The University of Akron SM

FIAT LUX 1870

DEPARTMENT OF CHEMICAL ENGINEERING

GRADUATE PROGRAM

Graduate assistant stipends for teaching and research start at $7,800.
Industrially sponsored fellowships available up to $17,000.
In addition to stipends, tuition and fees are waived. • Ph.D. students may get some incentive scholarships.

The deadline for assistantship applications is February 15th.

FACULTY	RESEARCH INTERESTS
G. A. ATWOOD [1]	• Digital Control, Mass Transfer, Multicomponent Adsorption
G. G. CHASE	• Multiphase Processes, Heat Transfer, Interfacial Phenomena
H. M. CHEUNG	• Colloids, Light Scattering Techniques
S. C. CHUANG	• Catalysis, Reaction Engineering, Combustion
J.R. ELLIOTT	• Thermodynamics, Material Properties
L. G. FOCHT	• Fixed Bed Adsorption, Process Design
K. L. FULLERTON	• Fuel Technology, Process Engineering, Environmental Engineering
M. A. GENCER [2]	• Biochemical Engineering, Environmental Biotechnology
H. L. GREENE [1]	• Oxidative Catalysis, Reactor Design, Mixing
L.K. JU	• Biochemical Engineering, Enzyme and Fermentation Technology
S. LEE	• Fuel and Chemical Process Engineering, Reactive Polymers, Waste Clean-Up
D. MAHAJAN [2]	• Homogeneous Catalysis, Reaction Kinetics
J. W. MILLER [2]	• Polymerization Reaction Engineering
H. C. QAMMAR	• Hazardous Waste Treatment, Nonlinear Dynamics
C. K. RIEW [2]	• Reactive Polymer Processing
R. W. ROBERTS [1]	• Plastics Processing, Polymer Films, System Design
N.D. SYLVESTER	• Environmental Engineering, Flow Phenomena
M. S. WILLIS	• Multiphase Transport Theory, Filtration, Interfacial Phenomena

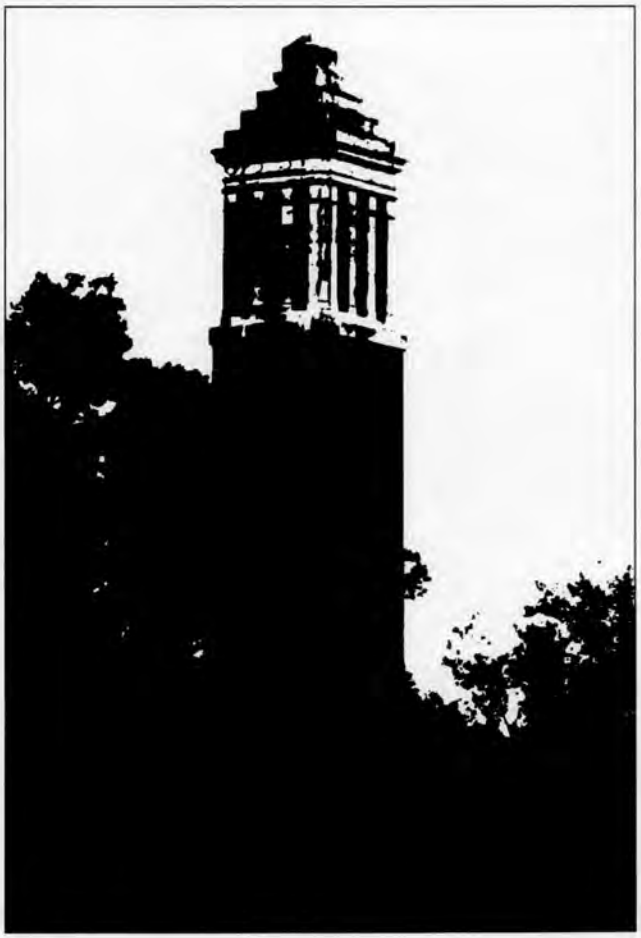
[1] *Professor Emeritus* [2] *Adjunct Faculty Member*

Cooperative Graduate Education Program is also available.

• For Additional Information, Write •

Chairman, Graduate Committee
Department of Chemical Engineering • The University of Akron • Akron, OH 44325-3906

CHEMICAL ENGINEERING PROGRAMS AT THE UNIVERSITY OF ALABAMA



The University of Alabama, located in the sunny South, offers excellent programs leading to M.S. and Ph.D. degrees in Chemical Engineering.

Our research emphasis areas are concentrated in environmental studies, reaction kinetics and catalysis, alternate fuels, and related processes. The faculty has extensive industrial experience, which gives a distinctive engineering flavor to our programs.

For further information, contact the Director of Graduate Studies, Department of Chemical Engineering, Box 870203, Tuscaloosa, AL 35487-0203; (205-348-6450).

FACULTY

G. C. April, Ph.D. (Louisiana State)
D. W. Arnold, Ph.D. (Purdue)
W. C. Clements, Jr., Ph.D. (Vanderbilt)
R. A. Griffin, Ph.D. (Utah State)
W. J. Hatcher, Jr., Ph.D. (Louisiana State)
I. A. Jefcoat, Ph.D. (Clemson)
A. M. Lane, Ph.D. (Massachusetts)
M.D. McKinley, Ph.D. (Florida)
L. Y. Sadler III, Ph.D. (Alabama)
V. N. Schrodt, Ph.D. (Pennsylvania State)

RESEARCH INTERESTS

Biomass Conversion, Modeling Transport Processes, Thermodynamics, Coal-Water Fuel Development, Process Dynamics and Control, Microcomputer Hardware, Catalysis, Chemical Reactor Design, Reaction Kinetics, Environmental, Synfuels, Alternate Chemical Feedstocks, Mass Transfer, Energy Conversion Processes, Ceramics, Rheology, Mineral Processing, Separations, Computer Applications, and Bioprocessing.

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THE UNIVERSITY OF ARIZONA

TUCSON, AZ

The Chemical and Environmental Engineering Department at the University of Arizona offers a wide range of research opportunities in all major areas of chemical engineering and environmental engineering, and graduate courses are offered in most of the research areas listed below. The department offers a fully accredited undergraduate degree as well as MS and PhD graduate degrees. Strong interdisciplinary programs exist in bioprocessing and bioseparations, microcontamination in electronics manufacture, and environmental process modification. Financial support is available through fellowships, government and industrial grants and contracts, teaching and research assistantships.

THE FACULTY AND THEIR RESEARCH INTERESTS

ROBERT ARNOLD, Associate Professor (Caltech)
Microbiological Hazardous Waste Treatment, Metals Speciation and Toxicity

JAMES BAYGENTS, Assistant Professor (Princeton)
Fluid Mechanics, Transport and Colloidal Phenomena, Bioseparations, Electrokinetics

MILAN BIER, Professor (Fordham)
Protein Separation, Electrophoresis, Membrane Transport

CURTIS W. BRYANT, Associate Professor (Clemson)
Biological Wastewater Treatment, Industrial Waste Treatment

WILLIAM P. COSART, Associate Professor (Oregon State)
Heat Transfer in Biological Systems, Blood Processing

EDWARD FREEH, Adjunct Professor (Ohio State)
Process Control, Computer Applications

JOSEPH GROSS, Professor Emeritus (Purdue)
Boundary Layer Theory, Pharmacokinetics, Microcirculation, Biorheology

ROBERTO GUZMAN, Assistant Professor (North Carolina State)
Protein Separation, Affinity Methods

BRUCE E. LOGAN, Associate Professor (Berkeley)
Bioremediation, Biological Wastewater Treatment, Fixed Film Bioreactors

KIMBERLY OGDEN, Assistant Professor (Colorado)
Bioreactors, Bioremediation, Organics Removal from Soils

THOMAS W. PETERSON, Professor and Head (CalTech)
Aerosols, Hazardous Waste Incineration, Microcontamination

ALAN D. RANDOLPH, Professor (Iowa State)
Crystallization Processes, Nucleation, Particulate Processes

THOMAS R. REHM, Professor (Washington)
Mass Transfer, Process Instrumentation, Computer Aided Design

FARHANG SHADMAN, Professor (Berkeley)
Reaction Engineering, Kinetics, Catalysis, Reactive Membranes, Microcontamination

RAYMOND A. SIERKA, Professor (Oklahoma)
Adsorption, Oxidation, Membranes, Solar Catalyzed Detox Reactions

JOST O. L. WENDT, Professor (Johns Hopkins)
Combustion-Generated Air Pollution, Incineration, Waste Management

DON H. WHITE, Professor Emeritus (Iowa State)
Polymers, Microbial and Enzymatic Processes

DAVID WOLF, Visiting Professor (Technion)
Fermentation, Mixing, Energy, Biomass Conversion

Tucson has an excellent climate and many recreational opportunities. It is a growing modern city of 450,000 that retains much of the old Southwestern atmosphere.

For further information, write to

Chairman,
Graduate Study Committee
Department of
Chemical and Environmental Engineering
University of Arizona
Tucson, Arizona 85721

The University of Arizona is an equal opportunity educational institution/equal opportunity employer.
Women and minorities are encouraged to apply.

ARIZONA STATE UNIVERSITY

CHEMICAL, BIO, AND MATERIALS ENGINEERING

Graduate Research in a High Technology Environment

Chemical Engineering

Beckman, James R., Ph.D., U. of Arizona • Crystallization and Solar Cooling

Bellamy, Lynn, Ph.D., Tulane • Process Simulation

Berman, Neil S., Ph.D., U. of Texas, Austin • Fluid Dynamics and Air Pollution

Burrows, Veronica A., Ph.D., Princeton • Surface Science, Semiconductor Processing

Cale, Timothy S., Ph.D., U. of Houston • Catalysis, Semiconductor Processing

Garcia, Antonio A., Ph.D., U.C., Berkeley • Acid-Base Interactions, Biochemical Separation, Colloid Chemistry

Henry, Joseph D., Jr., Ph.D., U. of Michigan • Biochemical, Molecular Recognition, Surface and Colloid Phenomena

Kuester, James L., Ph.D., Texas A&M • Thermochemical Conversion, Complex Reaction Systems

Raupp, Gregory B., Ph.D., U. of Wisconsin • Semiconductor Materials Processing, Surface Science, Catalysis

Rivera, Daniel, Ph.D., Cal Tech • Process Control and Design

Sater, Vernon E., Ph.D., Illinois Institute of Tech • Heavy Metal Removal from Waste Water, Process Control

Torrest, Robert S., Ph.D., U. of Minnesota • Multiphase Flow, Filtration, Flow in Porous Media, Pollution Control

Zwiebel, Imre, Ph.D., Yale • Adsorption of Macromolecules, Biochemical Separations

Bioengineering

Dorson, William J., Ph.D., U. of Cincinnati • Physicochemical Phenomena, Transport Processes

Guilbeau, Eric J., Ph.D., Louisiana Tech • Biosensors, Physiological Systems, Biomaterials

Kipke, Daryl R., Ph.D., University of Michigan • Computation Neuroscience • Machine Vision, Speech Recognition, Robotics • Neural Networks

Pizziconi, Vincent B., Ph.D. Arizona State • Artificial Organs, Biomaterials, Bioseparations

Sweeney, James D., Ph.D., Case-Western Reserve • Rehab Engineering, Applied Neural Control

Towe, Bruce C., Ph.D., Penn State • Bioelectric Phenomena, Biosensors, Biomedical Imaging

Yamaguchi, Gary T., Ph.D., Stanford • Biomechanics, Rehab Engineering, Computer-Aided Surgery

Materials Science & Engineering

Alford, Terry L., Ph.D., Cornell U. • Electronic Materials • Physical Metallurgy • Electronic Thin Films • Surface/Thin Film

Dey, Sandwip K., Ph.D., NYSC of Ceramics, Alfred U. • Ceramics, Sol-Gel Processing

Hendrickson, Lester E., Ph.D., U. of Illinois • Fracture and Failure Analysis, Physical and Chemical Metallurgy

Jacobson, Dean L., Ph.D., UCLA • Thermionic Energy Conversion, High Temperature Materials

Krause, Stephen L., Ph.D., U. of Michigan • Ordered Polymers, Electronic Materials, Electron X-ray Diffraction, Electron Microscopy

Mayer, James, Ph.D., Purdue •Thin Film Processing • Ion Bean Modification of Materials

Stanley, James T., Ph.D., U. of Illinois • Phase Transformations, Corrosion

For more details regarding the graduate degree programs in the Department of Chemical, Bio, and Materials Engineering, please call (602) 965-3313 or (602) 965-3676, or write to: Dr. Eric Guilbeau, Chair of the Graduate Committee, Department of Chemical, Bio, and Materials Engineering, Arizona State University, Tempe, Arizona 85287-6006.

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Coal Combustion & Gasification

Computer Simulation

Electrochemistry

Thermodynamics

Fluid Mechanics

Kinetics & Catalysis

Mathematical Modeling

Materials

Transport Phenomena

Molecular Dynamics

Process Design

Process Control

For additional information write to:

Graduate Coordinator
Department of Chemical Engineering, 350 CB
Brigham Young University
Provo, Utah 84602

Tel: (801) 378-2586

THE UNIVERSITY OF CALGARY

DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING

The Department offers graduate programs leading to the M.Sc. and Ph.D. degrees in Chemical Engineering (full-time) and the M.Eng. degree in Chemical Engineering or Petroleum Reservoir Engineering (part-time) in the following areas:

- **Biochemical Engineering & Biotechnology**
- **Biomedical Engineering**
- **Environmental Engineering**
- **Modeling, Simulation & Control**
- **Petroleum Recovery & Reservoir Engineering**
- **Process Development**
- **Reaction Engineering/Kinetics**
- **Thermodynamics**
- **Transport Phenomena**

FACULTY

R. G. Moore, Head *(Alberta)*
A. Badakhshan *(Birmingham, U.K.)*
L. A. Behie *(Western Ontario)*
J. D. M. Belgrave *(Calgary)*
F. Berruti *(Waterloo)*
P. R. Bishnoi *(Alberta)*
R. M. Butler *(Imperial College, U.K.)*
A. Chakma *(UBC)*
R. A. Heidemann *(Washington U.)*
A. A. Jeje *(MIT)*
N. Kalogerakis *(Toronto)*
A. K. Mehrotra *(Calgary)*
E. Rhodes *(Manchester, U.K.)*
P. M. Sigmund *(Texas)*
J. Stanislav *(Prague)*
W. Y. Svrcek *(Alberta)*
E. L. Tollefson *(Toronto)*
M. A. Trebble *(Calgary)*

Fellowships and Research Assistantships are available to all qualified applicants.

• For Additional Information Write •
Dr. A. K. Mehrotra • Chair, Graduate Studies Committee
Department of Chemical and Petroleum Engineering
The University of Calgary • Calgary, Alberta, Canada T2N 1N4

The University is located in the City of Calgary, the Oil capital of Canada, the home of the world famous Calgary Stampede and the 1988 Winter Olympics. The City combines the traditions of the Old West with the sophistication of a modern urban center. Beautiful Banff National Park is 110 km west of the City and the ski resorts of Banff, Lake Louise,and Kananaskis areas are readily accessible. In the above photo the University Campus is shown with the Olympic Oval and the student residences in the foreground. The Engineering complex is on the left of the picture.

THE UNIVERSITY OF CALIFORNIA AT BERKELEY . . .

. . . offers graduate programs leading to the Master of Science and Doctor of Philosophy. Both programs involve joint faculty-student research as well as courses and seminars within and outside the department. Students have the opportunity to take part in the many cultural offerings of the San Francisco Bay Area and the recreational activities of California's northern coast and mountains.

RESEARCH INTERESTS

BIOCHEMICAL ENGINEERING
ELECTROCHEMICAL ENGINEERING
ELECTRONIC MATERIALS PROCESSING
ENERGY UTILIZATION
FLUID MECHANICS
KINETICS AND CATALYSIS
POLYMER SCIENCE AND TECHNOLOGY
PROCESS DESIGN AND DEVELOPMENT
SEPARATION PROCESSES
SURFACE AND COLLOID SCIENCE
THERMODYNAMICS

FACULTY

ALEXIS T. BELL
HARVEY W. BLANCH
ELTON J. CAIRNS
ARUP K. CHAKRABORTY
DOUGLAS S. CLARK
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ALAN S. FOSS
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SCOTT LYNN
ROYA MABOUDIAN
SUSAN J. MULLER
JOHN S. NEWMAN
JOHN M. PRAUSNITZ
CLAYTON J. RADKE
JEFFREY A. REIMER
DAVID S. SOANE
DOROS N. THEODOROU

PLEASE WRITE: DEPARTMENT OF CHEMICAL ENGINEERING
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA 94720-9989

UNIVERSITY OF CALIFORNIA

IRVINE

Graduate Studies in

Chemical and Biochemical Engineering

for

Chemical Engineering, Engineering, and Science Majors

PROGRAM

Offers degrees at the M.S. and Ph.D. levels. Research in frontier areas in chemical engineering, including biochemical engineering, biotechnology and materials science and engineering. Strong molecular biology, biochemistry, microbiology, and other engineering and science research groups on campus.

LOCATION

The 1,510-acre UC Irvine campus is in Orange County, five miles from the Pacific Ocean and 40 miles south of Los Angeles. Irvine is one of the nation's fastest growing residential, industrial, and business areas. Nearby beaches, mountain and desert area recreational activities, and local cultural activities make Irvine a pleasant city in which to live and study.

FACULTY

Nancy A. Da Silva *(California Institute of Technology)*
G. Wesley Hatfield *(Purdue University)*
Juan Hong *(Purdue University)*
James T. Kellis, Jr. *(University of California, Irvine)*
Henry C. Lim *(Northwestern University)*
Martha L. Mecartney *(Stanford University)*
Betty H. Olson *(University of California, Berkeley)*
Frank G. Shi *(California Institute of Technology)*
Thomas K. Wood *(North Carolina State University)*

RESEARCH AREAS

- **Bioreactor Engineering**
- **Bioremediation**
- **Environmental Chemistry**
- **Environmental Engineering**
- **Interfacial Engineering**
- **Materials Processing**
- **Metabolic Engineering**
- **Microstructure of Materials**
- **Optimization**
- **Process Control**
- **Protein Engineering**
- **Recombinant Cell Technology**
- **Separation Processes**
- **Sol-Gel Processing**
- **Water Pollution Control**

For further information and application forms, contact

Biochemical Engineering Program
School of Engineering
University of California
Irvine, CA 92717-2575

CHEMICAL ENGINEERING AT

UCLA

RESEARCH AREAS

- Thermodynamics and Cryogenics
- Process Design, Dynamics, and Control
- Polymer Processing and Transport Phenomena
- Kinetics, Combustion, and Catalysis
- Surface and Interface Engineering
- Electrochemistry and Corrosion
- Biochemical Engineering
- Aerosol Science and Technology
- Air Pollution Control and Environmental Engineering

FACULTY

D. T. Allen
Y. Cohen
T. H. K. Frederking
S. K. Friedlander
R. F. Hicks
E. L. Knuth
(Prof. Emeritus)
V. Manousiouthakis
H. G. Monbouquette
K. Nobe
L. B. Robinson
(Prof. Emeritus)
S. M. Senkan
O. I. Smith
W. D. Van Vorst
(Prof. Emeritus)
V. L. Vilker
A. R. Wazzan

PROGRAMS

UCLA's Chemical Engineering Department offers a program of teaching and research linking fundamental engineering science and industrial practice. Our Department has strong graduate research programs in environmental chemical engineering, biotechnology, and materials processing. With the support of the Parsons Foundation and EPA, we are pioneering the development of methods for the design of clean chemical technologies, both in graduate research and engineering education.

Fellowships are available for outstanding applicants in both M.S. and Ph.D. degree programs. A fellowship includes a waiver of tuition and fees plus a stipend.

Located five miles from the Pacific Coast, UCLA's attractive 417-acre campus extends from Bel Air to Westwood Village. Students have access to the highly regarded science programs and to a variety of experiences in theatre, music, art, and sports on campus.

