THE UNIVERSITY OF ARIZONA

TUCSON, AZ

The Chemical Engineering Department at the University of Arizona is young and dynamic with a fully accredited undergraduate degree program and M.S. and Ph.D. graduate programs. Financial support is available through government grants and contracts, teaching, and research assistantships, traineeships and industrial grants. The faculty assures full opportunity to study in all major areas of chemical engineering.

THE FACULTY AND THEIR RESEARCH INTERESTS ARE:

JOSEPH F. GROSS, Professor
Ph.D., Purdue University, 1956
Boundary Layer Theory, Pharmacokinetics, Fluid Mechanics and Mass Transfer in The Microcirculation, Biorheology

ALAN D. RANDOLPH, Professor
Ph.D., Iowa State University, 1962
Simulation and Design of Crystallization Processes, Nucleation Phenomena, Particulate Processes, Explosives Initiation Mechanisms

THOMAS R. REHM, Professor and Acting Head
Ph.D., University of Washington, 1960
Mass Transfer, Process Instrumentation, Packed Column Distillation, Applied Design

JOST O.L. WENDT, Professor
Ph.D., Johns Hopkins University, 1968
Combustion Generated Air Pollution, Nitrogen and Sulfur Oxide Abatement, Chemical Kinetics, Thermodynamics Interfacial Phenomena

DON H. WHITE, Professor
Ph.D., Iowa State University, 1949
Polymers Fundamentals and Processes, Solar Energy, Microbial and Enzymatic Processes

WILLIAM P. COSART, Assoc. Professor
Ph.D. Oregon State University, 1973
Transpiration Cooling, Heat Transfer in Biological Systems, Blood Processing

THOMAS W. PETERSON, Asst. Professor
Ph.D., California Institute of Technology, 1977
Atmospheric Modeling of Aerosol Pollutants, Long-Range Pollutant Transport, Particulate Growth Kinetics.

FARHANG SHADMAN, Asst. Professor
Ph.D., University of California-Berkeley, 1972
Reaction Engineering, Kinetics, Catalysis

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:

Dr. J. O. L. Wendt
Graduate Study Committee
Department of
Chemical Engineering
University of Arizona
Tucson, Arizona 85721

THE UNIVERSITY OF ALABAMA

GRADUATE PROGRAMS FOR M.S. AND PH.D. DEGREES IN CHEMICAL ENGINEERING

The University of Alabama, enrolling approximately 18,000 undergraduate and 5,000 graduate students per year, is located in Tuscaloosa, a town of some 70,000 population in West Central Alabama. Since the climate is warm, outdoor activities are possible most of the year.

The Department of Chemical and Metallurgical Engineering has an annual enrollment of approximately 200 undergraduate and 25 graduate students. For information concerning available graduate fellowships and assistantships, contact: Director of Graduate Studies, Department of Chemical and Metallurgical Engineering, P.O. Box G, University, AL 35486.

Faculty and Research Interests

G.C. APRIL, Ph.D. (Louisiana State): Biomass Conversion, Modeling, Transport Processes

D.W. ARNOLD, Ph.D. (Purdue): Thermodynamics, Physical Properties, Phase Equilibrium

J.H. BLACK, Ph.D. (Pittsburgh): Process Design, Cost Engineering, Economics

W.C. CLEMENTS, JR., Ph.D. (Vanderbilt): Process Dynamics and Control, Micro-computer Hardware

W.J. HATCHER, JR., Ph.D. (Louisiana State): Catalysis, Chemical Reactor Design, Reaction Kinetics

E.K. LANDIS, Ph.D. (Carnegie Institute of Technology): Metallurgical Processes, Solid-liquid Separations, Thermodynamics

M.D. McKINLEY, Ph.D. (Florida): Coal and Oil Shale, Mass Transfer, Separation Processes

L.Y. SADLER, III, Ph.D. (Alabama): Energy Conversion Processes, Rheology, Lignite Technology

Chemical Engineering at

UNIVERSITY OF ALBERTA

EDMONTON, CANADA

Faculty and Research Interests

I. G. Dalla Lana, Ph.D. (Minnesota): Kinetics, Heterogeneous Catalysis.

D. G. Fisher, Ph.D. (Michigan): Process Dynamics and Control, Real-Time Computer Applications, Process Design.

C. Kiparissides, Ph.D. (McMaster): Polymer Reactor Engineering, Optimization, Modelling, Stochastic Control.

D. Lynch, Ph.D. (Alberta): Kinetic Modelling, Numerical Methods, Computer Aided Design.

J. H. Masliyah, Ph.D. (British Columbia): Transport Phenomena, Numerical Analysis, In-Situ Recovery of Oil Sands.

A. E. Mather, Ph.D. (Michigan): Phase Equilibria, Fluid Properties at High Pressures, Thermodynamics.

W. Nader, Dr. Phil, (Vienna): Heat Transfer, Air Pollution, Transport Phenomena in Porous Media, Applied Mathematics.

F. D. Otto (Chairman), Ph.D. (Michigan): Mass Transfer, Gas-Liquid Reactions, Separation Processes, Environmental Engineering.

