemical Engineering, $100

Connie Grimes, Robert Vaughan Award for Excellence in Undergraduate Research, $200

Wafa Tawackoli, Robert Vaughan Award for Excellence in Undergraduate Research, $200

Seth Erdner, Robert Vaughan Award for Excellence in Undergraduate Research, $200

Wooi-Aun Tan, CEMS Award to an Outstanding Senior in Chemical Engineering, $100

Jason Clark, Pamela Pesek Johnson Award to an Outstanding Senior in Process Design, $200

Eden Leigh Smith, F. Mark Townsend Scholarship for 1999-2000, $1,000

Ya-Huei Chin, CEMS Award to an Outstanding Teaching Assistant, $200

Billy Davidson, Tim Meyers & Stephen Elliot, 1st Place, Advanced Design Competition, $500

Abi Badiru, Yoong L. Chen, Chris Schuler, Maidung Nguyen, and **Thomas Pham**, 2nd Place, Advanced Design Competition, $250

Jun Yeow Chin, Sek Ping Goh, Kean Lee, Bee-Wooi Soo, Wooi-Aun Tan 2nd Place (Tie), Advanced Design Competion, $250

Program of Excellence Scholars, 1999-2000

Kirk Allen, Mobil Scholar, Tulsa, Oklahoma

Quincy Von Amen, National Merit Scholar, Omer A. & Marjorie M. Pipkin/Richard G. Askew Scholar, Bartlesville, Oklahoma

David Atkinson, Friendswood, Texas, Halliburton Scholar

Kylene Black, Burneyville, Oklahoma, Kathleen Lorengo-Sultan Memorial ChE Scholar

Susan Boyer, Texaco Scholar, Granbury, Texas

Lorna Bradley, Texaco Scholar, Tulsa, Oklahoma

Joshua Bridges, Omer A. & Marjorie M. Pipkin/ Richard G. Askew Alumni Scholar
Anadarko, Oklahoma

Jill Brown, National Merit Scholar, Richard L. Huntington/Richard G. Askew ChE Alumni Scholar, Brookfield, Illinois

Justin Brown, Keys Scholar, Fort Worth, Texas

Crystal Casey, National Achievement Scholar, Omer A. & Marjorie M. Pipkin Scholar,
Sherwood, Arkansas

Eugene Chen, Sam A. Wilson Memorial Scholar,
Moore, Oklahoma

Russell Cook, Texaco Scholar, Milburn, Oklahoma

Brian Daugherty, Shell Scholar, Claremore, Oklahoma

Sanjay Desai, Sam A. Wilson Memorial Scholar,
Moore, Oklahoma

Mariana Dionisio, Keys Scholar, Bartlesville, Oklahoma

Anh Thanh Do, Kendall Carrol Purgason Scholar

Ben Dribus, National Merit Scholar, Joseph D. Holbird/Richard G. Askew ChE Alumni Scholar,
Slidell, Louisiana

Kathleen Gardenhire, Keys Scholar, Norman, Oklahoma

Gregory Gonser, National Merit Scholar, Phillips Petroleum Scholar, Great Falls, Montana

James Gourley, Shell Scholar, Broken Arrow, Oklahoma

Robert Hannay, Exxon Scholar, Tulsa, Oklahoma

Harry Harjabrata, Baker Hughes Scholar, Indonesia

Christopher Harris, Keys Scholar, Sapulpa, Oklahoma

Jeffrey Harwell, Jr., National Merit Scholar, Laurance S. Reid/Richard G. Askew ChE Alumni Scholar

Jacob Hedden, Keys Scholar, Midwest City, Oklahoma

See Excellence page 13

Excellence, *continued from page 12*

Alissa Hinman, Shell Scholar, Mustang, Oklahoma

Bret Hunter, Sam A. Wilson Memorial Scholar, Altus, Oklahoma

Kendall Hurst, Ray G. Collins Engineering Scholar, Wichita, Kansas

Jeremy Jones, Omer A. & Marjorie M. Pipkin/ Richard G. Askew Alumni Scholar, Oklahoma City, Oklahoma