CONTACT

Admissions Officer • Chemical Engineering Department
5531 Boelter Hall • UCLA • Los Angeles, CA 90024-1592
(310) 825-9063

UNIVERSITY OF CALIFORNIA
SANTA BARBARA

• FACULTY AND RESEARCH INTERESTS •

L. GARY LEAL Ph.D. *(Stanford)* **(Chairman)** • Fluid Mechanics; Suspension and Polymer Physics.
ERAY S. AYDIL Ph.D. *(University of Houston)* • Microelectronics Materials Processing
SANJOY BANERJEE Ph.D. *(Waterloo)* • Two-Phase Flow, Chemical & Nuclear Safety, Computational Fluid Dynamics, Turbulence.
BRADLEY F. CHMELKA Ph.D. *(U.C. Berkeley)* • Guest/Host Interactions in Molecular Sieves, Dispersal of Metals in Oxide Catalysts, Molecular Structure and Dynamics in Polymeric Solids, Properties of Partially Ordered Materials, Solid-State NMR Spectroscopy.
GLENN H. FREDRICKSON Ph.D. *(Stanford)* • Electronic Transport, Glasses, Polymers, Composites, Phase Separation.
OWEN T. HANNA Ph.D. *(Purdue)* • Theoretical Methods, Chemical Reactor Analysis, Transport Phenomena.
JACOB ISRAELACHVILI Ph.D. *(Cambridge)* • Surface and Interfacial Phenomena, Adhesion, Colloidal Systems, Surface Forces.
FRED F. LANGE Ph.D. *(Penn State)* • Powder Processing of Composite Ceramics; Liquid Precursors for Ceramics; Superconducting Oxides.
GLENN E. LUCAS Ph.D. *(M.I.T.)* **(Vice Chairman)** • Mechanics of Materials, Radiation Damage.
DIMITRIOS MAROUDAS Ph.D. *(M.I.T.)* • Structure and Dynamics in Heterogeneous Materials.
ERIC McFARLAND Ph.D. *(M.I.T.)* M.D. *(Harvard)* • Biomedical Engineering, NMR and Neutron Imaging, Transport Phenomena in Complex Liquids, Radiation Interactions.
DUNCAN A. MELLICHAMP Ph.D. *(Purdue)* • Computer Control, Process Dynamics, Real-Time Computing.
G. ROBERT ODETTE Ph.D. *(M.I.T.)* • High Performance Structural Materials
DALE S. PEARSON Ph.D. *(Northwestern)* • Rheological and Optical Properties of Polymer Liquids and Colloidal Dispersions.
PHILIP ALAN PINCUS Ph.D. *(U.C. Berkeley)* • Theory of Surfactant Aggregates, Colloid Systems.
A. EDWARD PROFIO Ph.D. *(M.I.T.)* • Biomedical Engineering, Reactor Physics, Radiation Transport Analysis.
ROBERT G. RINKER Ph.D. *(Caltech)* • Chemical Reactor Design, Catalysis, Energy Conversion, Air Pollution.
ORVILLE C. SANDALL Ph.D. *(U.C. Berkeley)* • Transport Phenomena, Separation Processes.
DALE E. SEBORG Ph.D. *(Princeton)* • Process Control, Computer Control, Process Identification.
PAUL SMITH Ph.D. *(State University of Groningen, Netherlands)* • High Performance Fibers; Processing of Conducting Polymers; Polymer Processing.
T. G. THEOFANOUS Ph.D. *(Minnesota)* • Nuclear and Chemical Plant Safety, Multiphase Flow, Thermalhydraulics.
W. HENRY WEINBERG Ph.D. *(U.C. Berkeley)* • Surface Chemistry; Heterogeneous Catalysis; Electronic Materials
JOSEPH A. N. ZASADZINSKI Ph.D. *(Minnesota)* • Surface and Interfacial Phenomen, Structure of Microemulsions.

PROGRAMS AND FINANCIAL SUPPORT

The Department offers M.S. and Ph.D. degree programs Financial aid, including fellowships, teaching assistantships, and research assistantships, is available.

THE UNIVERSITY

One of the world's few seashore campuses, UCSB is located on the Pacific Coast 100 miles northwest of Los Angeles. The student enrollment is over 18,000. The metropolitan Santa Barbara area has over 150,000 residents and is famous for its mild, even climate.

For additional information and applications, write to

Chair
Graduate Admissions Committee
Department of Chemical and Nuclear Engineering
University of California
Santa Barbara, CA 93106

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John F. Brady
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Richard C. Flagan
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Konstantinos P. Giapis
Julia A. Kornfield
Manfred Morari
C. Dwight Prater (Visiting)
John H. Seinfeld
Nicholas W. Tschoegl (Emeritus)
Zhen-Gang Wang

RESEARCH INTERESTS

Aerosol Science
Applied Mathematics
Atmospheric Chemistry and Physics
Biocatalysis and Bioreactor Engineering
Bioseparations
Catalysis
Chemical Vapor Deposition
Combustion
Colloid Physics
Fluid Mechanics
Materials Processing
Microelectronics Processing
Microstructured Fluids
Polymer Science
Process Control and Synthesis
Protein Engineering
Statistical Mechanics of Heterogeneous Systems

For further information, write

Professor Mark E. Davis
Chemical Engineering 210-41 • California Institute of Technology • Pasadena, California 91125

Clues

John L. Anderson
Membrane and colloid transport phenomena

Lorenz T. Biegler
Process simulation and optimization

Paul A. DiMilla
Cellular and biomolecular engineering; cell membranes

Michael M. Domach
Biochemical engineering and cell biology

Ignacio E. Grossmann
Batch process synthesis and design

William S. Hammack
Characterization of amorphous materials; pressure-induced amorphorization

Annette M. Jacobson
Solubilization and surfacant adsorption phenomena

Myung S. Jhon
Magnetic and magneto-optical recording

Edmond I. Ko
Chemistry of solid-state materials; semiconductor processing

Gary J. Powers
Decision-making in the design of chemical processing systems

Dennis C. Prieve
Transport phenomena and colloids, especially electrokinetic phenomena

Jennifer L. Sinclair
Multiphase flow

Paul J. Sides
Electrochemical engineering; growth of advanced materials

Robert D. Tilton
Biomolecules at interfaces

Herbert L. Toor
Transport phenomena; energy utilization and transformation

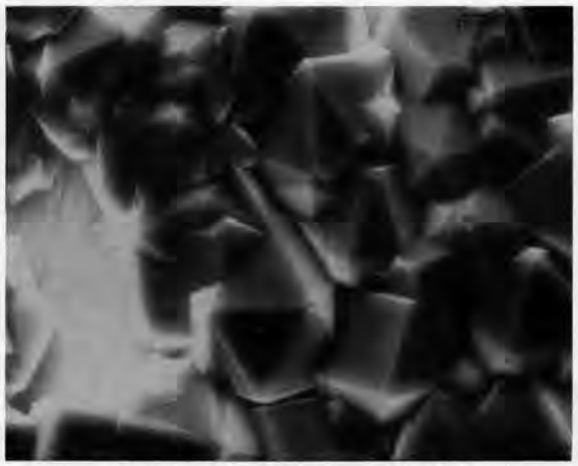
Arthur W. Westerberg
Engineering design

B. Erik Ydstie
Process Control

Find Out

Write to Director of Graduate Admissions, Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213.

Chemical Engineering in the 21st Century?



Diamond crystals synthesized by graduate student C. Kovach.

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- Novel Separations/Processing •

For more information contact:

The Graduate Coordinator
Department of Chemical Engineering
Case Western Reserve University
Cleveland, Ohio 44106

Faculty and Specializations

John C. Angus, Ph.D. 1960, University of Michigan
Diamond and diamond-like films, redox equilibria

Coleman B. Brosilow, Ph.D. 1962, Polytechnic Institute of Brooklyn
Adaptive inferential control, multi-variable control, coordination algorithms

Robert V. Edwards, Ph.D. 1968, Johns Hopkins University
Laser anemometry, mathematical modeling, data acquisition

Donald L. Feke, Ph.D. 1981, Princeton University
Colloidal phenomena, ceramic dispersions, fine-particle processing

Nelson C. Gardner, Ph.D. 1966, Iowa State University
High-gravity separations, sulfur removal processes

Uziel Landau, Ph.D. 1975, University of California (Berkeley)
Electrochemical engineering, current distributions, electrodeposition

Chung-Chiun Liu, Ph.D. 1968, Case Western Reserve University
Electrochemical sensors, electrochemical synthesis, electrochemistry related to electronic materials

J. Adin Mann, Jr., Ph.D. 1962, Iowa State University
Interfacial structure and dynamics, light scattering, Langmuir-Blodgett films, stochastic processes

Philip W. Morrison, Jr., Ph.D. 1987, University of California (Berkeley)
Materials synthesis, semiconductor processing, in-situ diagnostics

Syed Qutubuddin, Ph.D. 1983, Carnegie-Mellon University
Surfactant and polymer solutions, metal extraction, enhanced oil recovery

Robert F. Savinell, Ph.D. 1977, University of Pittsburgh
Applied electrochemistry, electrochemical system simulation and optimization, electrode processes

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The UNIVERSITY OF CINCINNATI

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Location

The city of Cincinnati is the 23rd largest city in the United States, with a greater metropolitan population of 1.7 million. The city offers numerous sites of architectural and historical interest, as well as a full range of cultural attractions, such as an outstanding art museum, botanical gardens, a world-famous zoo, theaters, symphony, and opera. The city is also home to the Cincinnati Bengals and the Cincinnati Reds. The business and industrial base of the city includes pharmaceutics, chemicals, jet engines, autoworks, electronics, printing and publishing, insurance, investment banking, and health care. A number of Fortune 500 companies are located in the city.

Faculty

Amy Ciric	**Robert Jenkins**
Joel Fried	**Yuen-Koh Kao**
Stevin Gehrke	**Soon-Jai Khang**
Rakesh Govind	**Jerry Lin**
David Greenberg	**Glenn Lipscomb**
Daniel Hershey	**Neville Pinto**
Sun-Tak Hwang	**Sotiris Pratsinis**

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▫ Chemical Reaction Engineering and Heterogeneous Catalysis
Modeling and design of chemical reactors, deactivation of catalysts, flow pattern and mixing in chemical equipment, laser induced effects.

▫ Coal Research
New technology for coal combustion power plant, desulfurization and denitritication.

▫ Material Synthesis
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▫ Membrane Separations
Membrane gas separations, membrane reactors, sensors and probes, equilibrium shift, pervaporation, dynamic simulation of membrane separators, membrane preparation and characterization for polymeric and inorganic materials.

▫ Polymers
Thermodynamics, thermal analysis and morphology of polymer blends, high-temperature polymers, hydrogels, polymer processing.

▫ Process Synthesis
Computer-aided design, modeling and simulation of coal gasifiers, activated carbon columns, process unit operations, prediction of reaction by-products.

• For Admission Information •
Director, Graduate Studies
Department of Chemical Engineering, # 0171
University of Cincinnati
Cincinnati, Ohio 45221-0171

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- CENTER FOR ADVANCED MATERIALS PROCESSING
- NASA CENTER FOR THE DEVELOPMENT OF COMMERCIAL CRYSTAL GROWTH IN SPACE
- INSTITUTE OF COLLOID AND SURFACE SCIENCE

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Dean of the Graduate School
Clarkson University
Box 5625
Potsdam, New York 13699-5625

Clarkson University is a nondiscriminatory, equal opportunity, affirmative action educator and employer.

Graduate Study at

Clemson University

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Ph.D., Stanford University, 1983

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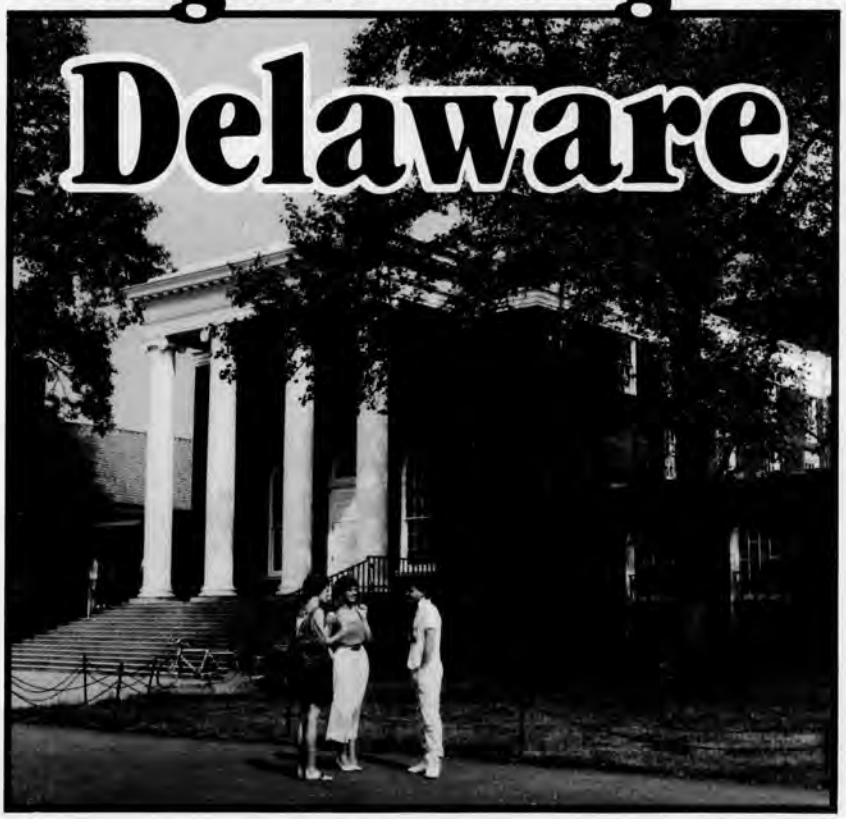

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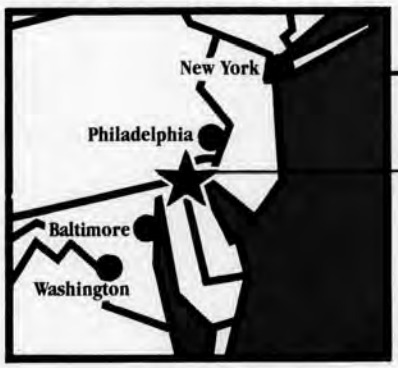

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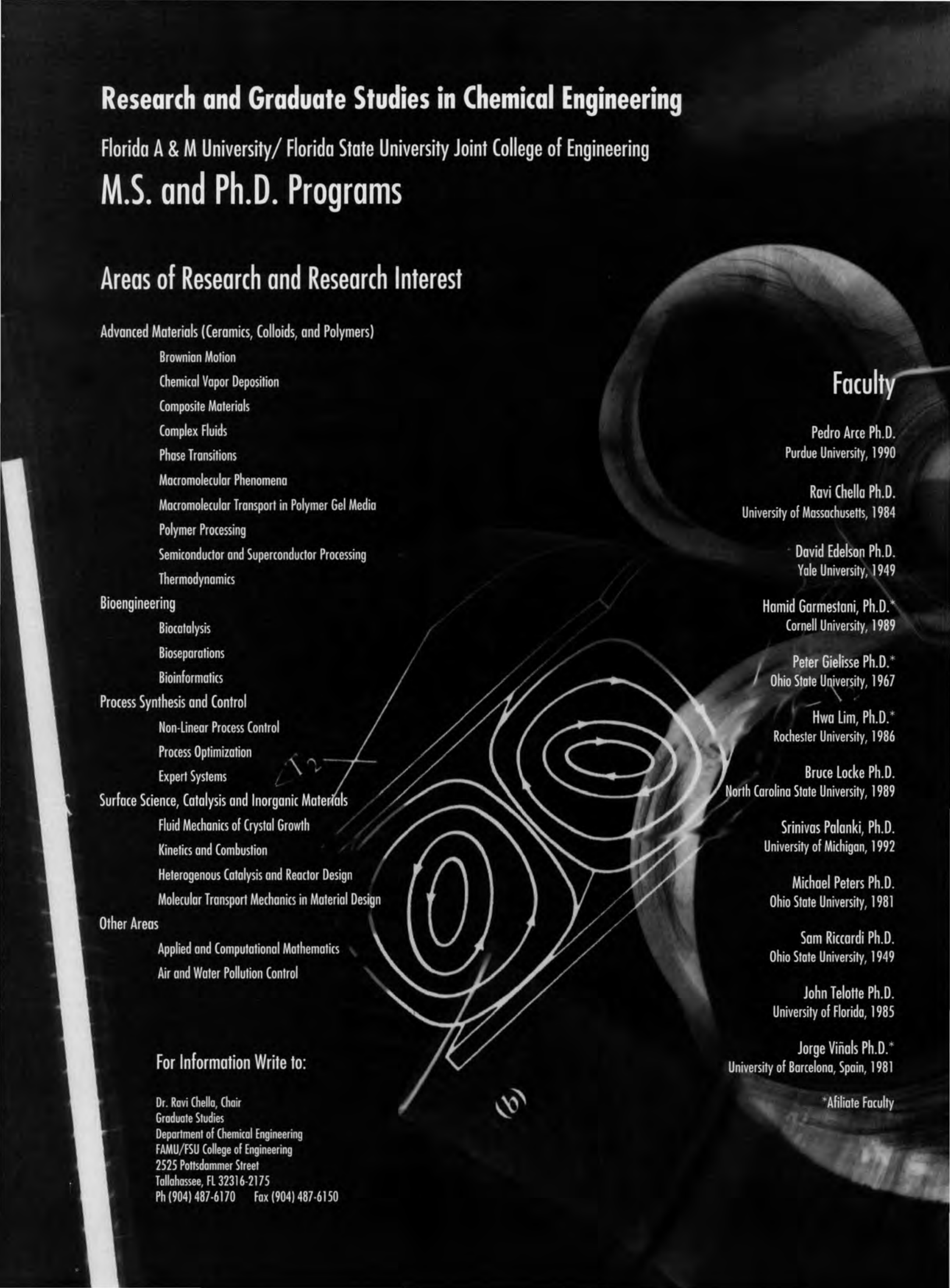

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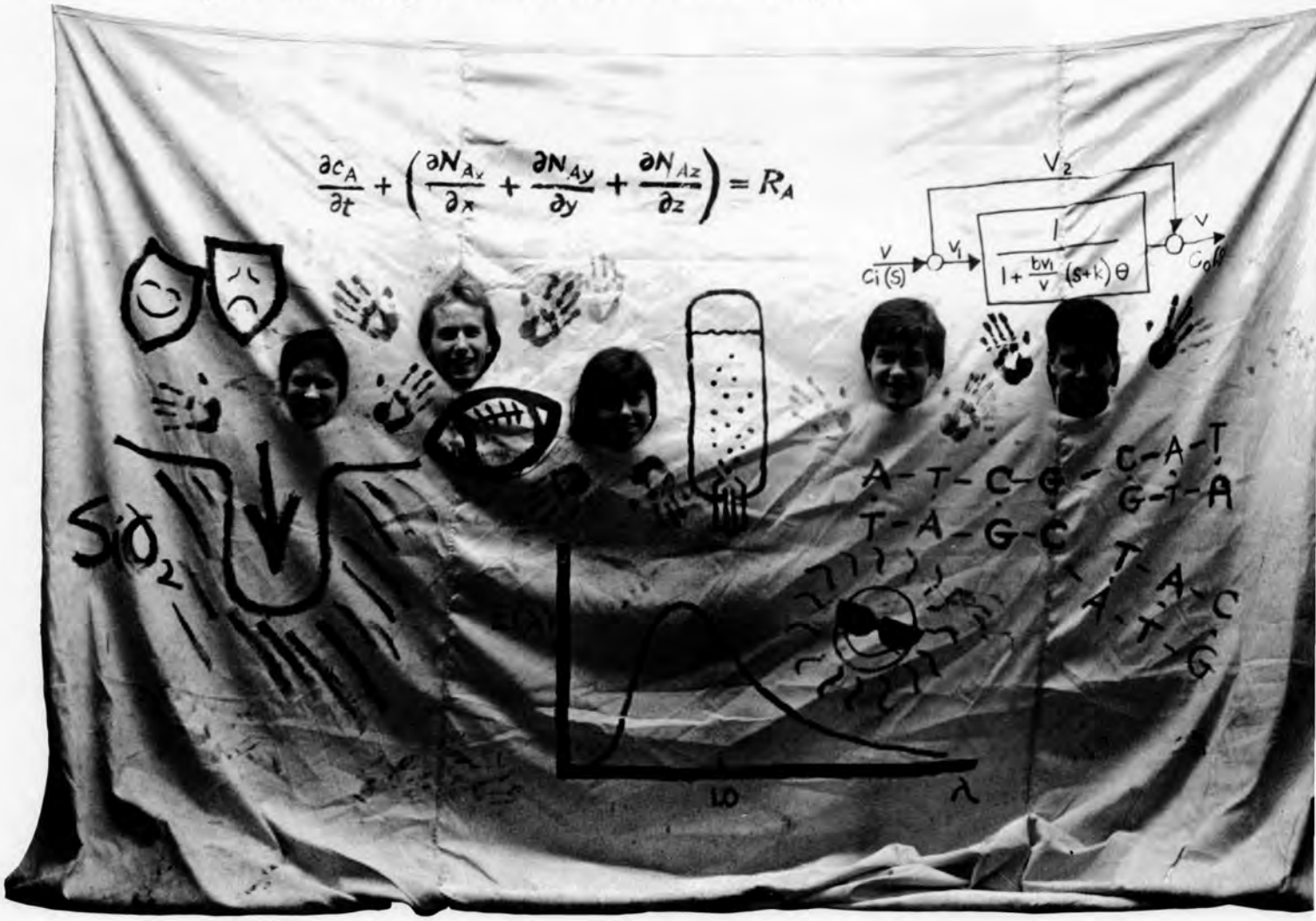