D. Quon, Sc.D. (MIT), Professor Emeritus: Energy Modelling and Economics, Linear Programming, Network Theory.

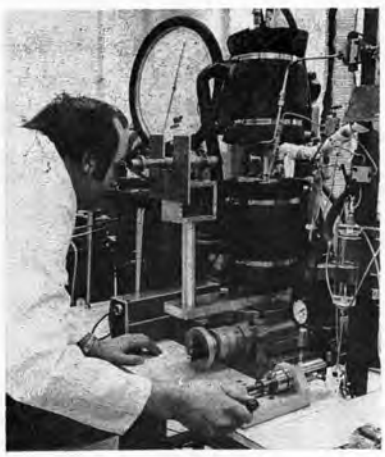
D. B. Robinson, Ph.D. (Michigan): Thermal and Volumetric Properties of Fluids. Phase Equilibria, Thermodynamics.

J. T. Ryan, Ph.D. (Missouri): Process Economics, Energy Economics and Supply.

S. L. Shah, Ph.D. (Alberta): Linear Systems Theory, Adaptive Control, Stability Theory, Stochastic Control.

S. E. Wanke, Ph.D. (California-Davis): Catalysis, Kinetics.

R. K. Wood, Ph.D. (Northwestern): Process Dynamics and Identification, Control of Distillation Columns, Modelling of Crushing and Grinding Circuits.



Graduate Study

U of A's Chemical Engineering graduate program offers exciting research opportunities to graduate students motivated towards advanced training and research. Graduate programs leading to the degrees of Master of Science, Master of Engineering and Doctor of Philosophy are offered. There are currently 13 full-time faculty members, a few visiting faculty, several post-doctoral research associates and 35 graduate students.

Financial Aid

Financial support is available to full-time graduate students in the form of fellowships, teaching assistantships and research assistantships.

The University of Alberta

U of A is one of Canada's largest Universities and engineering schools with total enrollment of over 25,000 students. The campus is located in the city of Edmonton and overlooks the scenic North Saskatchewan River Valley.

Edmonton is a cosmopolitan modern city of over 600,000 people. It enjoys a renowned resident professional theatre, symphony orchestra and professional football, hockey and soccer leagues. The famous Banff and Jasper National Parks in the Canadian Rocky Mountains are within easy driving distance.

Applications for additional information write to:

CHAIRMAN,
Department of Chemical Engineering
University of Alberta
Edmonton, Canada T6G 2G6

THE UNIVERSITY OF AKRON

Akron, OH 44325

DEPARTMENT OF CHEMICAL ENGINEERING

GRADUATE PROGRAM

FACULTY	RESEARCH INTERESTS
G. A. ATWOOD	Digital Control, Polymeric Diffusivities, Multicomponent Adsorption.
J. M. BERTY	Reactor Design.
L. G. FOCHT	Fixed Bed Adsorption, Design and Process Analysis.
H. L. GREENE	Biorheology, Kinetic Modeling, Contaminant Removal from Coal Gasification.
S. LEE	Coal Gasification, Kinetic Modeling, Digital Simulation.
J. P. LENCZYK	High Pressure Kinetics, Activity and Diffusion Coefficients via Ultracentrifuge.
R. W. ROBERTS	Atomization Processes, Fusion and Adhesion Characteristics of Polymer Powders.
R. F. SAVINELL	Electrochemical Phenomena.
M. S. WILLIS	Multiphase Theory, Filtration and Diffusion in Foamed Plastics.

Graduate assistant stipends for teaching and research start at $4,200. Industrially sponsored fellowships available up to $9,000. These awards include waiver of tuition and fees. Cooperative Graduate Education Program is also available. The deadline for assistantship application is March 1.