John Judkins, Richard L. O'Shields Engineering Scholar, Tulsa, Oklahoma

Hamad Khalili, Sam A. Wilson Memorial Scholar, Norman, Oklahoma

Katherine Keister, Halliburton Engineering Scholar, Dallas, Texas

Yin-Kei Lai, Sam A. Wilson Memorial Scholar, Malaysia

Hio Lao, W. D. Owsley Scholarship, Malaysia

Duc Le, Shell Scholar, Viet Nam

Huy Le, Shell Scholar, Viet Nam

Jia Lim, Exxon Scholar, Malaysia

Jonathan Lok, Sam A. Wilson Memorial Scholar, Tulsa, Oklahoma

John Long, Jr., Associates Scholar, Oklahoma City, Oklahoma

Yen-Soon Low, Exxon Scholar, Malaysia

Adam McGann, Exxon Scholar, Edmond, Oklahoma

Gregory Miller, Phillips Petroleum Scholar, Broken Arrow, Oklahoma

Anh Nguyen, Laurance S. Reid Scholarship for Natural Gas Processing, Viet Nam

Brandy Nolan, Exxon Scholar, Oklahoma City, Oklahoma

Israel Osisanya, Exxon Scholar, Norman, Oklahoma

Aaron Pack, National Merit Scholar, Laurance S. Reid/Richard G. Askew Alumni Scholar, Moore, Oklahoma

Elizabeth Phan, National Merit Scholar, Laurance S. Reid/Richard G. Askew Alumni Scholar, Oklahoma City, Oklahoma

Ryan Posey, Associates Scholar, Chickasha, Oklahoma

John Rasmussen, National Merit Scholar, Associates Scholar, McAlester, Oklahoma

Andrea Robben, National Merit Scholar, Laurance S. Reid/Richard G. Askew ChE Alumni Scholar, Clinton, Oklahoma

Michelle Rose, Phillips Petroleum Scholar, Tulsa, Oklahoma

Dale Simpson, Sam A. Wilson Memorial Scholar, Norman, Oklahoma

Preston Soell, W. D. Owsley Scholar, Boise City, Oklahoma

Jason P. Stewart, Sam A. Wilson Memorial Scholar, The Woodlands, Texas

Teresa Sullivan, Exxon Scholar, Cordell, Oklahoma

Wafa Tawackoli, Sam A. Wilson Memorial Scholarship, Canada

Brian Torgerson, Marathon Oil Scholar, Norman, Oklahoma

John Vernon, Texaco Scholar, Edmond, Oklahoma

Dustin Walker, Billy & Mary Crynes Engineering Scholar, Oklahoma City, Oklahoma

Andrea Watson, Sam A. Wilson Memorial Scholar, Houston, Texas

Matthew Wilson, Marathon Oil Scholar, Tulsa, Oklahoma

Brent Winter, Keys Scholar, Midland, Texas

Heather Witcher, Mary Ann Phelps Knowles Scholar, Dallas, Texas

Kelly Wrich, Sam A. Wilson Memorial Scholar, Bartlesville, Oklahoma

Matthew Yarrison, National Merit Scholar, Phillips Petroleum Scholar, Parker, Colorado

Whitaker Award Establishes Bioengineering Center

Collaborative medical research involving engineers, scientists and physicians is not a new concept at the University of Oklahoma. OU has a rich research history in the emerging field of biomedical engineering that has contributed to such breakthrough medical marvels as an artifical liver, laser surgery and mammography.