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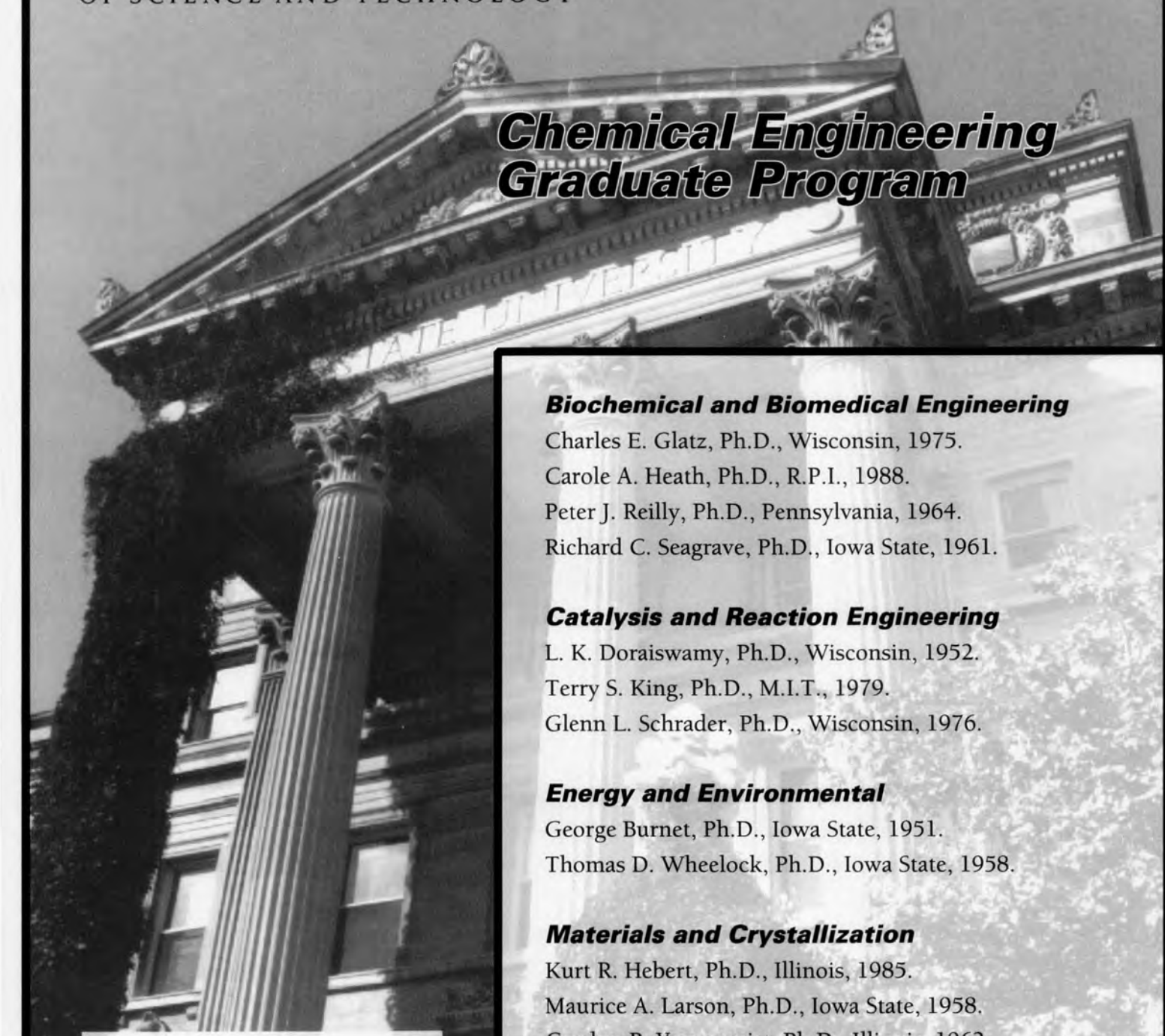

Chemical Engineering Graduate Program

Biochemical and Biomedical Engineering
Charles E. Glatz, Ph.D., Wisconsin, 1975.
Carole A. Heath, Ph.D., R.P.I., 1988.
Peter J. Reilly, Ph.D., Pennsylvania, 1964.
Richard C. Seagrave, Ph.D., Iowa State, 1961.

Catalysis and Reaction Engineering
L. K. Doraiswamy, Ph.D., Wisconsin, 1952.
Terry S. King, Ph.D., M.I.T., 1979.
Glenn L. Schrader, Ph.D., Wisconsin, 1976.

Energy and Environmental
George Burnet, Ph.D., Iowa State, 1951.
Thomas D. Wheelock, Ph.D., Iowa State, 1958.

Materials and Crystallization
Kurt R. Hebert, Ph.D., Illinois, 1985.
Maurice A. Larson, Ph.D., Iowa State, 1958.
Gordon R. Youngquist, Ph.D., Illinois, 1962.

Process Design and Control
Derrick K. Rollins, Ph.D., Ohio State, 1990.
Dean L. Ulrichson, Ph.D., Iowa State, 1970.

Transport Phenomena and Thermodynamics
James C. Hill, Ph.D., Washington, 1968.
Kenneth R. Jolls, Ph.D., Illinois, 1966.

For additional information, please write
Graduate Office
Department of
Chemical Engineering
Iowa State University
Ames, Iowa 50011
or call 515 294-7643
E-Mail Seagrave@IASTATE.EDU

Graduate Study and Research in

Chemical Engineering

Timothy A. Barbari
Ph.D., University of Texas, Austin
- Membrane Science
- Sorption and Diffusion in Polymers
- Polymeric Thin Films

Michael J. Betenbaugh
Ph.D., University of Delaware
- Biochemical Kinetics
- Insect Cell Culture
- Recombinant DNA Technology

Marc D. Donohue
Ph.D., University of California, Berkeley
- Equations of State
- Statistical Thermodynamics
- Phase Equilibria

Joseph L. Katz
Ph.D., University of Chicago
- Nucleation
- Crystallization
- Flame Generation of Ceramic Powders

Mark A. McHugh
Ph.D., University of Delaware
- High-Pressure Thermodynamics
- Polymer Solution Thermodynamics
- Supercritical Solvent Extraction

W. Mark Saltzman
Ph.D., Massachusetts Institute of Technology
- Transport in Biological Systems
- Polymeric Controlled Release
- Cell-Surface Interactions

W. H. Schwarz
Dr. Engr., The Johns Hopkins University
- Rheology
- Non-Newtonian Fluid Dynamics
- Physical Acoustics and Fluids
- Turbulence

Kathleen J. Stebe
Ph.D., The City University of New York
- Interfacial Phenomena
- Electropermeability of Biological Membranes
- Surface Effects at Fluid-Droplet Interfaces

Denis Wirtz
Ph.D., Stanford University
- Phase Transitions and Critical Phenomena
- Polymer Systems Far from Equilibrium
- Pattern Selection in Convective Systems

Johns Hopkins

For further information contact:

The Johns Hopkins University
G.W.C. Whiting School of Engineering
Department of Chemical Engineering
34th and Charles Streets
Baltimore, MD 21218
(410) 516-8480

E.O.E./A.A.

THE UNIVERSITY OF KANSAS

GRADUATE STUDY IN CHEMICAL AND PETROLEUM ENGINEERING

GRADUATE PROGRAMS

- M.S. degree with a thesis requirement in both chemical and petroleum engineering
- Ph.D. degree characterized by moderate and flexible course requirements and a strong research emphasis
- Typical completion times are 16-18 months for a M.S. degree and 4 1/2 years for a Ph.D. degree (from B.S.)

RESEARCH AREAS

Catalytic Kinetics and Reaction Engineering
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Controlled Drug Delivery
Corrosion
Economic Evaluation
Enhanced Oil Recovery Processes
Fluid Phase Equilibria and Process Design
Kinetics and Homogeneous Catalysis for Polymer Reactions
Plasma Modeling and Plasma Reactor Design
Phase Behavior
Process Control
Supercomputer Applications
Supercritical Fluid Applications
Waste Heat and Pollution of Combustion Processes

FINANCIAL AID

Financial aid is available in the form of fellowships and research and teaching assistantships ($13,000 to $16,000 a year)

THE UNIVERSITY

The University of Kansas is the largest and most comprehensive university in Kansas. It has an enrollment of more than 28,000 and almost 2,000 faculty members. KU offers more than 100 bachelors', nearly ninety masters', and more than fifty doctoral programs. The main campus is in Lawrence, Kansas, with other campuses in Kansas City, Wichita, Topeka, and Overland Park, Kansas.

FACULTY

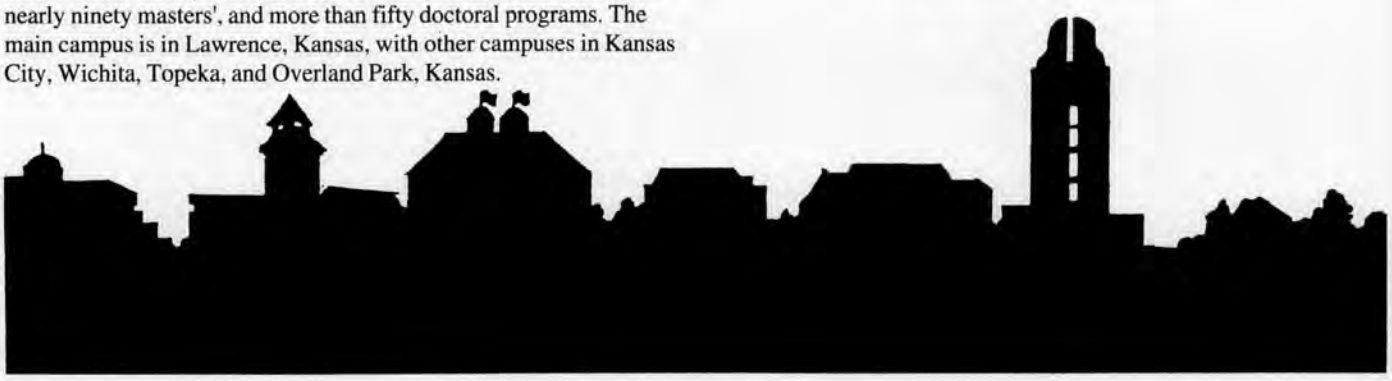
Kenneth A. Bishop (Ph.D., Oklahoma)
John C. Davis (Ph.D., Wyoming)
Don W. Green (Ph.D., Oklahoma)
Colin S. Howat (Ph.D., Kansas)
Carl E. Locke, Jr., Dean (Ph.D., Texas)
Russell D. Osterman (Ph.D., Kansas)
Marylee Z. Southard (Ph.D., Kansas)
Bala Subramaniam (Ph.D., Notre Dame)
Galen J. Suppes (PH.D., Johns Hopkins)
Brian E. Thompson (Ph.D., MIT)
Shapour Vossoughi (Ph.D., Alberta, Canada)
G. Paul Willhite, Chairman (Ph.D., Northwestern)

RESEARCH FACILITIES

Excellent facilities are available for research and instruction. Extensive equipment and shop facilities are available for research in such areas as enhanced oil recovery processes, fluid phase equilibria, catalytic kinetics, plasma processing, and supercritical fluid applications. The VAX 9000, along with a network of Macintosh personal computers and IBM, Apollo, and Sun workstations, support computational and graphical needs.

For more information and application material, write or call

The University of Kansas
The Graduate Adviser
Department of Chemical and Petroleum Engineering
4006 Learned Hall
Lawrence, KS 66045-2223



Graduate Study
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- Interdisciplinary Areas of Systems Engineering
- Food Science
- Environmental Engineering

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For More Information Write To

Professor B.G. Kyle
Durland Hall
Kansas State University
Manhattan, KS 66506

Areas of Study and Research

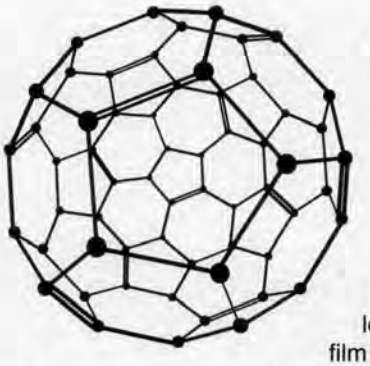
Transport Phenomena
Energy Engineering
Coal and Biomass Conversion
Thermodynamics and Phase Equilibrium
Biochemical Engineering
Proces Dynamics and Control
Chemical Reaction Engineering
Materials Science
Catalysis and Fuel Synthesis
Process System Engineering and Artificial Intelligence
Environmental Pollution Control
Fluidization and Solid Mixing
Hazardous Waste Treatment

KSU
KANSAS STATE UNIVERSITY

University of Kentucky

Far From An Ordinary Ball

Research with advanced materials (carbon fibers, nitride catalysts, superconducting thin films, and liquid crystalline polymers) and with Buckyballs is ongoing here in Lexington.



Anything But An Ordinary University

At the University of Kentucky—designated by the Carnegie Foundation as a Research University of the First Class, and included in the NSF's prestigious listing of Top 100 research institutions in America—*CHOICES* for Chem. E. graduate students are anything but ordinary. There are joint projects with Pharmacy, the Medical School, the Markey Cancer Center, and Chemistry researchers. And abundant opportunities for intense interaction with extraordinary faculty, as well as access to state-of-the-art facilities and equipment, including an IBM ES 3900/600J Supercomputer.

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Ph.D.

Recent national awards won by our faculty include: Larry K. Cecil AIChE Environmental Division; AIChE Outstanding Counselor Award, 1983, 1991; ASM Henry Marion Howe Medal; AAAR Kenneth T. Whitby Memorial Award; BMES Dr. Harold Lamport Award for a Young Investigator; and two NSF-Presidential Young Investigators. Recent University-wide awards by faculty include: Great Teacher; Research Professor; Excellence in Undergraduate Education; and Alumni Professor.

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Computational Engineering—Modeling turbulent diffusion in atmospheric convective boundary layers; modeling growth of multi-component aerosol systems.
Environmental Engineering—EPA-approved analytical laboratory; global atmospheric transport models; atmospheric photochemistry; control of heavy metals and hazardous organics; water pollution research.
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606-257-4956

University of Kentucky Department of Chemical Engineering

UNIVERSITÉ LAVAL

Québec, Canada

Ph.D. and M.Sc. in Chemical Engineering

Research Areas

- *CATALYSIS (S. Kaliaguine, A. Sayari)*
- *BIOCHEMICAL ENGINEERING (L. Choplin, A. LeDuy, J. -R. Moreau, J. Thibault)*
- *ENVIRONMENTAL ENGINEERING (C. Roy)*
- *COMPUTER AIDED ENGINEERING (R. Lacroix)*
- *TECHNOLOGY MANAGEMENT (P. -H. Roy)*
- *MODELLING AND CONTROL (J. Thibault)*
- *RHEOLOGY AND POLYMER ENGINEERING (A. Ait-Kadi)*
- *THERMODYNAMICS (S. Kaliaguine)*
- *CHEMICAL AND BIOCHEMICAL UPGRADING OF BIOMASS (S. Kaliaguine, A. LeDuy, C. Roy)*
- *FLUIDISATION AND SEPARATIONS BY MEMBRANES (B. Grandjean)*

Université Laval is a French speaking University. It provides the graduate student with the opportunity of learning French and becoming acquainted with French culture.

Please write to:

Le Responsable du Comité d'Admission et de Supervision
Département de génie chimique
Faculté des sciences et de génie
Université Laval
Sainte-Foy, Québec, Canada G1K 7P4

The Faculty

ABDELLATIF AIT-KADI
Ph.D. École Poly. Montreal
Professeur agrégé

BERNARD GRANDJEAN
Ph.D. École Poly. Montreal
Professeur adjoint

SERGE KALIAGUINE
D.Ing. I.G.C. Toulouse
Professeur titulaire

R. LACROIX
Ph.D. Laval
Professeur adjoint

ANH LEDUY
Ph.D. Western Ontario
Professeur titulaire

J. -CLAUDE METHOT
D.Sc. Laval
Professeur titulaire

JEAN-R. MOREAU
Ph.D. M.I.T.
Professeur titulaire

CHRISTIAN ROY
Ph.D. Sherbrooke
Professeur titulaire

PAUL-H. ROY
Ph.D. Illinois Inst. of Technology
Professeur titulaire

ABDELHAMID SAYARI
Ph.D. Tunis/Lyon
Professeur adjoint

JULES THIBAULT
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- Thermodynamic Properties
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Additional information and applications may be obtained by writing to:

Dr. Hugo S. Caram
Chairman, Graduate Admissions Committee
Department of Chemical Engineering
Lehigh University
111 Research Drive
Iacocca Hall
Bethlehem, PA 18015

Philip A. Blythe (University of Manchester)
fluid mechanics • heat transfer • applied mathematics

Hugo S. Caram (University of Minnesota)
gas-solid and gas-liquid systems • optical techniques • reaction engineering

Marvin Charles (Polytechnic Institute of Brooklyn)
biochemical engineering • bioseparations

John C. Chen (University of Michigan)
two-phase vapor-liquid flow • fluidization • radiative heat transfer • environmental technology

Mohamed S. El-Aasser (McGill University)
polymer colloids and films • emulsion copolymerization • polymer synthesis and characterization

Christos Georgakis (University of Minnesota)
process modeling and control • chemical reaction engineering • batchreactors

Dennis W. Hess (Lehigh University)
microelectronics processing • thin film science and technology

James T. Hsu (Northwestern University)
separation processes • adsorption and catalysis in zeolites

Andrew J. Klein (North Carolina State University)
emulsion polymerization • colloidal and surface effects in polymerization

William L. Luyben (University of Delaware)
process design and control • distillation

Janice A. Phillips (University of Pennsylvania)
biochemical engineering • instrumentation/control of bioreactors • mammalian cell culture

Maria M. Santore (Princeton University)
polymers adsorption processes and blend stability

William E. Schiesser (Princeton University)
numerical algorithms and software in chemical engineering

Cesar A. Silebi (Lehigh University)
separation of colloidal particles • electrophoresis • mass transfer

Leslie H. Sperling (Duke University)
mechanical and morphological properties of polymers • interpenetrating polymer networks

Fred P. Stein (University of Michigan)
thermodynamic properties of mixtures

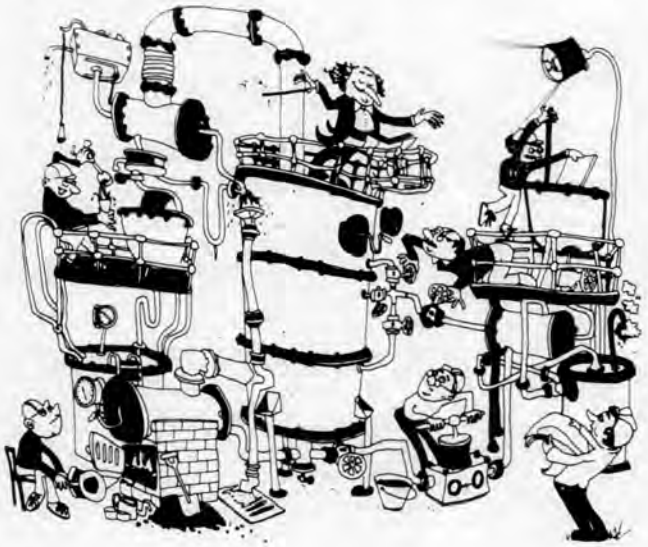
Harvey G. Stenger, Jr. (Massachusetts Institute of Technology)
reactor engineering

Israel E. Wachs (Stanford University)
materials synthesis and characterization • surface chemistry • heterogeneous catalysis

Leonard A. Wenzel, Emeritus (University of Michigan)
thermodynamics

LOUISIANA STATE UNIVERSITY

CHEMICAL ENGINEERING GRADUATE SCHOOL



THE CITY

Baton Rouge is the state capitol and home of the major state institution for higher education — LSU. Situated in the Acadian region, Baton Rouge blends the Old South and Cajun Cultures. The Port of Baton Rouge is a main chemical shipping point, and the city's economy rests heavily on the chemical and agricultural industries. The great outdoors provide excellent recreational activities year-round. The proximity of New Orleans provides for superb nightlife, especially during Mardi Gras.