ADDITIONAL INFORMATION WRITE:

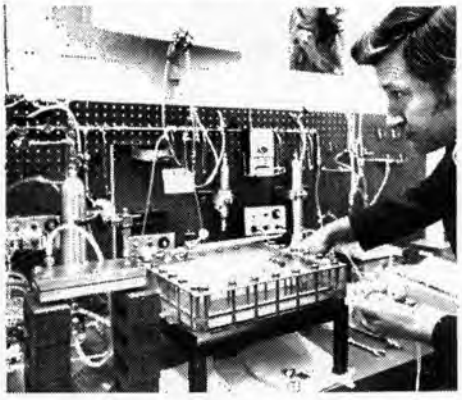
Dr. Howard L. Greene, Head
Department of Chemical Engineering
University of Akron
Akron, Ohio 44325

ARIZONA STATE UNIVERSITY

Graduate Programs

for M.S. and Ph.D. Degrees

in Chemical and Bio Engineering



Research Specializations Include:
ENERGY CONVERSION • ADSORPTION/SEPARATION • BIOMEDICAL ENGINEERING • TRANSPORT PHENOMENA • SURFACE PHENOMENA • REACTION ENGINEERING • ENVIRONMENTAL CONTROL • ENGINEERING DESIGN •

Our excellent facilities for research and teaching are complemented by a highly-respected faculty:

James R. Beckman, University of Arizona, 1976
Lynn Bellamy, Tulane University, 1966
Neil S. Berman, University of Texas, 1962
William J. Crowe, University of Florida, 1969 (Adjunct)
William J. Dorson, Jr., University of Cincinnati, 1967
Eric J. Guilbeau, Louisiana Tech University, 1971
James T. Kuester, Texas A&M University, 1970
Kim L. Nelson, University of Delaware, 1981
Castle O. Reiser, University of Wisconsin, 1945 (Emeritus)
Vernon E. Sater, Illinois Institute of Technology, 1963
Robert S. Torrest, University of Minnesota, 1967
Bruce C. Towe, Pennsylvania State University, 1978
Imre Zwiebel, Yale University, 1961

Fellowships and teaching and research assistantships are available to qualified applicants.

ASU is in Tempe, a city of 120,000, part of the greater Phoenix metropolitan area. More than 38,000 students are enrolled in ASU's ten colleges; 10,000 of whom are in graduate study. Arizona's year-round climate and scenic attractions add to ASU's own cultural and recreational facilities.

FOR INFORMATION, CONTACT:
Imre Zwiebel, Chairman,
Department of Chemical and Bio Engineering
Arizona State University, Tempe, AZ 85287

AUBURN UNIVERSITY

CHEMICAL ENGINEERING GRADUATE STUDIES

Graduate Degrees

The Department of Chemical Engineering at Auburn University offers graduate work leading to the M.S. and Ph.D. degrees in chemical engineering. The research emphasizes experimental and theoretical work in areas of current national interest. Modern research equipment is available for analytical, process and computational studies. Auburn University is an equal opportunity Institution.

Area Description

Auburn University, which has 18,000 students, is located in Alabama between Atlanta and Montgomery, Ala., with Columbus, the second largest city in Georgia, only 35 miles away. The local population is about 75,000. University-sponsored activities include a lecture series with nationally known speakers, a series of plays and artistic and cultural presentations of all kinds. Recreational opportunities include equipment at the University for participation in almost every sport.

Research Areas

COAL: Coal liquefaction, magnetic desulfurization and beneficiation, solvent refining.

BIOMASS: Chemical and enzymatic conversion of forest and agricultural waste to fuels, petrochemicals and animal feed.

FUNDAMENTALS: Kinetics, catalysis, enzymatic and fermentation reactors, high gradient magnetic separation, transport phenomena, solid-liquid separation, biomedical engineering.

ENVIRONMENTAL: Air and water pollution control processes.