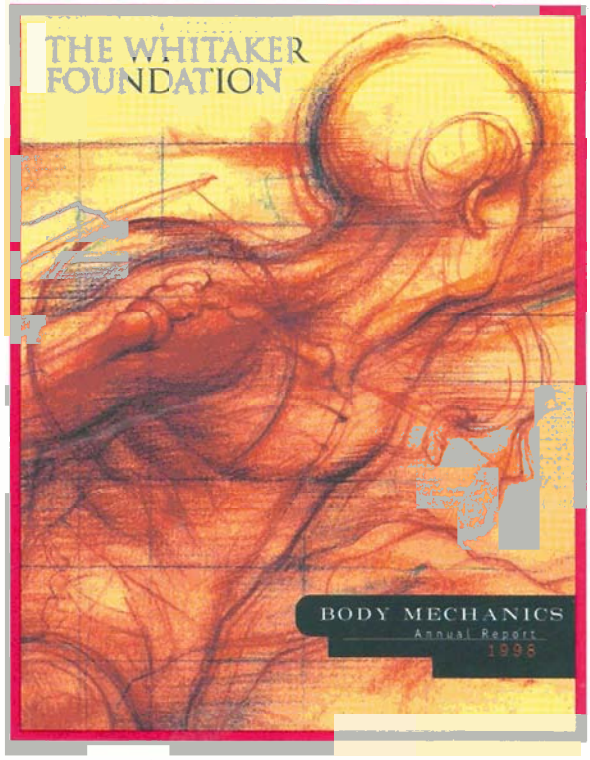
What the university has lacked is a formal bioengineering program, says Edgar O'Rear, professor of Chemical Engineering and Materials Science. While OU faculty and student researchers were knee-deep in projects that combined medical needs and knowledge with the technical expertise of engineering, no graduate degree in bioengineering supported those efforts.

Thanks to a $1 million Special Opportunity Award from the Whitaker Foundation this year, that's about to change. The money is dedicated to the establishment of a Bioengineering Center — not a physical center, as such, but a graduate degree program combining the knowledge and resources of various academic units at OU and the Health Sciences Center.

O'Rear — who serves as principal investigator for the project — will serve as director of the new center. He is quick to point out that like the bioengineering field, itself, it was a collaborative effort by faculty members from both the Norman campus and Oklahoma City HSC campus that resulted in the written proposal that landed the grant money. The project also has the support of the Oklahoma Medical Research Foundation.

A passionate researcher and scientist, O'Rear is dedicated to his role in academia. That role encompasses not only teaching the next generation of scientists and researchers, but also involves ensuring that a strong academic environment exists where quality teaching and researching can occur.

OU, he says, was ripe for establishment of a bioengineering degree program for many reasons, not the least of which was OU's already formal affiliation with a nationally-recognized medical school, the number of ongoing biomedical research projects in which OU's faculty and students from both campuses already were engaged, and an impressive record of past research projects by both faculty and alumni.



O'Rear's vision of a collaborative biomedical engineering educational program between the two campuses was shared by Dr. Joseph J. Ferretti, senior vice president and provost of HSC, Dr. J. Donald Capra, president and scientific director of the Oklahoma Medical Research Foundation, Dr. Eddie C. Smith, vice president of research at Norman, Dr. Frank J. Waxman, vice president of research at HSC, Harold Stalford, director and professor of Mechanical Engineering, and Dr. Kenneth Dormer, OU professor of Physiology and an employee of the Hough Ear Institute.

"It was definitely a team effort to write the proposal," O'Rear says.

Faculty and administrators invested more than a year in researching and drafting it, even traveling as a team to the Whitaker Foundation in Washington, D.C., to promote the center and explore funding possibilities.

The Whitaker Foundation was a natural choice as a possible funding source. A private, nonprofit foundation dedicated to improving human health through the support of biomedical engineering, it was established in 1975 upon the death of U.A. Whitaker, founder and chief executive officer of AMP Incorporated, now the world's largest manufacturer of electrical connectors and connecting devices.

Whitaker was an inventor, engineer and philanthropist who encouraged and supported collaborative medical research involving engineers, scientists and physicians. The foundation was created to continue efforts in the field after his death. Since its inception, the foundation's biomedical engineering programs have awarded more than $450 million to colleges and universities for faculty research, graduate fellowships and program development.