THE DEPARTMENT

- M.S. and Ph.D. Programs
- Approximately 70 Graduate Students

DEPARTMENTAL FACILITIES

- IBM 4341 and 9370 with more than 70 color graphics terminals and PC's
- Analytical Facilities including GC/MS, FTIR, FT-NMR, LC, GC, AA, XRD, . . .
- Vacuum to High Pressure Facilities for kinetics, catalysis, thermodynamics, supercritical processing
- Shock Tube and Combustion Laboratories
- Laser Doppler Velocimeter Facility
- Bench Scale Fermentation Facilities
- Polymer Processing Equipment

TO APPLY, CONTACT

DIRECTOR OF GRADUATE INSTRUCTION
Department of Chemical Engineering
Louisiana State University
Baton Rouge, LA 70803

FACULTY

J.R. COLLIER (Ph.D., Case Institute)
Polymers, Textiles, Fluid Flow

A.B. CORRIPIO (Ph.D., Louisiana State University)
Control, Simulation, Computer-Aided Design

K.M. DOOLEY (Ph.D., University of Delaware)
Heterogeneous Catalysis, Reaction Engineering

G.L. GRIFFIN (Ph.D., Princeton University)
Electronic Materials, Surface Chemistry

F.R. GROVES (Ph.D., University of Wisconsin)
Control, Modeling, Separation Processes

D.P. HARRISON (Ph.D., University of Texas)
Fluid-Solid Reactions, Hazardous Wastes

M.A.HENSON (Ph.D., UC Santa Barbara)
Nonlinear and Biological Systems Control

M. HJORTSØ (Ph.D., University of Houston)
Biotechnology, Applied Mathematics

F.C. KNOPF (Ph.D., Purdue University)
Computer-Aided Design, Supercritical Processing

E. McLAUGHLIN (D.Sc., University of London)
Thermodynamics, High Pressures, Physical Properties

R. OCONE (Ph.D., Princeton University)*
Applied Mathematics, Fluid Mechanics

R.W. PIKE (Ph.D., Georgia Institute of Technology)
Fluid Dynamics, Reaction Engineering, Optimization

G.L. PRICE (Ph.D., Rice University)
Heterogeneous Catalysis, Surfaces

D.D. REIBLE (Ph.D., California Institute of Technology)
Environmental Chemodynamics, Transport Modeling

R.G. RICE (Ph.D., University of Pennsylvania)
Mass Transfer, Separation Processes

A.M. STERLING (Ph.D., University of Washington)
Transport Phenomena, Combustion

L.J. THIBODEAUX (Ph.D., Louisiana State University)
Chemodynamics, Hazardous Waste

D.M. WETZEL (Ph.D., University of Delaware)
Physical Properties, Hazardous Wastes

* *Visiting Professor*

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University of Maine

• Faculty and Research Interests •

DOUGLAS BOUSFIELD Ph.D. (U.C.Berkeley)
Fluid Mechanics, Rheology, Coating Processes, Particle Motion Modeling

WILLIAM H. CECKLER Sc.D. (M.I.T.)
Heat Transfer, Pressing & Drying Operations, Energy from Low BTU Fuels, Process Simulation & Modeling

ALBERT CO Ph.D. (Wisconsin)
Polymeric Fluid Dynamics, Rheology, Transport Phenomena, Numerical Methods

JOSEPH M. GENCO Ph.D. (Ohio State)
Acting Chair
Process Engineering, Pulp and Paper Technology, Wood Delignification

JOHN C. HASSLER Ph.D. (Kansas State)
Process Control, Numerical Methods, Instrumentation and Real Time Computer Applications

MARQUITA K HILL Ph.D. (U.C. Davis)
Environmental Science, Waste Management Technology

JOHN J. HWALEK Ph.D. (Illinois)
Liquid Metal Natural Convection, Electronics Cooling, Process Control Systems

ERDOGAN KIRAN Ph.D. (Princeton)
Polymer Physics & Chemistry, Supercritical Fluids, Thermal Analysis & Pyrolysis, Pulp & Paper Science

PIERRE LEPOUTRE Ph.D. (North Carolina State University)
Surface Physics and Chemistry, Materials Science, Adhesion Phenomena

KENNETH I. MUMME Ph.D. (Maine)
Process Simulation and Control, System Identification & Optimization

HEMANT PENDSE Ph.D. (Syracuse)
Colloidal Phenomena, Particulate & Multiphase Processes, Porous Media Modeling

EDWARD V. THOMPSON Ph.D., (Polytechnic Institute of Brooklyn)
Thermal & Mechanical Properties of Polymers, Papermaking and Fiber Physics, Recycle Paper

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• The University •

The spacious campus is situated on 1,200 acres overlooking the Penobscot and Stillwater Rivers. Present enrollment of 12,000 offers the diversity of a large school, while preserving close personal contact between peers and faculty. The University's Maine Center for the Arts, the Hauck Auditorium, and Pavilion Theatre provide many cultural opportunites, in addition to those in the nearby city of Bangor. Less than an hour away from campus are the beautiful Maine Coast and Acadia National park, alpine and cross-country ski resorts, and northern wilderness areas of Baxter State Park and Mount Katahdin.

Enjoy life, work hard and earn your graduate degree in one of the most beautiful spots in the world.

Call Collect or Write

Doug Bousfield
Department of Chemical Engineering
Jenness Hall, Box B • University of Maine
Orono, Maine 04469-5737
(207) 581-2300

University of Maryland

College Park

Location

The University of Maryland at College Park is located approximately ten miles from the heart of the nation, Washington, D.C. Excellent public transportation permits easy access to points of interest such as the Smithsonian, National Gallery, Congress, White House, Arlington Cemetery, and the Kennedy Center. A short drive west produces some of the finest mountain scenery and recreational opportunities on the east coast. An even shorter drive brings one to the historic Chesapeake Bay.

Degrees Offered

M.S. and Ph.D. programs in Chemical Engineering

Financial Aid Available

Teaching and Research Assistantships at $13,160/yr., plus tuition

Faculty:

William E. Bentley
Richard V. Calabrese
Kyu Yong Choi
Larry L. Gasner
James W. Gentry
Thomas J. McAvoy
Thomas M. Regan
Jan V. Sengers
Theodore G. Smith
Nam Sun Wang
William A. Weigand
Evanghelos Zafiriou

Research Areas:

Aerosol Science
Artificial Intelligence
Biochemical Engineering
Multiphase Flow
Neural Computation
Polymer Processing
Polymer Reaction Engineering
Process Control
Recombinant DNA Technology
Separation Processes
Systems Engineering
Turbulence and Mixing

For Applications and Further Information, Write

Chemical Engineering Graduate Studies • Department of Chemical Engineering
University of Maryland • College Park, MD 20742-2111

UMBC
University of Maryland
Baltimore County

Graduate Study in BIOCHEMICAL ENGINEERING for Engineering and Science Majors

EMPHASIS

The Department of Chemical and Biochemical Engineering at UMBC offers graduate programs leading to M.S. and Ph.D. degrees in Chemical Engineering. Our research is heavily focused in biochemical and bioprocess engineering and covers a wide range of areas from fermentation,cell culture, downstream processing,drug delivery, protein engineering and protein stability. Unique programs in the Regulatory-Engineering interface of bioprocessing are offered as well.

FACILITIES

The Department offers state-of-the-art facilities for faculty and graduate student research. These modern facilities have been developed primarily in the last six years and comprise 6,000 square feet of laboratory space in the Technology Research Center plus 7,000 square feet of departmental laboratories in the new Engineering and Computer Science building, a $26 million facility opened in the Fall of 1992.

LOCATION

UMBC is located in the Baltimore-Washington corridor and within easy access to both metropolitan areas. A number of government research facilities such as NIH, FDA, USDA, NSA and a large number of biotechnology companies are located nearby and provide excellent opportunities for research interactions.

FACULTY

D. F. Bruley, Ph.D. ***Tennessee***
Biodownstream processing and processes in the microcirculation; Process simulation and control.

T. W. Cadman, Ph.D. ***Carnegie Mellon***
Bioprocess modeling, control, and optimization; Educational software development.

A. Gomezplata, Ph.D. ***Rensselaer***
Heterogeneous flow systems; Simultaneous mass transfer and chemical reactions.

J. A. Lumpkin, Ph.D. ***Pennsylvania***
Analytical chemi-and bioluminescence; Kinetics of enzymatic reactions; Protein oxidation.

A. R. Moreira, Ph.D. ***Pennsylvania***
rDNA fermentation; Regulatory issues; Scale-up; Downstream processing.

G. F. Payne, Ph.D.* ***Michigan***
Plant cell tissue culture; Streptomyces bioprocessing; Adsorptive separations; Toxic waste treatment.

G. Rao, Ph.D.* ***Drexel***
Animal cell culture; Oxygen toxicity; Biosensing.

M. R. Sierks, Ph.D. ***Iowa State***
Protein engineering; Site-directed mutagenesis; Catalytic antibodies.

D. I. C. Wang, Ph.D.** ***Pennsylvania***
Bioreactors; Bioinstrumentation; Protein refolding

* *Joint appointment with the Maryland Biotechnology Institute*
** *Adjunct Professor/Eminent Scholar*

FOR FURTHER INFORMATION CONTACT:

Graduate Program Coordinator
Department of Chemical and Biochemical Engineering
University of Maryland Baltimore County
5401 Wilkens Avenue
Baltimore, Maryland 21228-5398
Phone:(410) 455-3400
FAX:(410) 455-1049

University of Massachusetts
at Amherst

M.S. and Ph.D. Programs in
Chemical Engineering

Faculty

M. F. Doherty, Ph.D. *(Cambridge)*, Head
W. C. Conner, Ph.D. *(Johns Hopkins)*
M. R. Cook, Ph.D. *(Harvard)*
J. M. Douglas, Ph.D. *(Delaware)*
V. Haensel, Ph.D. *(Northwestern)*
R. L. Laurence, Ph.D. *(Northwestern)*
M. F. Malone, Ph.D. *(Massachusetts)*
P. A. Monson, Ph.D. *(London)*
K. M. Ng, Ph.D. *(Houston)*
J. W. van Egmond *(Stanford)*
D. G. Vlachos, Ph.D. *(Minnesota)*
P. R. Westmoreland, Ph.D. *(M.I.T.)*
H. H. Winter, Ph.D. *(Stuttgart)*

Current Areas of Research

- Combustion, Plasma Processing
- Process Synthesis, Design of Polymer and Solids Processes
- Statistical Thermodynamics, Phase Behavior
- Control System Synthesis
- Fluid Mechanics, Rheology
- Polymer Processing, Composites
- Catalysis and Kinetics, Reaction Dynamics
- Design of Multiphase and Polymerization Reactors
- Nonideal Distillation, Adsorption, Crystallization
- Computer Aided Design, Optimization
- Computational Chemistry

Design and Control Center

The Department has a research center in design and control, which is sponsored by industrial companies.

Financial Support

All students are awarded full financial aid at a nationally competitive rate.

Location

The Amherst Campus of the University is in a small New England town in Western Massachusetts. Set amid farmland and rolling hills, the area offers pleasant living conditions and extensive recreational facilities.

For application forms and further information on fellowships and assistantships, academic and research programs, and student housing, write:

GRADUATE PROGRAM DIRECTOR
DEPARTMENT OF CHEMICAL ENGINEERING
159 GOESSMANN LABORATORY
UNIVERSITY OF MASSACHUSETTS
AMHERST, MA 01003

The University of Massachusetts at Amherst prohibits discrimination on the basis of race, color, religion, creed, sex, sexual orientation, age, marital status, national origin, disability or handicap, or veteran status, in any aspect of the admission or treatment of students or in employment.

CHEMICAL ENGINEERING AT

MIT

MIT is located in Cambridge, just across the Charles River from Boston, a few minutes by subway from downtown Boston and Harvard Square. The heavy concentration of colleges, hospitals, research facilities, and high technology industry provides a populace that demands and finds an unending variety of theaters, concerts, restaurants, museums, bookstores, sporting events, libraries, and recreational facilities.

With the largest chemical engineering research faculty in the country, the Department of Chemical Engineering at MIT offers programs of research and teaching which span the breadth of chemical engineering with unprecedented depth in fundamentals and applications. The Department offers three levels of graduate programs, leading to Master's, Engineer's, and Doctor's degrees. In addition, graduate students may earn a Master's degree through the **David H. Koch School of Chemical Engineering Practice**, a unique internship program that stresses defining and solving industrial problems by applying chemical engineering fundamentals. Students in this program spend half a semester at each of two Practice School Stations, including Dow Chemical in Midland, Michigan, and Merck Pharmaceutical Manufacturing Division in West Point, Pennsylvania, in addition to one or two semesters at MIT.

RESEARCH AREAS

Artificial Intelligence • Biomedical Engineering
Biotechnology
Catalysis and Reaction Engineering
Combustion • Computer-Aided Design
Electrochemistry • Energy Conversion
Environmental Engineering • Fluid Mechanics
Kinetics and Reaction Engineering
Microelectronic Materials Processing
Polymers • Process Dynamics and Control
Surfaces and Colloids • Transport Phenomena

FOR MORE INFORMATION CONTACT

Chemical Engineering Graduate Office, 66-366
Massachusetts Institute of Technology, Cambridge, MA 02139-4307
Phone: (617) 253-4579; FAX: (617) 253-9695
E-Mail: info@chemegrad.mit.edu

FACULTY

R.A. Brown, *Department Head*
R.C. Armstrong
P.I. Barton
E.D. Blankschtein
H. Brenner
L.G. Cima
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C.K. Colton
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Ge. Stephanopoulos
Gr. Stephanopoulos
M.F. Stephanopoulos
J.W. Tester
P.S. Virk
D.I.C. Wang
J.Y. Ying

Chemical Engineering at

The University of Michigan

Faculty

1. **Johannes Schwank** Chair, Heterogeneous catalysis, surface science
2. **Stacy G. Bike** Colloids, transport, electrokinetic phenomena
3. **Dale E. Briggs** Coal processes
4. **Mark A. Burns** Biochemical and field-enhanced separations
5. **Brice Carnahan** Numerical methods, process simulation
6. **Rane L. Curl** Rate processes, mathematical modeling
7. **Frank M. Donahue** Electrochemical engineering
8. **H. Scott Fogler** Flow in porous media, microelectronics processing
9. **John L. Gland** Surface science
10. **Erdogan Gulari** Interfacial phenomena, catalysis, surface science
11. **Robert H. Kadlec** Ecosystems, process dynamics
12. **Costas Kravaris** Nonlinear process control, system identification
13. **Jennifer J. Linderman** Engineering approaches to cell biology
14. **Bernhard O. Palsson** Cellular bioengineering
15. **Phillip E. Savage** Reaction pathways in complex systems
16. **Levi T. Thompson, Jr.** Catalysis, processing materials in space
17. **Henry Y. Wang** Biotechnology processes, industrial biology
18. **James O. Wilkes** Numerical methods, polymer processing
19. **Robert M. Ziff** Aggregation processes, statistical mechanics


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For More Information, Contact:

Graduate Program Office, Department of Chemical Engineering / The University of Michigan / Ann Arbor, MI 48109-2136 / 313 763-1148

GRADUATE STUDY IN CHEMICAL ENGINEERING AT

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FACULTY AND RESEARCH INTERESTS

➤ **D. K. ANDERSON**, Chairperson • *Ph.D., 1960, University of Washington*
Transport Phenomena, Diffusion in Polymer Solutions

➤ **K. A. BERGLUND** • *Ph.D., 1981, Iowa State University*
Sensors, Applied Spectroscopy, Food and Biochemical Engineering, Crystallization from Solution

➤ **D. M. BRIEDIS** • *Ph.D., 1981, Iowa State University*
Surface Phenomena in Crystallization Processes, Biochemical and Food Engineering, Bioadhesion

➤ **C. M. COOPER,** Professor Emeritus • *Sc.D., 1949, Massachusetts Institute of Technology*
Thermodynamics and Phase Equilibria, Modeling of Transport Processes

➤ **L. T. DRZAL** • *Ph.D., 1974, Case Western Reserve University*
Surface and Interfacial Phenomena, Adhesion, Composite Materials, Surface Characterization, Surface Modification of Polymers, Composite Processing

➤ **E. A. GRULKE** • *Ph.D., 1975, Ohio State University*
Mass Transport Phenomena, Polymer Devolatilization, Biochemical Engineering, Food Engineering

➤ **M. C. HAWLEY** • *Ph.D., 1964, Michigan State University*
Kinetics, Catalysis, Reactions in Plasmas, Polymerization Reactions, Composite Processing, Biomass Conversion, Reaction Engineering

➤ **K. JAYARAMAN** • *Ph.D., 1975, Princeton University*
Polymer Rheology, Processing of Polymer Blends and Composites, Computational Methods

➤ **C. T. LIRA** • *Ph.D., 1986, University of Illinois at Urbana-Champaign*
Thermodynamics and Phase Equilibria of Complex Systems, Supercritical Fluid Studies

➤ **D. J. MILLER** • *Ph.D., 1982, University of Florida*
Kinetics and Catalysis, Reaction Engineering, Coal Gasification, Catalytic Conversion of Biomass-Based Materials

➤ **R. NARAYAN** • *Ph.D., 1976, University of Bombay*
Polymer Blends and Alloys, Biodegradable Plastics, Low-Cost Composites Using Recycled/Reclaimed and Natural Polymers, Biodegradation and Composting Studies

➤ **R. Y. OFOLI** • *Ph.D., 1994, Carnegie Mellon University*
Colloid and Interface Science, Colloid Stability, Adsorption of Proteins at the Liquid-Liquid Interface

➤ **C. A. PETTY** • *Ph.D., 1970, University of Florida*
Fluid Mechanics, Turbulent Transport Phenomena, Solid-Fluid and Liquid-Liquid Separations, Polymer Composite Processing

➤ **A. B. SCRANTON** • *Ph.D., 1990, Purdue University*
Polymer Science and Engineering, Polymer Complexation and Network Formation, Applications of NMR Spectroscopy, Molecular Modeling, Crosslinking Polymerizations

➤ **B. W. WILKINSON** • Professor Emeritus • *Ph.D., 1958, Ohio State University*
Energy Systems and Environmental Control, Nuclear Reactor, Radioisotope Applications

➤ **R. M. WORDEN** • *Ph.D., 1986, University of Tennessee*
Biochemical Engineering, Immobilized Cell Technology, Food Engineering

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Department of Chemical Engineering
Michigan Technological University
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Houghton, MI 49931-1295
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FAX 906/487-3213

Chemical Engineering Faculty

Process and plant design
Bruce A. Barna, Associate Professor
Ph.D., New Mexico State, 1985

Polymerization, polymer materials, nonlinear dynamics
Gerard T. Caneba, Assistant Professor
Ph.D., University of California Berkeley, 1985

Process control, neural networks
Tomas B. Co, Assistant Professor
Ph.D., Massachusetts, 1988

Energy transfer and excited state processes
Edward R. Fisher, Professor and Head
Ph.D., Johns Hopkins University, 1965

Numerical analysis, absorption, process safety
Anton J. Pintar, Associate Professor
Ph.D., Illinois Institute of Technology, 1968

Transport processes and process scaleup
Davis W. Hubbard, Professor
Ph.D., University of Wisconsin Madison, 1964

Process control, energy systems
Nam K. Kim, Associate Professor
Ph.D., Montana State, 1982

Polymer rheology, liquid crystals, composites
Faith A. Morrison, Assistant Professor
Ph.D., Massachusetts, 1988

Surface science, sol-gel processing
Michael E. Mullins, Professor
Ph.D., Rochester, 1983

Polymer Science, polymer and composite processing
John G. Williams, Professor
Ph.D., Melbourne University

Chemical Process Safety
Daniel A. Crowl, Professor
Ph.D., University of Illinois Urbana, 1975

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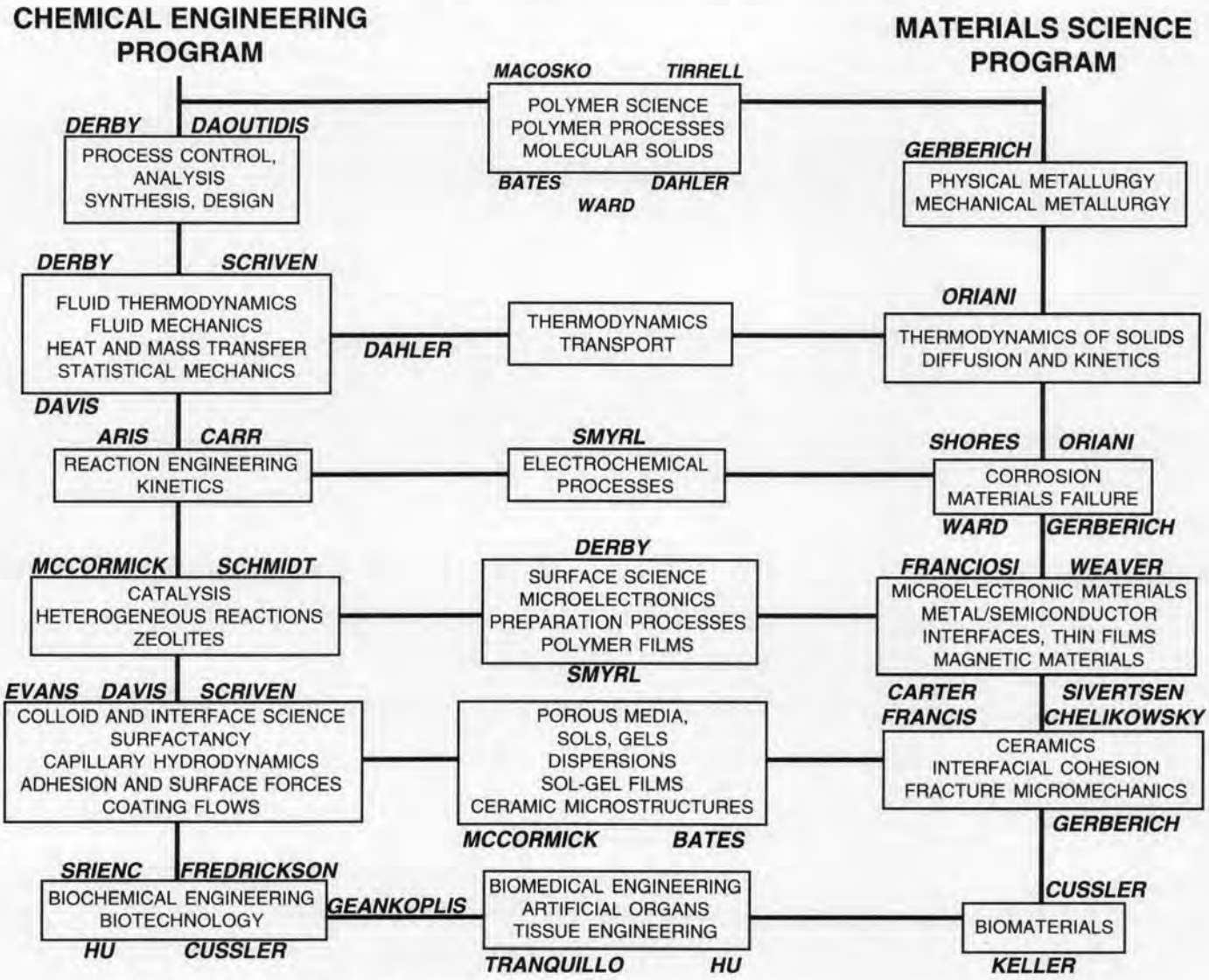

THE FACULTY

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J.R. Chelikowsky	L.F. Francis	R.A. Oriani	R. Tranquillo
E.L. Cussler	A.G. Fredrickson	L.D. Schmidt	M.D. Ward
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University of Minnesota • 421 Washington Ave. S.E. • Minneapolis, MN 55455

Department of Chemical Engineering

UMR

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UNIVERSITY OF MISSOURI-ROLLA

M.S. and Ph.D. Degrees

FACULTY AND RESEARCH INTERESTS

N. L. BOOK ***(Ph.D., Colorado)***
- Computer Aided Process Design • Bioconversion

O. K. CROSSER ***(Ph.D., Rice)***
- Transport Properties • Adsorption

D. FORCINITI ***(Ph.D., North Carolina State)***
- Bioseparations • Thermodynamics
- Statistical Mechanics

J. W. JOHNSON ***(Ph.D. Missouri)***
- Electrode Reactions • Adsorption

A. I. LIAPIS ***(Ph.D., ETH-Zurich)***
- Adsorption • Affinity Chromatography • Perfusion Chromatography • Transport Phenomena
- Lyophilization (Freeze Drying)

D. B. MANLEY ***(Ph.D., Kansas)***
- Thermodynamics • Vapor-Liquid Equilibrium
- Process Development

N. C. MOROSOFF ***(Ph.D., Brooklyn Polytech)***
- Plasma Polymerization • Membranes

P. NEOGI ***(Ph.D., Carnegie-Mellon)***
- Interfacial and Transport Phenomena

G. K. PATTERSON ***(Ph.D., Missouri-Rolla)***
- Mixing • Polymer Rheology • Computational Fluid Dynamics and Turbulent Transport

X B REED, JR. ***(Ph.D., Minnesota)***
- Fluid Mechanics • Drop and Particle Mechanics
- Transport Phenomena • Turbulence Structure
- Turbulence Modeling, including Reactions

S. L. ROSEN ***(Ph.D., Cornell)***
- Polymerization Reactions • Applied Rheology
- Polymeric Materials

O. C. SITTON ***(Ph.D., Missouri-Rolla)***
- Bioengineering

R. C. WAGGONER ***(Ph.D., Texas A&M)***
- Multistage Mass Transfer Operations • Distillation
- Extraction • Process Control

R. M. YBARRA ***(Ph.D., Purdue)***
- Rheology of Polymer Solutions • Chemical Reaction Kinetics

Financial aid is obtainable in the form of Graduate and Research Assistantships, and Industrial Fellowships. Aid is also obtainable through the Materials Research Center.

Contact Dr. X B Reed, Graduate Coordinator
Chemical Engineering Department
University of Missouri - Rolla
Rolla, Missouri 65401
Telephone (314) 341-4416

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Department of Chemical Engineering, Chemistry and Environmental Science
201-596-3599

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The University of New Mexico

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Sol-gel and colloidal processing of ceramics
Biomedical engineering
Plasma science
Surface science
Aerosol physics
Materials characterization
Uncertainty and risk assessment

Faculty

Harold Anderson
C. Jeffrey Brinker
Abhaya K. Datye
David Kauffman
Toivo T. Kodas
Ronald E. Loehman
Gabriel P. López
Richard W. Mead
H. Eric Nuttall
Douglas M. Smith
Timothy L. Ward
Ebtisam S. Wilkins

The **University of New Mexico** along with **Sandia and Los Alamos National Laboratories,** and local industry, make Albuquerque a major scientific and research center. The chemical engineering department houses the NSF-supported **Center for Micro-Engineered Ceramics** and the DOE sponsored **Waste Management Education and Research Consortium.** Faculty participate in the **SEMATECH Center of excellence in semiconductor research, The Center for High Technology Materials, and the Institute for Space Nuclear Power Studies.**

The Chemical Engineering Department offers financial aid in the form of research assistantships paying $10-15,000 per year, plus tuition.

Albuquerque's southwestern climate and rugged mountainous terrain provide plenty of opportunities for outdoor recreation such as skiing, hiking, and whitewater rafting.

For more information, write to:
Timothy L. Ward, Graduate Advisor
Department of Chemical and Nuclear Engineering
The University of New Mexico
Albuquerque, NM 87131-1341
Phone (505) 277-5431

North Carolina

State University

DEPARTMENT OF CHEMICAL ENGINEERING

Biochemical Engineering
Catalysis, Kinetics, and Reaction Engineering
Computer-Aided Design and Manufacturing
Electronic Materials
Electrochemical Engineering
Environmental Engineering
Polymer Science and Engineering
Thermodynamics and Computer Simulation

FACULTY AND THEIR RESEARCH INTERESTS

Ruben G. Carbonell • ***Princeton***
Bioseparations; Colloid and Surface Science; Multiphase Transport Phenomena

Peter S. Fedkiw • ***Cal-Berkeley***
Electrochemical Engineering; Electrocatalysis

Richard M. Felder• ***Princeton***
Computer-Aided Manufacturing of Specialty Chemicals; Process Simulation and Optimization

James K. Ferrell • ***NC State***
Waste Minimization; Heat Transfer; Process Control

Benny D. Freeman • ***Cal-Berkeley***
Polymer Physical Chemistry

Christine S. Grant • ***Georgia Tech***
Colloid and Surface Science; Environmental Engineering

Carol K. Hall • ***Stony Brook***
Statistical Thermodynamics; Computer Simulation; Polymers; Protein Folding

Harold B. Hopfenberg • ***MIT***
Transport and Aging in Glassy Polymers; Controlled Release; Membranes; Barrier Packaging

Saad Khan • ***MIT***
Polymer Rheology; Rheology of Reactive Polymer Solutions and Melts; Polymer Spectroscopy

Robert M. Kelly • ***NC State***
Bioenergetics and Physiology of Microorganisms from Extreme Environments; Biocatalysis

Peter K. Kilpatrick • ***Minnesota***
Interfacial and Surface Science; Biotechnology

H. Henry Lamb • ***Delaware***
Heterogeneous Catalysis; Microelectronics; Surface Science

P. K. Lim • ***Illinois***
Interfacial Phenomena; Homogeneous Catalysis; Free Radical Chemistry

David F. Ollis • ***Stanford***
Biochemical Engineering; Photochemical Engineering

Michael R. Overcash • ***Minnesota***
Environmental Engineering; Improved Manufacturing Productivity by Waste Reduction

Gregory N. Parsons • ***N.C. State***
Semiconductor and Insulator Growth Chemistry; Physics of Amorphous Materials and Devices

Steven W. Peretti • ***Caltech***
Genetic and Metabolic Engineering; Microbial, Plant and Animal Cell Culture; Bioremediation

George W. Roberts • ***MIT***
Heterogeneous Catalysis; Reaction Kinetics and Engineering; Pollution Prevention

C. John Setzer • ***Ohio State***
Plant and Process Economics and Management

Vivian T. Stannett, Emeritus • ***Brooklyn Poly***
Pure and Applied Polymer Science

Robert Thorogood • ***London***
Process Design and Modeling; Adsorptive and Membrane Separations

Inquiries to:
Professor Robert M. Kelly, Director of Graduate Studies, (919) 515-6396

Box 7905 • North Carolina State University • Raleigh, North Carolina 27695-7905

Chemical Engineering at

Northwestern University

S. George Bankoff, Ph.D., Purdue, 1955
Two-phase heat transfer, fluid mechanics

Wesley R. Burghardt, Ph.D., Stanford, 1990
Polymer science, rheology

John B. Butt, D.Eng., Yale, 1960
Chemical reaction engineering

Stephen H. Carr, Ph.D., Case Western Reserve, 1970
Solid state properties of polymers

Buckley Crist, Jr., Ph.D., Duke, 1966
Polymer science

Joshua S. Dranoff, Ph.D., Princeton, 1960
Chemical reaction engineering, chromatographic separations

Thomas K. Goldstick, Ph.D., Berkeley, 1966
Biomedical engineering, oxygen transport in the human body

Harold H. Kung, Ph.D., Northwestern, 1974
Kinetics, heterogeneous catalysis

Richard S. H. Mah, Ph.D., London, 1961
Computer-aided process planning, design and analysis

Michael L. Mavrovouniotis, Ph.D., MIT, 1989
Computer-aided process engineering and pathway analysis

William M. Miller, Ph.D., Berkeley, 1987
Cell culture for biotechnology and medicine

Lyle F. Mockros, Ph.D., Berkeley, 1962
Biomedical engineering, fluid mechanics in biological systems

Monica Olvera de la Cruz, Ph.D., Cambridge, 1984
Statistical mechanics in polymer systems

Julio M. Ottino, Ph.D., Minnesota, 1979
Fluid mechanics, chaos, mixing in materials processing

E. Terry Papoutsakis, Ph.D., Purdue, 1980
Biotechnology of animal and microbial cells

Mark A. Petrich, Ph.D., Berkeley, 1987
Environmental engineering, electronic materials, solid state NMR

Bruce E. Rittmann, Ph.D., Stanford, 1979
In situ bioremediation, biofilms

Gregory Ryskin, Ph.D., Caltech, 1983
Fluid mechanics, computational methods, polymeric liquids

Wolfgang M. H. Sachtler, Dr. rer.nat., Braunschweig, 1952
Heterogeneous catalysis

John M. Torkelson, Ph.D., Minnesota, 1983
Polymer science, membranes

For information and application to the graduate program, write

Director of Graduate Admissions
Department
of Chemical Engineering
McCormick School of Engineering
and Applied Science
Northwestern University
Evanston, Illinois 60208-3120
Phone (708) 491-2776
or (800) 848-5135 (U.S. only)

Chemical Engineering at Notre Dame

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FACULTY

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RESEARCH AREAS

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Chemical Reaction Engineering
Gas-Liquid Flows
Nonlinear Dynamics
Phase Equilibria
Polymer Science
Process Dynamics and Control
Statistical Mechanics
Supercritical Fluids
Suspension Rheology
Thermodynamics and Separations
Transport Phenomena

For further information, write to:

Dr. D. T. Leighton, Jr. • Department of Chemical Engineering
University of Notre Dame • Notre Dame, Indiana 46556

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- **Bhavik Bakshi,** *Mass. Inst. Tech. 1992,* Process Control, Intelligent Controllers, Wavelet Neural Networks, Systems Integration, Artificial Intelligence in Design, Planning, and Analysis
- **Robert S. Brodkey,** *Wisconsin 1952,* Turbulence, Mixing, Image Analysis, Reactor Design, and Rheology
- **Jeffrey J. Chalmers,** *Cornell 1988,* Biochemical Engineering, Hydrodynamic Effects on Cells, Cell Separations, Biodegradation/Bioremediation
- **James F. Davis,** *Northwestern 1981,* Artificial Intelligence in Diagnosis and Control, Intelligent Control, Data Interpretation, Pattern Recognition, Neural Networks, Systems Integration, Model Integration
- **L. S. Fan,** *West Virginia 1975,* Fluidization, Powder Technology, Multiphase and Particulates Reaction Engineering, and Mathematical Modeling
- **Morton H. Friedman,** *Michigan 1961,* Biomedical Engineering and Hemodynamics
- **Harry C. Hershey,** *Missouri-Rolla 1965,* Thermodynamics and Environmental
- **Kurt W. Koelling,** *Princeton 1992,* Polymer Processing, Liquid Crystalline Polymers, Biodegradable Polymers, Polymer Rheology and Morphology
- **L. James Lee,** *Minnesota 1979,* Polymer Processing, Composite Manufacturing, and Thermoset Polymers
- **Umit S. Ozkan,** *Iowa State 1984,* Application of Heterogeneous Catalysis to Energy and Environmental Issues, Catalytic Materials, and Heterogeneous Kinetics
- **James F. Rathman,** *Oklahoma 1987,* Interfacial Phenomena, Surfactant Science, Rheology of Surfactant Systems
- **David L. Tomasko,** *Illinois 1992,* Intermolecular Interactions in Supercritical Fluids, Supercritical Fluid Extraction, Molecular Thermodynamics
- **Shang-Tian Yang,** *Purdue 1984,* Biochemical Engineering and Biotechnology, Fermentation Processes, and Kinetics
- **Jacques L. Zakin,** *New York 1959,* Surfactant and Polymer Drag Reduction, Micellar Structures, Rheology, and Emulsions

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Ohio University

Chemical Engineering

Graduate Programs

The Department of Chemical Engineering offers programs leading to both the M.S. and Ph.D. degrees. The department is located in the Stocker Engineering Center, which recently (1985) underwent extensive modernization and now contains some of the finest state-of-the-art equipment available. The department's activities are enhanced by the Stocker endowment, which was made possible by the generosity of Dr. C. Paul and Beth K. Stocker and which has now grown to over $14 million. The interest on this endowment is used to help support research efforts in such ways as providing competitive graduate fellowships and associateships, matching equipment funds, and seed money for new project areas.

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Energy and Environmental Engineering
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Metallic Corrosion
Chemical Reaction Engineering
Wastewater Treatment
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Financial support includes teaching and grant-related associateships and fellowships ranging from $10,000 to $15,000 per twelve months. In addition, students are granted a full tuition scholarship for both the regular and summer academic terms. Stocker Fellowships are available to especially well-qualified students.

The Faculty

William D. Baasel, P.E. *(Ph.D., Cornell, 1962)*
Calvin H. Baloun, P.E. *(Ph.D., Cincinnati, 1962)*
W. J. Russell Chen *(Ph.D., Syracuse, 1974)*
Nicholas Dinos *(Ph.D., Lehigh, 1967)*
Tingyue Gu *(Ph.D., Purdue, 1991)*
Daniel A. Gulino *(Ph.D., Illinois, 1983)*
W. Paul Jepson, Chair *(Ph.D., Heriot-Watt, 1980)*
H. Benne Kendall, P.E., Emeritus *(Ph.D., Case Institute of Technology, 1956)*
Michael E. Prudich *(Ph.D., West Virginia, 1979)*
Darin Ridgway, P.E. *(Ph.D., Florida State, 1990)*
Kendree J. Sampson *(Ph.D., Purdue, 1981)*
Robert L. Savage, P.E., Emeritus *(Ph.D., Case Institute of Technology, 1948)*

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For More Information: Director of Graduate Studies, Department of Chemical Engineering, 172 Stocker Center, Ohio University, Athens OH 45701-2979

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Faculty

Kenneth J. Bell (Ph.D., University of Delaware)
Gary L. Foutch (Ph.D., University of Missouri-Rolla)
K.A.M. Gasem (Ph.D., Oklahoma State University)
Karen A. High (Ph.D., Pennsylvania State University)
Martin S. High (Ph.D., Pennsylvania State University)
A.J. Johannes (Ph.D., University of Kentucky)
Robert L. Robinson, Jr. (Ph.D., Oklahoma State University)
D. Alan Tree (Ph.D., University of Illinois)
Jan Wagner (Ph.D., University of Kansas)
James R. Whiteley (Ph.D., Ohio State University)

Research Areas

Adsorption
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Artificial Intelligence
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Corrosion
Design
Environmental Engineering
Fluid Flow
Gas Processing
Hazardous Wastes
Heat Transfer
Ion Exchange
Kinetics
Mass Transfer
Modeling
Phase Equilibria
Polymers
Process Control
Process Simulation
Thermodynamics

For more information contact

Graduate Coordinator
School of Chemical Engineering
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S. Kimura	•	Reaction Engineering, High-Temperature Materials
J. G. Knudsen	•	Heat Transfer
M. D. Koretsky	•	Electronic Materials Processing
O. Levenspiel	•	Fluidization, Chemical Reaction Engineering
K. L. Levien	•	Process Optimization and Control
J. McGuire	•	Protein Adsorption, Biofilm Development
W. E. Rochefort	•	Rheology, Characterization of Polymers
G. L. Rorrer	•	Biochemical Reaction Engineering
C. E. Wicks	•	Mass Transfer

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For further information, write:

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Oregon State University • Gleeson Hall, Room 103
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University of Pennsylvania Chemical Engineering

Stuart W. Churchill
Combustion, thermoacoustic convection, Czochralski crystallization, rate processes

Russell J. Composto
Polymeric materials science, surface and interface studies

Gregory C. Farrington
Electrochemistry, solid state and polymer chemistry

William C. Forsman
Polymer science and engineering, graphite intercalation

Eduardo D. Glandt
Classical and statistical thermodynamics, random media

Raymond J. Gorte
Heterogeneous catalysis, surface science, zeolites

David J. Graves
Biochemical and biomedical engineering, bioseparations

Mitchell Litt
Biorheology, transport processes in biological systems, biomedical engineering