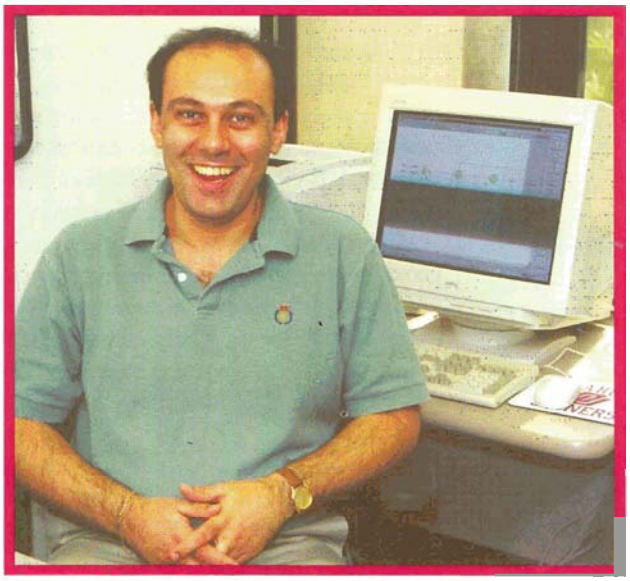
Currently, support goes to more than 400 faculty research projects, 150 graduate fellows, and more than 100 education and internship programs at colleges and universities in the U.S. and Canada.

Little wonder plans for the proposed bioengineering center were pitched to

New Faculty

CEMS welcomes Dr. Dimitrios Papavassiliou as assistant professor of chemical engineering. He comes to Oklahoma from Upstream Strategic Research Center of the Mobil Technology Company, headquartered in Dallas. Papavassiliou received his undergraduate education in Greece at the Aristotle University of Thessaloniki. Upon graduation (1989), he worked as a graduate research fellow with the Chemical Process Research Institute in Thessaloniki. His research was focused on heterogeneous catalysis and kinetics. He developed kinetic models for lignite pyrolysis and for coke combustion for fluid catalytic cracking catalyst regeneration.

Papavassiliou came to the US in 1990 to pursue graduate education at the University of Illinois, where he worked with direct numerical simulations (DNS) of turbulent flows. He completed his M.S. work on the structure of turbulence in a plane Couette flow channel and continued with his Ph.D. work to study turbulent transport and structure using both Eulerian and Lagrangian techniques. The use of DNS with Lagrangian methods to simulate flow with molecular Prandtl numbers from 0.1 to 2400 (from liquid metals to gases, to liquids and heavy oils) was a record-breaking accomplishment. The computational platforms used in this work were the NCSA facilities (CRAY-2, CM-5, Convex C-3, Convex Exemplar, SGI Origin 2000).



Dimitrios Papavassiliou

Papavassiliou graduated in 1996 and joined the Upstream Strategic Research Center in Dallas, a new group with the recently reorganized Mobil Technology Company. This team was responsible for the long term, high risk/high reward research effort in Exploration and Production for Mobil. The experience was highly rewarding. Papavassiliou had the opportunity to interact with a multidisciplinary group of talented people both inside and outside Mobil. During his Mobil career, he collaborated with IBM, Texas A&M University, the University of Houston and the Russian Academy of Science. His research interests shifted to the area of multiphase flow through porous media and novel numerical methods for reservoir and basin simulation. Papavassiliou accepted the position of Senior Research Engineer with Mobil in 1998. He was offered an academic position at the University of Oklahoma, where his wife Georgia Kosmopoulou was on faculty in the School of Economics. He joined OU in March 1999.

Papavassiliou is a member of AIChE and SPE. He has received a number of awards from his native country (Alexander S. Onassis Fellowship, Bodosakis Foundation Fellowship) and was a University of Illinois Fellow. In June 1999, he was an invited visitor to the Institute for Process Engineering, ETH-Zurich, with the visitor program of the European Research Community On Flow Turbulence and Combustion (ERCOFAC) ■

CEMS faculty member Daniel Resasco and research associate Walter Alvarez operate the new XPS-Phi 5800, an X-ray photoelectron spectrometer used to determine the surface composition and chemical state of working samples. In addition to aiding CEMS research in catalysis, nanotubes, nanocomposites, polymers and semi-conductors, the spectrometer is available to outside users who need analysis of surfaces in the areas of metallurgy, catalysis, polymers and biomaterials. The spectrometer was funded through a National Science Foundation grant given to Resasco and co-workers and through Oklahoma state matching funds. For more information on user requirements, e-mail Resasco at resasco@ou.edu.