Alan L. Myers
Adsorption of gases and liquids, molecular simulations

Daniel D. Perlmutter
Chemical reactor design, gas-solid reactions, gel kinetics

John A. Quinn
Membrane transport, biochemical/biomedical engineering

Warren D. Seider
Process analysis, simulation, design, and control

Lyle H. Ungar
Artificial intelligence in process control, neural networks

T. Kyle Vanderlick
Thin-film and interfacial phenomena

John M. Vohs
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Department of Chemical Engineering
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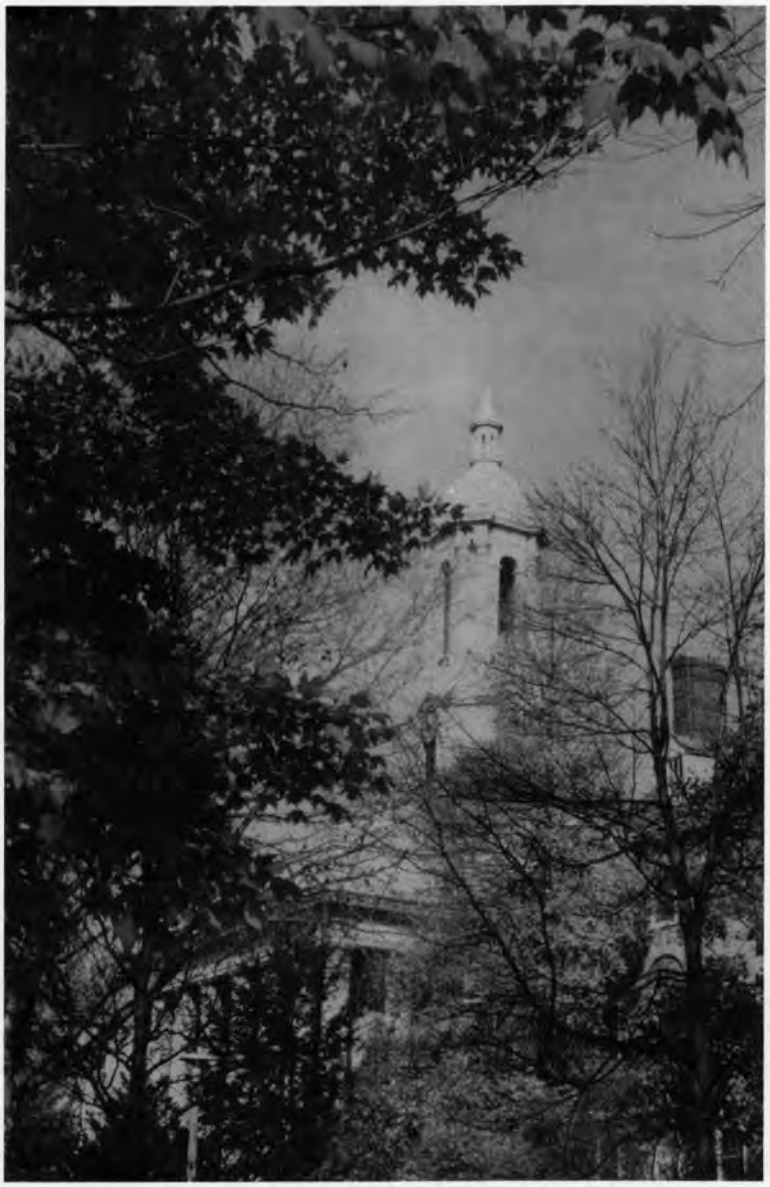

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Chairman, Graduate Admissions Committee
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Department of Chemical Engineering
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Paul Barton (Penn State)
Separational Processes

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Fluid Dynamics, Transport Phenomena

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Lance R. Collins (Penn)
Turbulent Flow, Combustion

Wayne Curtis (Purdue)
Plant Biotechnology

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Applied Thermodynamics, Adsorption Phenomena

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John R. McWhirter (Penn State)
Gas-Liquid Mass Transfer, Microencapsulation

R. Nagarajan (SUNY Buffalo)
Colloid and Polymer Science

Jonathan Phillips (Wisconsin)
Heterogeneous Catalysis, Surface Science

John M. Tarbell (Delaware)
Cardiovascular Fluid Mechanics and Mass Transfer, Turbulent Reacting Flows

James S. Ultman (Delaware)
Mass Transport in the Human Lung, Intensive Care Monitoring

M. Albert Vannice (Stanford)
Heterogeneous Catalysis

James S. Vrentas (Delaware)
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kinetics
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organometallic chemistry
petroleum engineering
phase equilibria
polymers
process design
protein engineering
reaction engineering
recycling technology
separation science
solids processing
superacids
supercritical fluids
surface chemistry
transport phenomena

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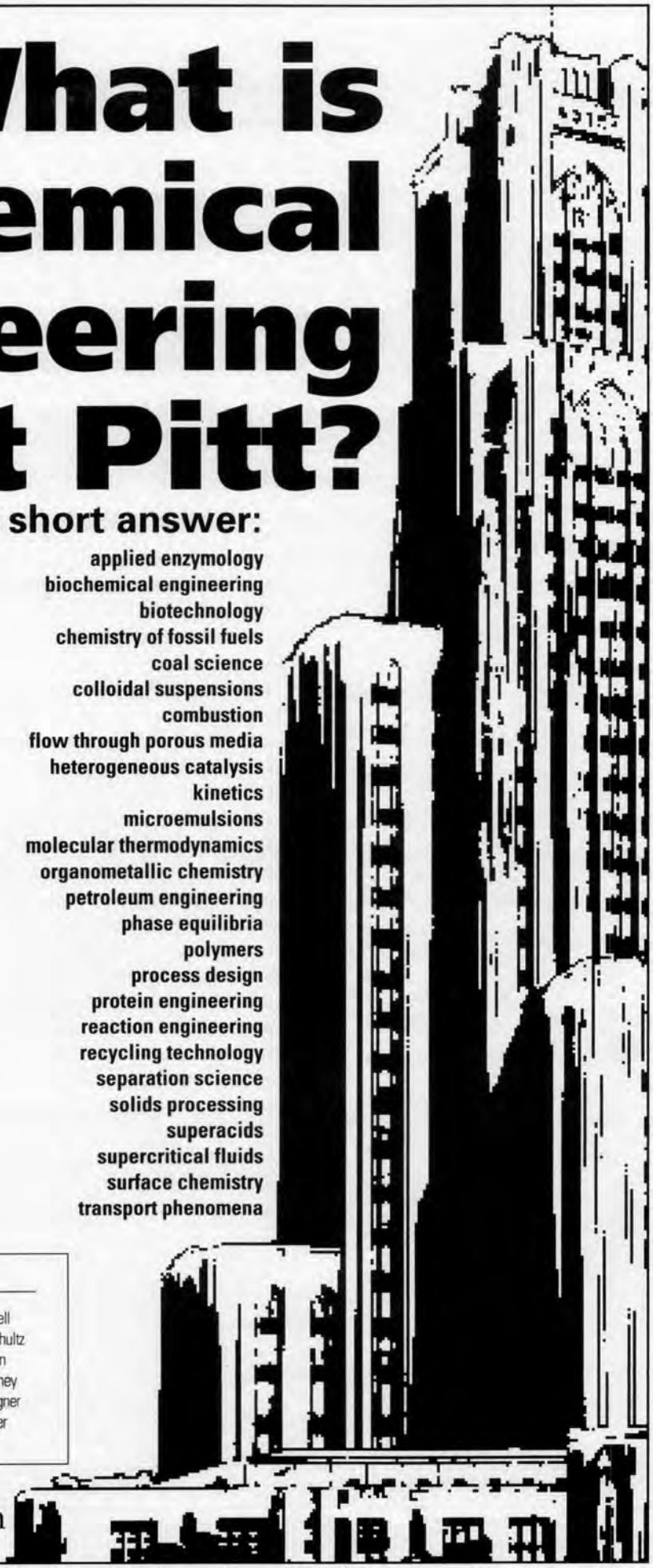
Graduate Coordinator
Department of Chemical and Petroleum Engineering
1249 Benedum Hall
University of Pittsburgh
Pittsburgh,PA15261
412-624-9630

FACULTY

Mohammad M. Ataai	Dan Farcasiu	Alan J. Russell
Eric J. Beckman	James G. Goodwin, Jr.	Jerome S.Schultz
Alan J. Brainard	Gerald D. Holder	Sindee Simon
Edward Cape	George E. Klinzing	John W.Tierney
Shiao-Hung Chiang	George Marcelin	William Wagner
James T. Cobb, Jr.	Badie I. Morsi	Irving Wender
Robert M. Enick		

University of Pittsburgh



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T.K. Kwei • *polymer-polymer miscibility, phase relationships in polymers*

J.S. Mijovic • *polymer morphology, fracture properties of polymers*

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E.M. Pearce • *polymer synthesis and degradation*

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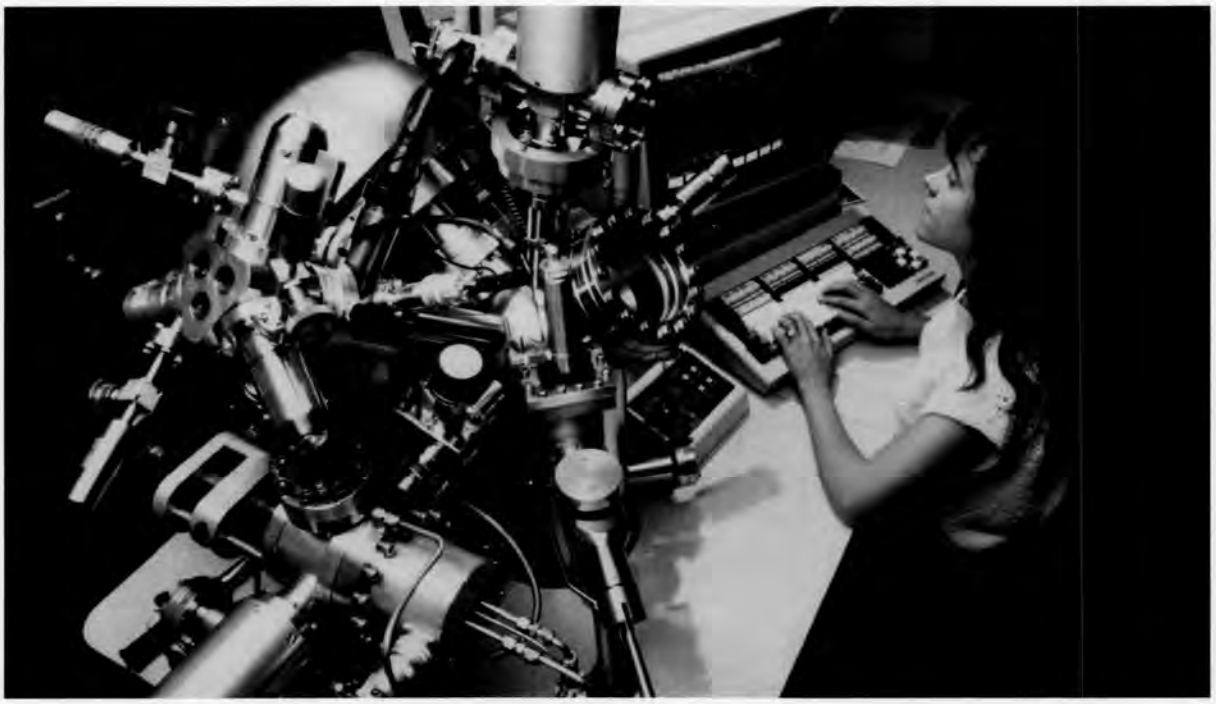
Faculty

..F. Albright, *Emeritus*
R.P. Andres
.M. Caruthers
K.C. Chao
V.N. Delgass
F.J. Doyle
R.E. Eckert
A.H. Emery
E.I. Franses
R.A. Greenkorn
I.L. Hampsch
R.E. Hannemann
R.N. Houze
O.P. Kessler
.F. Pekny
N.A. Peppas
O. Ramkrishna
G.V. Reklaitis
R.G. Squires
C.G. Takoudis
. Talbot
G.T. Tsao
V. Venkatasubramanian
N.H.L. Wang
P.C. Wankat
.M. Wiest



Research Areas

- Applied Mathematics
- Artificial Intelligence
- Biochemical Engineering
- Biomedical Engineering
- Catalysis and Reaction Engineering
- Colloids and Interfacial Engineering
- Process Operations and Design
- Environmental Science
- Materials and Microelectronics Processing
- Parallel Computing and Combinatorics
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Purdue University
1283 Chemical Engineering Building
West Lafayette, Indiana 47907-1283

Phone: (317) 494-4057

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R. B. Newell (Alberta)
S. Reid (Griffith)
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B. R. Stanmore (Manchester)
E. T. White (Imperial College)
R. J. Wiles (Queensland)

■ *Adjunct Staff*

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J. M. Burgess (Edinburgh)
W. W. Eckenfelder (Manhattan)
J. E. Hendry (Wisconsin)
G. W. Pace (MIT)
D. H. Randerson (New South Wales)

■ *Research Areas*

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- Computer Control
- Applied Mathematics
- Transport Phenomena
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- Chemical Reactor Analysis
- Energy Resource Studies
- Oil Shale Processing
- Wastewater Treatment
- Landfill Practice
- Particle Mechanics
- Environmental Modeling
- Computational Fluid Dynamics
- Process Simulation
- Fermentation Systems
- Tissue Culture
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Co-ordinator of Graduate Studies • Department of Chemical Engineering
The University of Queensland • Brisbane Qld 4072 Australia

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- Interfacial phenomena
- Microelectronics manufacturing
- Multiphase flow
- Polymer reaction engineering
- Process control and design
- Separation engineering
- Simultaneous diffusion and chemical reaction
- Thermodynamics
- Transport Processes

For full details write
Department Head
Department of Chemical Engineering
Rensselaer Polytechnic Institute
Troy, New York 12180-3590

The Faculty

Michael M. Abbott *Ph.D., Rensselaer*

Elmar R. Atwicker *Ph.D., Ohio State*

Georges Belfort *Ph.D., California—Irvine*

B. Wayne Bequette *Ph.D., Texas—Austin*

Henry R. Bungay, III *Ph.D., Syracuse*

Steven M. Cramer *Ph.D., Yale*

Arthur Fontijn *D.Sc., Amsterdam*

William N. Gill *Ph.D., Syracuse*

Martin E. Glicksman *Ph.D., Rensselaer*

Richard T. Lahey, Jr. *Ph.D., Stanford*

Howard Littman *Ph.D., Yale*

Morris H. Morgan, III *Ph.D., Rensselaer*

Charles Muckenfuss *Ph.D., Wisconsin*

E. Bruce Nauman *Ph.D., Leeds*

Joel L. Plawsky *D.Sc., M.I.T.*

Todd M. Przybycien *Ph.D., Cal. Tech*

Hendrick C. Van Ness *D.Eng., Yale*

Peter C. Wayner, Jr. *Ph.D., Northwestern*

Robert H. Wentorf, Jr. *Ph.D., Wisconsin*

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Department of Chemical Engineering
PO Box 1892
Rice University
Houston, TX 77251

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Faculty

- William W. Akers *(Michigan, 1950)*
- Constantine D. Armeniades *(Case Western Reserve, 1969)*
- Thomas A. Badgwell *(Texas, 1992)*
- Walter Chapman *(Cornell, 1988)*
- Sam H. Davis, Jr. *(MIT, 1957)*
- Derek C. Dyson *(London, 1966)*
- J. David Hellums *(Michigan, 1961)*
- Joe W. Hightower *(Johns Hopkins, 1963)*
- George J. Hirasaki *(Rice, 1967)*
- Riki Kobayashi *(Michigan, 1951)*
- Larry V. McIntire *(Princeton, 1970)*
- Antonios G. Mikos *(Purdue, 1988)*
- Clarence A. Miller *(Minnesota, 1969)*
- Mark A. Robert *(Swiss Fed. Inst. of Technology, 1980)*
- Ka-Yiu San *(CalTech, 1984)*
- Jacqueline Shanks *(CalTech, 1989)*
- Kyriacos Zygourakis *(Minnesota, 1981)*

Research Interests

- Applied Mathematics
- Biochemical Engineering
- Biomedical Engineering
- Equilibrium Thermodynamic Properties
- Fluid Mechanics
- Interfacial Phenomena
- Kinetics and Catalysis
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Professor Harvey J. Palmer, Chair
Department of Chemical Engineering
University of Rochester
Rochester, New York 14627
Phone: (716) 275-4042
Fax: (716) 442-6686

Faculty and Research Areas

S. H. CHEN, Ph.D. 1981, Minnesota
Polymer Science and Engineering, Transport Phenomena, Optical Materials

E. H. CHIMOWITZ, Ph.D. 1982, Connecticut
Critical Phenomena, Statistical Mechanics of Fluids, and Computer-Aided Design

M. R. FEINBERG, Ph.D. 1968, Princeton
Complex Reaction Systems, Optimal Reactor Design, Applied Mathematics

J. R. FERRON, Ph.D. 1958, Wisconsin
Transport Processes, Applied Mathematics

J. C. FRIEDLY, Ph.D. 1965, California (Berkeley)
Process Dynamics, Control, Groundwater Transport

R. H. HEIST, Ph.D. 1972, Purdue
Nucleation, Aerosols, Ultrafine Particles

S. A. JENEKHE, Ph.D. 1985, Minnesota
Polymer Science and Engineering, Materials Chemistry, Optoelectronic and Photonic Materials and Devices

J. JORNE, Ph.D. 1972, California (Berkeley)
Electrochemical Engineering, Microelectronics Processing, Theoretical Biology

R. H. NOTTER, Ph.D. 1969, Washington (Seattle)
M.D. 1980, Rochester
Biomedical Engineering, Lung Surfactant, Molecular Biophysics

H. J. PALMER, Ph.D. 1971, Washington (Seattle)
Interfacial Phenomena, Phase Transfer Reactions, Mass Transfer, Bioengineering

H. SALTSBURG, Ph.D. 1955, Boston
Surface Phenomena, Catalysis

S. V. SOTIRCHOS, Ph.D. 1982, Houston
Reaction Engineering, Gas-Solid Reactions, Processing of Ceramic Materials

J. H. D. WU, Ph.D. 1987, M.I.T.
Biochemical Engineering, Fermentation , Biocatalysis, Genetic and Tissue Engineering

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- FOOD PROCESSING
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- PROTEIN ENGINEERING
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● CHEMICAL TECHNOLOGY
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Department of Chemical and Biochemical Engineering
Rutgers, The State University of New Jersey
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Faculty

M. W. Davis, Jr. (Emer.)
A. E. Farell
F. A. Gadala-Maria
J. H. Gibbons
E. L. Hanzevack, Jr.
E. J. Markel
J. A. Ritter
F. P. Pike (Emer.)
R. L. Smith, Jr.
T. G. Stanford
V. Van Brunt
J. W. Van Zee
J. W. Weidner
R. E. White

For further information contact:

Professor R. E. White
Chairman, Chemical Engineering
Swearingen Engineering Center
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J. A. Biesenberger (PhD, Princeton University)
G.B. DeLancey (PhD, University of Pitsburgh)
C. G. Gogos (PhD, Princeton University)
D. M. Kalyon (PhD, McGill University)
S. Kovenklioglu (PhD, Stevens Institute of Technology)
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Chemical Vapor Deposition
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Combustion
Crystal Structure & Properties
Crystallization
Distillation
Electrochemistry
Electronic and Optical Materials

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Expert Systems
Fault Detection & Diagnosis
Flow of Suspensions
Fluid Mechanics
Heat Transfer
Laser Processing
Liquid Crystalline Polymers
Lithographic Materials
Materials Science
Membrane Science
Microelectronics Processing
Optimization
Plasma Processing
Polymer Blends
Polymer Processing
Polymer Synthesis
Polymer Thermodynamics
Process Dynamics & Control
Process Modeling & Simulation
Protein & Fermentation Engineering
Reaction Injection Molding
Separation Processes
Stack Gas Desulfurization
Statistical Thermodynamics
Superconductivity
Supercritical Fluid Science
Surface Science
Thermodynamics

Inquiries should be sent to:
Graduate Advisor • Department of Chemical Engineering
The University of Texas • Austin, Texas 78712
(512) 471-6991

Faculty

Joel W. Barlow
Wisconsin
Roger T. Bonnecaze
Caltech
James R. Brock
Wisconsin
Thomas F. Edgar
Princeton
John G. Ekerdt
Berkeley
James R. Fair
Texas
George Georgiou
Cornell
Adam Heller
Hebrew (Jerusalem)
David M. Himmelblau
Washington
Jeffrey A. Hubbell
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Illinois
William J. Koros
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Douglas R. Lloyd
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Donald R. Paul
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Robert P. Popovich
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Wisconsin
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- Separations
- Thermodynamics

R. W. Flumerfelt, Head, Ph.D.
Northwestern, 1965
Fluid mechanics, interfacial phenomena

A. Akgerman, Ph.D.
Virginia, 1971
Reaction engineering, waste treatment

R. G. Anthony, Ph.D.
Texas, 1966
Catalysis, reaction engineering

A. J. Appleby, Ph.D.
Cambridge (UK), 1965
Electrochemistry

D. B. Bukur, Ph.D.
Minnesota, 1974
Reaction engineering, math methods

J. A. Bullin, Ph.D.
Houston, 1972
Gas sweetening, asphalt characterization

B. E. Dale, Ph.D.
Purdue, 1979
Biochemical engineering

R. Darby, Ph.D.
Rice, 1962
Rheology, polymers

R. R. Davidson, Ph.D.
Texas A&M, 1962
Methanol fuel, asphalt characterization

L. D. Durbin, Ph.D.
Rice, 1961
Process control

P. T. Eubank, Ph.D.
Northwestern, 1961
Thermodynamics

A. M . Gadalla, Ph.D.
Sheffield (UK), 1964
Ceramics, materials science

C. J. Glover, Ph.D.
Rice, 1974
Polymer solutions

K. R. Hall, Ph.D.
Oklahoma, 1967
Thermodynamics

D. T. Hansen, Ph.D.
Minnesota, 1968
Biochemical engineering

C. D. Holland, Ph.D.
Texas A&M, 1953
Separation processes, distillation, unsteady-state processes

J. C. Holste, Ph.D.
Iowa State, 1973
Thermodynamics

M. T. Holtzapple, Ph.D.
Pennsylvania, 1981
Biochemical engineering

J. C. Liao, Ph.D.
Wisconsin, 1987
Biochemical engineering, metabolic engineering

M. Nikolaou, Ph.D.
UCLA, 1989
Process control, optimization and design

H. J. Ploehn, Ph.D.
Princeton, 1988
Colloidal and interfacial systems

A. T. Watson, Ph.D.
Cal Tech, 1979
Porous media, math modeling

For More Information

Graduate Admissions Office ▪ Department of Chemical Engineering
Texas A&M University
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Ph.D., Northwestern University
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Ronald L. Fournier, Associate Professor
Ph.D., University of Toledo
Transport Phenomena, Thermodynamics, Mathematical Modeling and Biotechnology

Saleh Jabarin, Professor
Ph.D., University of Massachusetts
Physical Properties of Polymers, Polymer Orientation and Crystallization

Steven E. LeBlanc, Associate Professor
Ph.D., University of Michigan
Dissolution Kinetics, Surface and Colloid Phenomena, Controlled Release Technology

Richard M. Lemert, Assistant Professor
Ph.D., University of Texas at Austin
Thermodynamics and Supercritical Fluid Extraction

Bruce E. Poling, Professor, Chairman,
Ph.D., University of Illinois
Professor; Thermodynamics and Physical Properties

Sasidhar Varanasi, Associate Professor
PhD., State University of New York at Buffalo
Colloidal and Interfacial Phenomena, Enzyme Kinetics, Membrane Transport

For Details Contact:

Dr. B. E. Poling, Chairman
Department of Chemical Engineering
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- HETEROGENEOUS CATALYSIS
- ELECTROCATALYTIC PROCESSES
- THERMODYNAMICS

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- STABILITY OF SUSPENSIONS
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- MAMMALIAN CELL BIOREACTORS
- RECOMBINANT DNA TECHNOLOGY
- APPLIED PHYSIOLOGY
- PROTEIN REFOLDING
- BIOSEPARATIONS

ENVIRONMENTAL ENGINEERING

- SOLID-WASTE PROCESS ENGINEERING
- HAZARDOUS WASTE TECHNOLOGY
- BIODEGRADATION OF SOLID WASTE
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Graduate Committee
Department of Chemical Engineering
Tufts University
Medford, MA 02155
Phone (617) 627-3900
FAX (617) 627-3991

FACULTY

GREGORY D. BOTSARIS
Ph.D., M.I.T., 1965
ELIANA R. DEBERNARDEZ-CLARK
Ph.D., U.N.L. (Argentina), 1984
JERRY H. MELDON
Ph.D., M.I.T., 1973
JAMES J. NOBLE
Ph.D., M.I.T., 1968
DANIEL F. RYDER
Ph,.D., Worcester Polytechnic, 1984
MICHAEL STOUKIDES
Ph.D., M.I.T., 1982
MARTIN V. SUSSMAN
Ph.D., Columbia, 1958
NAK-HO SUNG
Ph.D., M.I.T., 1972
KENNETH A. VAN WORMER
Sc.D., M.I.T., 1961

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The Faculty

M.A. Abraham • Reaction kinetics, catalysis, supercritical fluids
. Ariman • Particulate science and technology, multiphase separation processes
.L. Cerro • Capillary hydrodynamics, multiphase flows
.P. Hesketh • Combustion, incineration and pollution control
.D. Luks • Thermodynamics, phase equilibria
S. Manning • Industrial pollution control, surface processing of petroleum
.L. Sublette • Fermentation, biocatalysis, biological waste treatment
.E. Thompson • Oil and gas processing, computer-aided process design
.D. Wisecarver • Fluidization, bioreactor modeling, mass transfer and adsorption in porous solids

urther Information

raduate Program Director • Chemical Engineering Department
he University of Tulsa • 600 South College Avenue • Tulsa, Oklahoma 74104-3189
18) 631-2974 • Fax number: (918) 631-3268
-Mail: che_maa@vax1.utulsa.edu • Graduate School application: 1-800-882-4723

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Department of Chemical Engineering
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Kenneth A. Debelak ***(Ph.D., Kentucky)***

Artificial intelligence in process control; coal conversion with emphasis on particle structure and diffusional processes; hazardous waste minimization.

Tomlinson Fort ***(Ph.D., Tennessee)***

Adsorption; surfactant spreading on liquid surfaces; monolayers and think films; flow in unsaturated porous media; applications to drying, mining, and environmental cleanup.

Todd D. Giorgio ***(Ph.D., Rice)***

Rheological aspects of blood/endothelial cell response; structured lipid systems; biochemical cell-cell interaction; mechanism and kinetics of cellular ion transport.

Thomas M. Godbold ***(Ph.D., North Carolina State)***

Coal pyrolysis and gasification; sulfur removal from syngas; computer-aided design.

David Hunkeler ***(Ph.D., McMaster)***

Water soluble polymers and polyelectrolytes, heterophase polymerizations, polymer characterization, light scattering, liquid chromatography, birefringence.

John A. Roth ***(Ph.D., Louisville)***

Physical-chemical wastewater treatment; hazardous waste management; corrosion mechanisms in microcircuitry.

Karl B. Schnelle, Jr. ***(Ph.D., Carnegie Mellon)***

Environmental dispersion modeling; use of natural gas in atmospheric pollution control; supercritical extraction of toxic materials in the environment.

Eva M. Sevick ***(Ph.D., Carnegie Mellon)***

Optical spectroscopy and imaging in strongly scattering media; applications for biomedical imaging, measurement of tissue oxygenation, and characterization of motion and physical properties of colloidal systems.

Robert D. Tanner ***(Ph.D., Case Western Reserve)***

Biochemical engineering; effect of light on yeast growth and protein secretion; aerated solid fermentation fluidized bed processes; bubble and aerosol fractionation of proteins.

For further information:

VANDERBILT ENGINEERING

Professor Eva M. Sevick
Chemical Engineering Department
Box 1604 Station B
Vanderbilt University
Nashville, TN 37235
1-800-288-7722

University of Virginia

Graduate Studies in Chemical Engineering

"Academic research should provide the opportunity for students to improve their methods of rational thought and inquiry with the advisor supplying insight and direction. The faculty here at UVa seem dedicated to allowing students the freedom to learn, but with guidance available when needed."

Jamie Rudisill, B.S.ChE
Ph.D. 1992

Faculty and Research Areas

Giorgio Carta, *Ph.D., University of Delaware*
Absorption, adsorption, ion exchange, biological separations

Robert J. Davis, *Ph.D., Stanford University*
Heterogeneous catalysis, characterization of metal clusters, reaction kinetics

Erik J. Fernandez, *Ph.D., University of California, Berkeley*
Mammalian cell biocatalysis, metabolism in diseased tissues

Roseanne M. Ford, *Ph.D., University of Pennsylvania*
Bioremediation, bacterial migration (chemotaxis)

Elmer L. Gaden, Jr., *Ph.D., Columbia University*
Biochemical engineering, bioprocess development and design

John L. Gainer, *Ph.D., University of Delaware*
Mass transfer including biomedical applications, biochemical engineering

John L. Hudson, *Ph.D. Northwestern University*
Dynamics of chemical reactors, electrochemical and multiphase reactors

Donald J. Kirwan, *Ph.D., University of Delaware*
Biochemical engineering, mass transfer, crystallization

M. Douglas LeVan, *Ph.D., University of California, Berkeley*
Adsorption, fluid mechanics, process design

Lembit J. Lilleleht, *Ph.D., University of Illinois*
Fluid mechanics, heat transfer, multiphase systems, alternative energy

John P. O'Connell, *Ph.D., University of California, Berkeley*
Statistical thermodynamics with applications to physical and biological systems

To receive application materials and further information, please write to

Graduate Admissions Coordinator • Department of Chemical Engineering • Thornton Hall
University of Virginia • Charlottesville, VA 22903-2442 • Phone (804) 924-7778

Chemical Engineering

Virginia Tech

Hancock Hall, one of the most recent additions to the Virginia Tech campus, houses the Unit Operations Laboratory and many of the research facilities used in the processing of new materials.

For further information, contact the

Department of Chemical Engineering
Virginia Tech
133 Randolph Hall
Blacksburg, VA 24061

Telephone (703) 231-6631
FAX (703) 231-5022

FACULTY

Donald G. Baird
(Ph.D. University of Wisconsin)
The Harry C. Wyatt Professor
Polymer Processing and non-Newtonian Fluid Mechanics

William L. Conger
(Ph.D. University of Pennsylvania)
Professor and Department Head
Analysis of Coal Gasification Processes

David F. Cox
(Ph.D. University of Florida)
Associate Professor
Catalysis, Ultrahigh Vacuum Surface Science

Richey M. Davis
(Ph.D. Princeton University)
Assistant Professor
Physical Chemistry and Rheology of Colloids and Polymer Solutions

Kimberly E. Forsten
(Ph.D. University of Illinois)
Assistant Professor
Computational Bioengineering

Y. A. Liu
(Ph.D. Princeton University)
The Frank C. Vilbrandt Professor
Artificial Intelligence and Engineering Design

Eva Marand
(Ph.D. University of Massachusetts)
Assistant Professor
Transport through Polymer Membranes, Polymer Spectroscopy

Henry A. McGee Jr.
(Ph.D. Georgia Tech)
Professor
Molecular Engineering, Science Policy

Donald L. Michelsen
(Ph.D. Cornell)
Associate Professor Emeritus
Waste Minimization/Treatment, Adsorption, and Indoor Air Quality

S. Ted Oyama
(Ph.D. Stanford University)
Associate Professor
Heterogeneous Catalysis and New Materials

Peter R. Rony
(Ph.D. University of California at Berkeley)
Professor
Instrumentation

William H. Velander
(Ph.D. Pennsylvania State University)
Associate Professor
Transgenic Livestock Bioreactors & Immunopurification of Therapeutics

Garth Wilkes
(Ph.D. University of Massachusetts)
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Inquiries welcome. Please contact:
Graduate Admissions
Department of Chemical Engineering, BF-10
University of Washington
Seattle, Washington 98195
Phone: (206) 543-2250
Fax: (206) 543-3778

Chemical Engineering Faculty • Research Areas

Albert L. Babb, Ph.D., Illinois	•	Biomedical Engineering; Hemodialysis
François Baneyx, Ph.D., Texas (Austin)	•	Biotechnology; Protein Technology; Biochemical Engineering
John C. Berg, Ph.D., California (Berkeley)	•	Interfacial Phenomena; Surface and Colloid Science
E. James Davis, Ph.D., Washington	•	Colloid Science; Aerosol Chemistry and Physics; Electrokinetics
Bruce A. Finlayson, Ph.D., Minnesota	•	Mathematical Modeling
Kermit L. Garlid, Ph.D., Minnesota	•	Nuclear Engineering; Radioactive Waste
William J. Heideger, Ph.D., Princeton	•	Mass Transfer
Bradley R. Holt, Ph.D., Wisconsin	•	Process Design and Control
Barbara Krieger-Brockett, Ph.D., Wayne State	•	Reaction Engineering
N. Lawrence Ricker, Ph.D., California (Berkeley)	•	Process Control and Optimization
J. W. Rogers, Jr., Ph.D., Texas (Austin)	•	Surface Science; Thin-Film Deposition
Daniel T. Schwartz, Ph.D., California (Davis)	•	Electrochemical Engineering; Electrolytic Thin-Film Science
James C. Seferis, Ph.D., Delaware	•	Polymeric Composites
Eric M. Stuve, Ph.D., Stanford	•	Catalytic and Electrochemical Surface Science
Lewis E. Wedgewood, Ph.D., Wisconsin	•	Polymer Rheology
Gene L. Woodruff, Ph.D., MIT	•	Nuclear Engineering

Research Faculty

David G. Castner, Ph.D., California (Berkeley) • Biomaterials; Surface Science

Adjunct and Joint Faculty Active in Department Research

G. Graham Allan, Ph.D., D.Sc., Glasgow	•	Fiber and Polymer Science
Richard R. Gustafson, Ph.D., Washington	•	Pulp and Paper
Allan S. Hoffman, Sc.D., MIT	•	Biomaterials in Medicine and Biotechnology
Thomas A. Horbett, Ph.D., Washington	•	Biomaterials; Peptide Drug Delivery
William T. McKean, Ph.D., Washington	•	Pulp and Paper Science
Buddy D. Ratner, Ph.D., Brooklyn Polytechnic	•	Biomaterials; Polymers; Surface Characterization

WASHINGTON STATE UNIVERSITY

Chemical Engineering Department

Here at Washington State University, we are proud of our graduate program, and of our students. The program has been growing quickly in size and quality, but is still small and informal.

For a department of this size, the range of faculty research interests is very broad. Students choose research projects of interest to them, then have the opportunity—and the responsibility—to make an individual contribution.

Through a combination of core courses and many electives, students can gain a thorough understanding of the basics of chemical engineering.

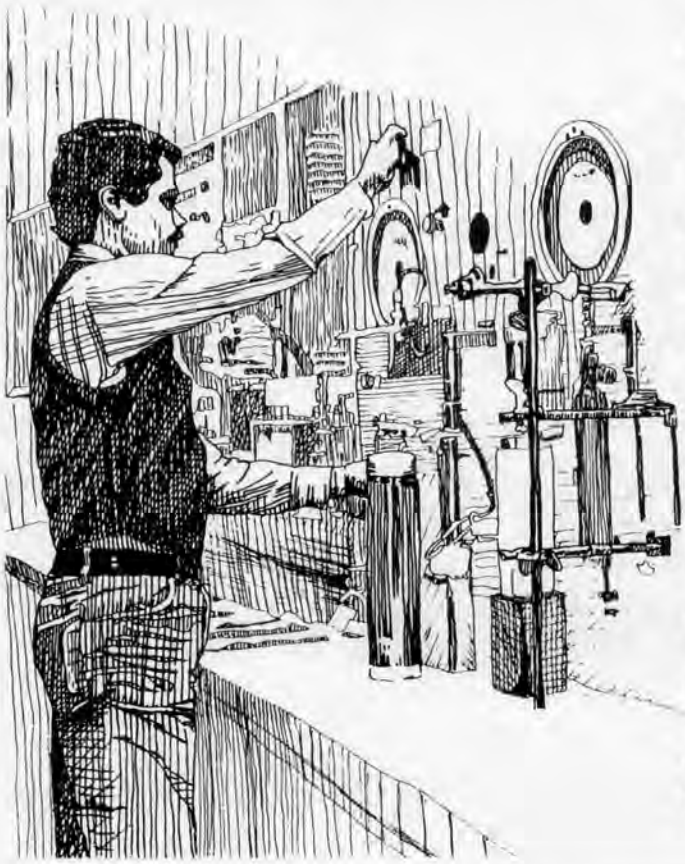
FACULTY AND RESEARCH INTERESTS

C. F. Ivory (Ph.D., Princeton): bioseparations, including electrophoresis, electrochromatography and field flow fractionation.

J. M. Lee (Ph.D., University of Kentucky): plant tissue cultivation, genetic engineering, enzymatic hydrolysis, mixing

K. C.Liddell (Ph.D., Iowa State University): semiconductor electrochemistry, reactions on fractal surfaces, separations, radioactive waste management

R. Mahalingam (Ph.D., University of Newcastle-upon-Tyne): multiphase systems, physical and chemical separations, particulate phoretic phenomena, electronic materials and polymers, synfuels and environment



J. N. Petersen (Ph.D., Iowa State University); adaptive online optimization of biochemical processes, adaptive control, drying of food products

J. C. Sheppard (Ph.D., Washington University); radioactive wastes, actinide element chemistry, atmospheric chemistry, radiocarbon dating

W. J. Thomson (Ph.D. University of Idaho); kinetics of solid state reactions, sintering rates of ceramic and electronic material precursers, chemical reaction engineering

B. J. Van Wie (Ph.D., University of Oklahoma); kinetics of mammalian tissue cultivation, bio-reactor design, centrifugal blood cellular separations, development of biochemical sensors

R. L. Zollars (Ph.D., University of Colorado); multiphase reactor design, polymer reactor design, colloidal phenomena, chemical vapor deposition reactor design

GRADUATE DEGREE PROGRAMS AT WSU

M.S. in Chemical Engineering

Twelve credits in graduate chemical engineering courses, nine credits in supporting courses, and a thesis are required.

Ph.D. in Chemical Engineering

Eighteen credits in graduate chemical engineering courses, sixteen credits in supporting courses, and a dissertation are required. Upon successful completion of the coursework and the Ph.D. preliminary examination, a student is admitted to candidacy for the degree. The dissertation must represent a significant original contribution to the research literature.

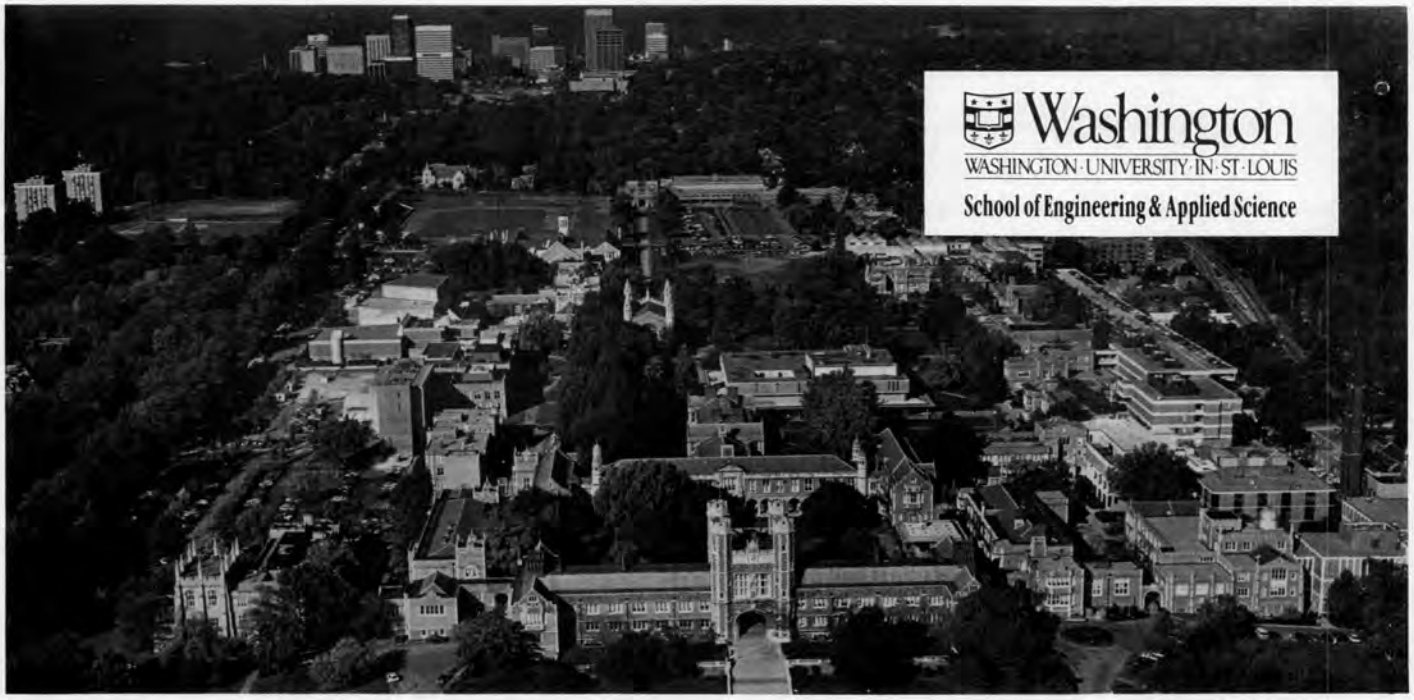
Conversion Program

Students with B.S. degrees in the physical or life sciences may apply for admission to the conversion program. Normally a small number of undergraduate courses must be taken in addition to the regular requirements for the M.S. or Ph.D.

FINANCIAL ASSISTANCE

Research or teaching assistantships, partial tuition waivers, and fellowships are available, and nearly all of our students receive financial assistance. Living costs are quite low.

WANT TO APPLY? Contact: Dr. C. F. Ivory, Graduate Coordinator, Department of Chemical Engineering, Washington State University, Pullman, WA 99164-2710
509/335-4332 or 509/335-7716



GRADUATE STUDY IN **CHEMICAL ENGINEERING**

MASTER'S AND DOCTORAL PROGRAMS

• *Faculty and Research Areas* •

M. P. Dudukovic Chemical Reaction Engineering

J. T. Gleaves Heterogeneous Catalysis, Surface Science, Microstructured Materials

B. Joseph Process Control, Process Optimization, Expert Systems

J. L. Kardos Composite Materials and Polymer Engineering

B. Khomami Rheology, Polymer and Composite Materials Processing

J. M. McKelvey Polymer Science and Engineering

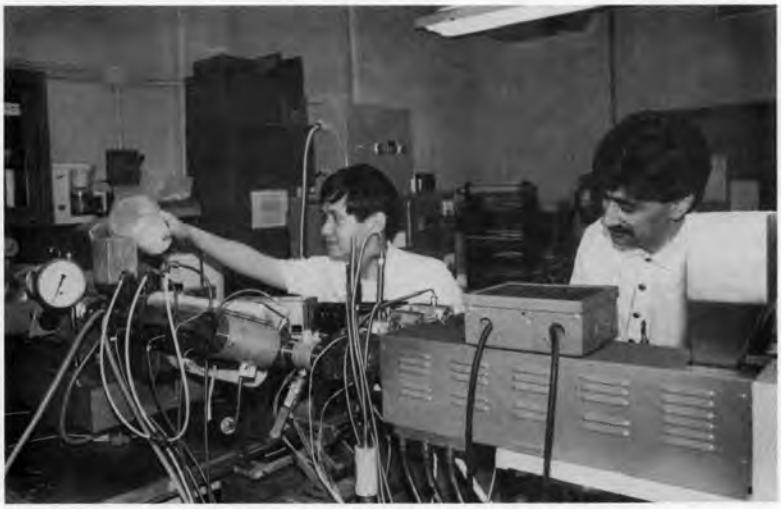
R. L. Motard Computer Aided Process Engineering, Knowledge-Based Systems

P. A. Ramachandran Chemical Reaction Engineering

R. E. Sparks Biomedical Engineering, Microencapsulation, Transport Phenomena

C. Thies Biochemical Engineering, Microencapsulation

M. Underwood Unit Operations, Process Safety, Polymer Processing



For Information Contact

Graduate Admissions Committee
Washington University
Department of Chemical Engineering
Campus Box 1198
One Brookings Drive
St. Louis, Missouri 63130-4899

Washington University encourages and gives full consideration to application for admission and financial aid without respect to sex, race, handicap, color, creed or national origin.

West Virginia University

M.S. and Ph.D. Programs in Chemical Engineering

FACULTY

Eugene V. Cilento, Chairman
(University of Cincinnati)

Dady B. Dadyburjor
(University of Delaware)

Rakesh K. Gupta
(University of Delaware)

Hisashi O. Kono
(Kyushu University)

Edwin L. Kugler
(Johns Hopkins University)

Joseph A. Shaeiwitz
(Carnegie-Mellon University)

Alfred H. Stiller
(University of Cincinnati)

Richard Turton
(Oregon State University)

Wallace B. Whiting
(University of California, Berkeley)

Ray Y. K. Yang
(Princeton University)

John W. Zondlo
(Carnegie-Mellon University)

RESEARCH AREAS

Catalysis and Reaction Engineering
Separation Processes
Biological Separations
Phase Equilibria
Fluidization
Biomedical Engineering
Solution Chemistry
Surface and Colloid Phenomena
Transport Phenomena
Biochemical Engineering
Polymer Rheology

For Application Information, Write

Professor Richard Turton ◆ Graduate Admission Committee
Department of Chemical Engineering ◆ P.O. Box 6101
West Virginia University ◆ Morgantown, West Virginia 26506-6101

Wisconsin

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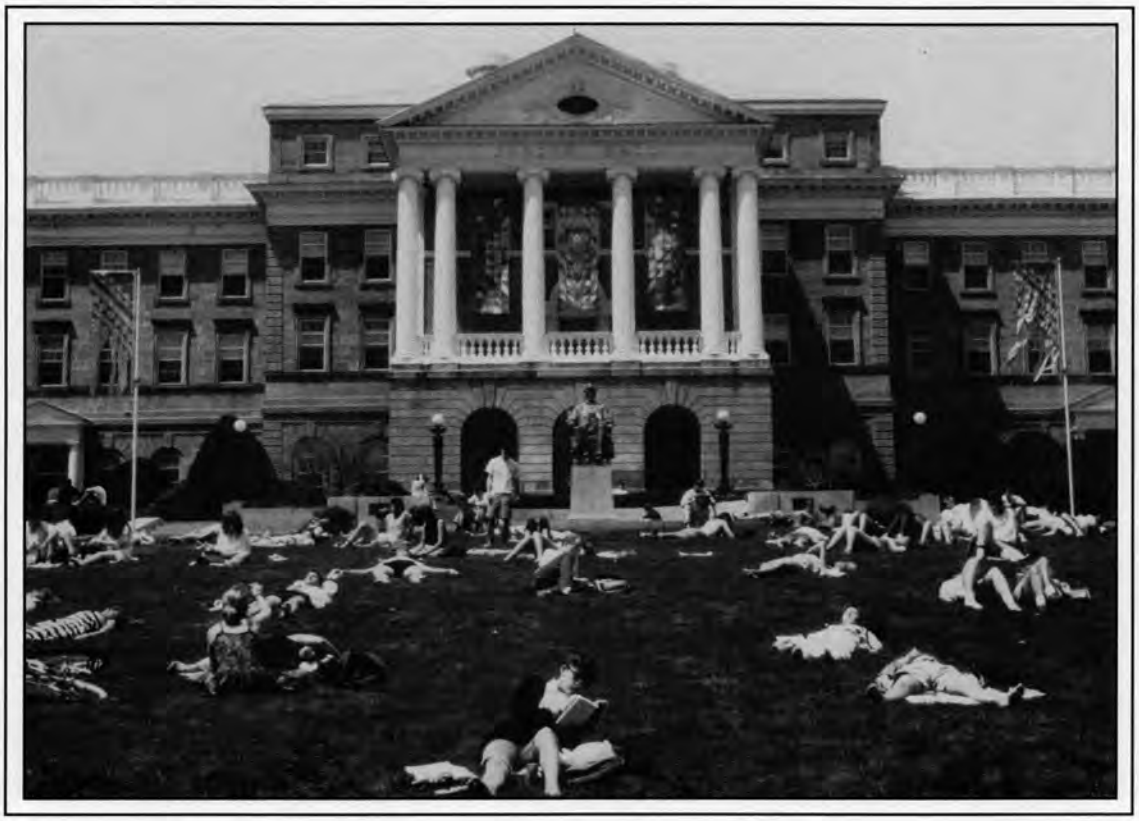

Faculty Research Interests

Kevin L. Bray
High pressure solid-state chemistry, electronic properties of materials

Douglas C. Cameron
Biotechnology, metabolic engineering

Thomas W. Chapman
Electrochemical reaction engineering

Juan de Pablo
Molecular thermodynamics, statistical mechanics

James A. Dumesic (Chairman)
Kinetics and catalysis, surface chemistry

Michael D. Graham
Fluid mechanics, reaction-transport systems, applied and computational mathematics

Charles G. Hill, Jr.
Kinetics and catalysis, membrane separation processes, immobilized enzymes

Sangtae Kim
Fluid mechanics, applied mathematics, parallel computing

Daniel J. Klingenberg
Colloid science, transport phenomena

James A. Koutsky
Polymer science, adhesives, composites

Thomas F. Kuech
Semiconductor processing, solid-state and electronic materials, thin films

Stanley H. Langer
Kinetics, catalysis, electrochemistry, chromatography, hydrometallurgy

E. N. Lightfoot, Jr.
Mass transfer and separations processes, biochemical engineering

Regina M. Murphy
Biomedical engineering, applied immunology, protein-protein interactions

W. Harmon Ray
Process dynamics and control, reaction engineering, polymerization

Thatcher W. Root
Surface chemistry, catalysis, solid-state NMR

Dale F. Rudd
Process design and industrial development

Warren E. Stewart
Reactor modeling, fractionation modeling, transport phenomena, applied mathematics

Ross E. Swaney
Process design, synthesis, modeling, and optimization

For further information about graduate study in chemical engineering, write:

The Graduate Committee
Department of Chemical Engineering
University of Wisconsin–Madison
1415 Johnson Drive
Madison, Wisconsin 53706-1691

Graduate Studies in Chemical Engineering

Areas of Research:

Advanced Materials
- Carbon Filaments
- Inorganic Membranes
- Materials Processing in Space
- Molecular Sieve Zeolites

Biochemical Engineering
- Biopolymer Engineering
- Bioreactor Analysis
- Bioseparations

Catalysis and Reaction Engineering
- Adsorption and Transport in Porous Media
- Heterogeneous and Homogeneous Catalysis
- Zeolite Catalysis

Environmental Engineering
- Aerosol Dynamics
- Nucleation and Phase Transitions
- Waste Reduction Technology

Faculty:

William M. Clark • *Ph.D., Rice*
David DiBiasio • *Ph.D., Purdue*
Anthony G. Dixon • *Ph.D., Edinburgh*
Yi Hua Ma • *Sc.D., MIT*
William R. Moser • *Ph.D., MIT*
James E. Rollings • *Ph.D., Purdue*
Albert Sacco, Jr. • *Ph.D., MIT*
Robert W. Thompson • *Ph.D., Iowa State*
Alvin H. Weiss • *Ph.D., Pennsylvania*
Barbara E. Wyslouzil • *Ph.D., CalTech*

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Graduate Coordinator
Chemical Engineering Department
100 Institute Road
Worcester Polytechnic Institute
Worcester, MA 01609-2280

WORCESTER POLYTECHNIC INSTITUTE

Persons seeking admission, employment or access to programs of the University of Wyoming shall be considered without regard to race, color, national origin, sex, age, religion, policitical belief, handicap or veteran status.

UNIVERSITY OF WYOMING

Chemical Engineering

P. K. Agarwal	*coal combustion/gasification • fluidization • image analysis*
C. Y. Cha	*solid waste utilization • microwave reactors • gas clean-up*
D. O. Cooney	*mass transfer • scrubbers • air and water pollution*
H. A. Deans	*enhanced oil recovery • carbon dioxide flooding*
J. W. Glass	*environmental*
R. D. Gunn	*coal drying • active carbon • mathematical modeling*
H. W. Haynes	*catalysis • reaction kinetics • synthetic fuels*
M. A. Matthews	*transport properties • thermodynamics*
M. Merrill	*applications of magnetic resonance imaging*
H. F. Silver	*coal liquefaction • desulfurization*
J. G. Speight	*coal chemistry*

We offer exciting opportunities for research in many processing areas, especially energy related technology development. In recent years we have developed clean coal, solid waste utilization, and advance gas clean-up technologies up to bench scale levels. Currently we are working with industry to construct and operate pilot units of these technologies. This will provide excellent opportunities for students to obtain hands-on experience on industrial projects. Also, research has been conducted in the areas of kinetics, catalysis, adsorption, extraction, computer modeling, coal processing, and enhanced oil recovery.

The Western Coal Consortium has been established by the Chemical Engineering Department with western coal producers and utilities. The Western Coal Consortium and Enhanced Oil Recovery Institute and NSF/EPSCoR Program provide excellent financial aid packages to graduate students.

The University of Wyoming is located in Laramie, Wyoming at an elevation of 7200 feet. The town is surrounded by state and national parks which allow for beautiful year-round outdoor activities. The nearby Snowy Range mountains provide ideal sources of recreation for mountain and rock climbing, skiing, fishing, and hunting.

Graduates of any accredited chemical engineering program are eligible for admission, and the department offers both an M.S. and Ph.D. accredited program. Financial aid is available, and all recipients receive full fee waivers.

For more information contact

Dr. Chang-Yul Cha, Head • Department of Chemical Engineering • University of Wyoming
P. O. Box 3295 • Laramie, WY 82071-3295

YALE Department of Chemical Engineering

Douglas D. Frey, *Ph.D. Berkeley*

Gary L. Haller, *Ph.D. Northwestern*

Csaba G. Horváth, *Ph.D. Frankfurt*

James A. O'Brien, *Ph.D. Pennsylvania*

Lisa D. Pfefferle, *Ph.D. Pennsylvania*

Theodore W. Randolph, *Ph.D. Berkeley*

Daniel E. Rosner, *Ph.D. Princeton*

Robert S. Weber, *Ph.D. Stanford*

Adjunct Professors:

- **Leslie S. Ettre**
- **John P. Marano**

Lecturers:

- **Joseph J. Levitzky**
- **John Bett**
- **Jovan Boskovic**
- **Yehia Khalil**

Department of Chemical Engineering
Yale University
2159 Yale Station
New Haven, Ct 06520
Phone: (203) 432-2222
FAX: (203) 432-7232

Adsorption

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Biochemical Engineering

Catalysis

Chemical Reaction Engineering

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Combustion

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Interfacial Phenomena

Molecular Beams

Multiphase Transport Phenomena

Separation Science and Technology

Statistical Thermodynamics

Supercritical Fluid Phenomena

BUCKNELL

BUCKNELL UNIVERSITY
Department of Chemical Engineering
MS PROGRAM

W. E. KING, JR., Chair
(PhD, University of Pennsylvania)
Biomedical engineering

J. CSERNICA
(PhD, M.I.T.)
Materials science, polymer structures/property relations

M. E. HANYAK, JR.
(PhD, University of Pennsylvania)
Computer-aided design, thermodynamics, applied software engineering

F. W. KOKO, JR.
(PhD, Lehigh University)
Optimization, fluid mechanics, direct digital control

J. E. MANEVAL
(PhD, University of California, Davis)
Multiphase transport processes, ion exchange, nuclear magnetic resonance imaging

J. M. POMMERSHEIM
(PhD, University of Pittsburgh)
Transport phenomena, mathematical modeling, cement hydration

M. J. PRINCE
(PhD, U. of California, Berkeley)
Biochemical engineering, interfacial phenomena

D. S. SCHUSTER
(PhD, West Virginia Univ.)
Fluidization, particulate systems, agglomerations

W. J. SNYDER
(PhD, Pennsylvania State U.)
Catalysis, polymerization, instrumentation

Bucknell is a small, private, highly selective university with strong programs in engineering, business, and the liberal arts. The Department is located in the newly renovated Charles A. Dana Engineering Building which provides ample facilities for both computational and experimental research. State-of-the-art computing for both research and course work and modern laboratory equipment are readily available. Graduate students have a unique opportunity to work very closely with a faculty research advisor.

Lewisburg, located in the center of Pennsylvania, provides the attraction of a rural setting while conveniently located within 200 miles of New York, Philadelphia, Washington, D.C., and Pittsburgh.

For further information, write or phone

Dr. William E. King, Jr., Chair
Department of Chemical Engineering
Bucknell University
Lewisburg, PA 17837
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- Enhanced Oil Recovery
- Electrochemical Processes, Solids, Handling

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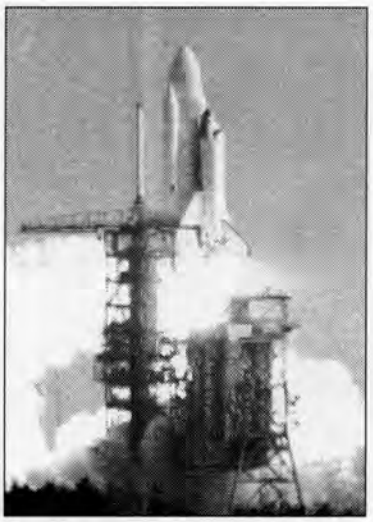

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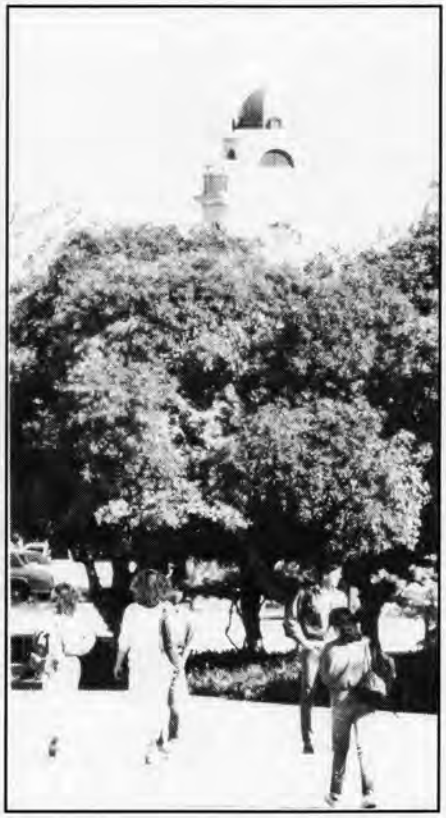

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W. VICTOR CHANG
(Ph.D., Ch.E., Caltech, 1976) • Physical properties of polymers and composites; adhesion; finite element analysis

ELMER L. DOUGHERTY, JR.
(Ph.D., Ch.E., Illinois, Urbana, 1955) • Optimization of oil and gas producing operations; simulation of hydrocarbon reservoir behavior; energy and environmental economics

IRAJ ERSHAGHI
(Ph.D., PTE, Southern Cal, 1972) • Well test analyses of fractured, geothermal, and gas storage reservoirs; reservoir characterization; petrophysical modeling

RONALD G. MINET
(Ph.D., Ch.E., New York University, 1959) *(Adjunct)* • Computer aided chemical process and plant design; catalysis; ceramic membranes

MUHAMMAD SAHIMI
(Ph.D., Ch.E., Minnesota, 1984) • Transport and mechanical properties of disordered systems; percolation theory and non-equilibrium growth processes; flow, diffusion, dispersion and reaction in porous media

RONALD SALOVEY
(Ph.D., Phys. Chem., Harvard, 1958) • Physical chemistry and irradiation of polymers; characterization of elastomers and filled systems; polymer crystallization

JAMES SCOTT SHAFFER
(Ph.D., Ch.E., California, Berkeley, 1993) • Interfacial phenomena in polymeric composites; rheology of confined polymeric materials

KATHERINE S. SHING
(Ph.D., Ch.E., Cornell, 1982) • Thermodynamics and statistical mechanics; supercritical extraction

THEODORE T. TSOTSIS
(Ph.D., Ch.E., Illinois, Urbana, 1978) • Chemical reaction engineering; process dynamics and control

IAN A. WEBSTER
(D.Sc., Ch.E., M. I. T., 1984) *(Adjunct)* • Catalysis and reaction kinetics; transport phenomena, chemical reaction engineering; surface spectroscopy, biochemical engineering

YANIS C. YORTSOS
(Ph.D., Ch.E., Caltech, 1979) • Mathematical modeling of transport processes; flow and transport in porous media

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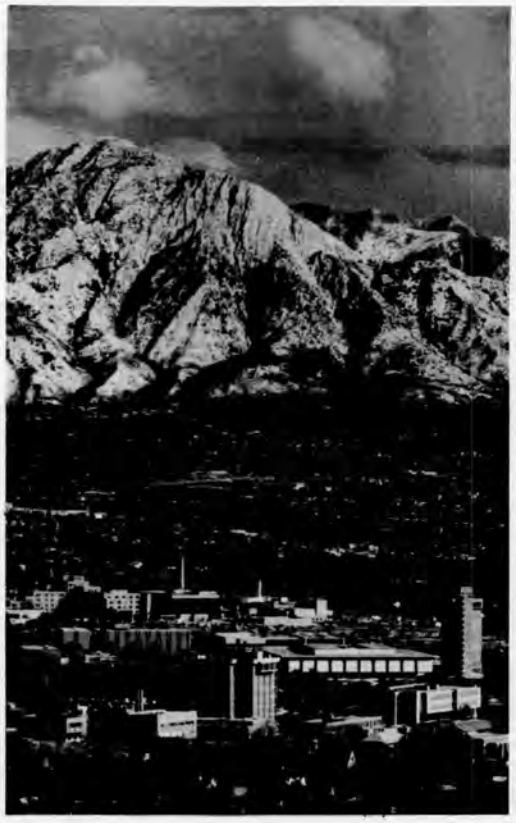

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We also wish to thank
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University of Southwestern Louisiana
Lafayette, LA 70504-4130

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This guide is offered to aid authors in preparing manuscripts for Chemical Engineering Education (CEE), a quarterly journal published by the Chemical Engineering Division of the American Society for Engineering Education (ASEE).

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