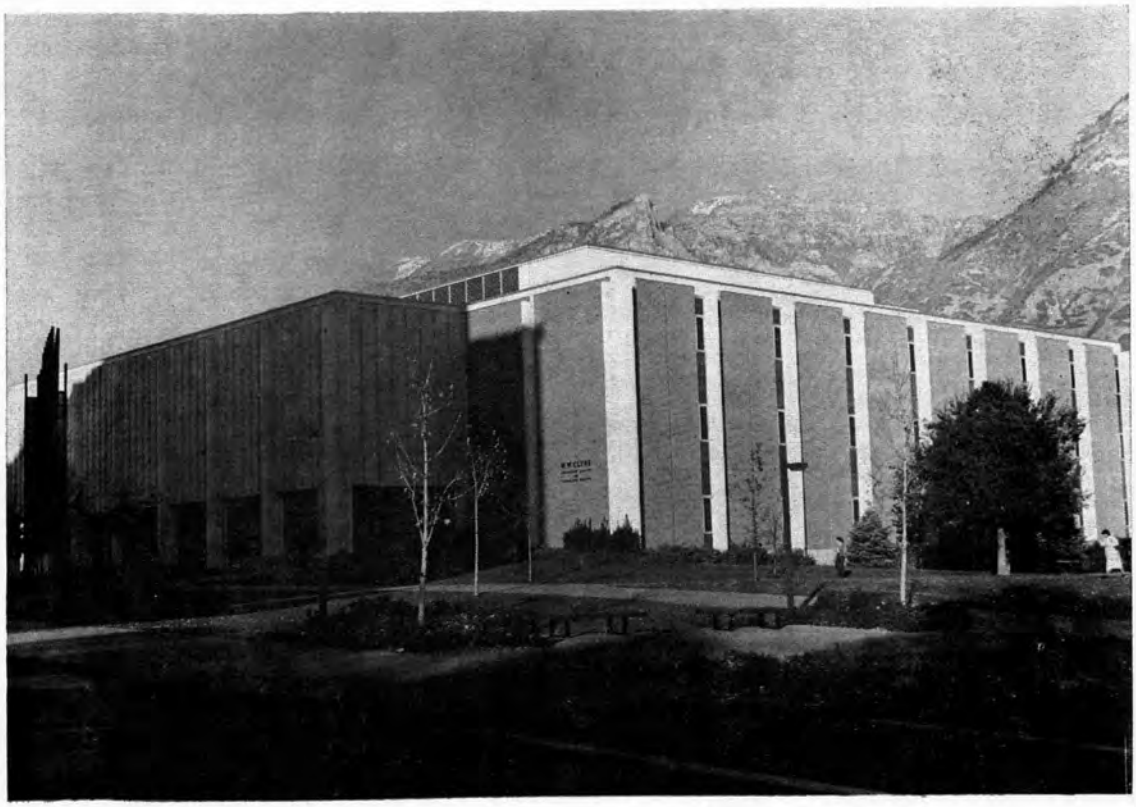
NEW TECHNOLOGY: Advanced coal conversion, novel enzymatic reactors, applications of high gradient magnetic separation, photography by immobilized enzymes, novel thickener design, polymeric replacement of textile size, enzymatic artificial liver.

PROCESS SYNTHESIS AND CONTROL: Design of optimal energy-integrated processes and control of interactive, multivariable, nonlinear processes.

For financial aid and admission application forms write:

Dr. R. P. Chambers, Head
Chemical Engineering
Auburn University, AL 36849

BRIGHAM YOUNG UNIVERSITY
PROVO, UTAH



- **Ph.D., M.S., & M.E.**
- **ChE. Masters for Chemists Program**
- **Research**

Biomedical Engineering	Combustion	Fossil Fuels Recovery
Catalysis	Electrochemical Engineering	High Pressure Chemistry
Coal Gasification	Fluid Mechanics	Thermochemistry & Calorimetry

- **Faculty**

D. H. Barker, (Ph.D., Utah, 1951)
C. H. Bartholomew, (Ph.D., Stanford, 1972)
M W. Beckstead, (Ph.D., Utah, 1965)
D. N. Bennion, (Ph.D., Berkeley, 1964)
B. S. Brewster, (Ph.D., Utah, 1979)
J J. Christensen, (Ph.D., Carnegie Inst. Tech, 1958)
J. M. Glassett, (M.S., MIT, 1948)
R. W. Hanks, (Ph.D., Utah, 1961)
W. C. Hecker, (Ph.D., U.C. Berkeley, 1981)
P O. Hedman, (Ph.D., BYU, 1973)
J. L. Oscarson, (Ph.D., Michigan, 1979)
P. J. Smith, (Ph.D., BYU, 1979)
L. D. Smoot, (Ph.D., Washington, 1960)
K. A. Solen, (Ph.D., Wisconsin, 1974)

- **Beautiful campus located in the rugged Rocky Mountains**
- **Financial aid available (We have lots of money.)**

Address Inquiries to: Brigham Young University, Dr. Richard W. Hanks, Chairman
Chemical Engineering Dept. 350 CB Provo, Utah 84602

The University of Calgary

Program of Study

The Department of Chemical Engineering provides unusual opportunities for research and study leading to the M.Eng., M.Sc. or Ph.D. degrees. This dynamic department offers a wide variety of course work and research in the following areas: Petroleum Reservoir Engineering, Environmental Engineering, Fluid Mechanics, Heat Transfer, Mass Transfer, Process Engineering, Rheology and Thermodynamics. The University operates on an eight-month academic year, thus allowing four full months per year for research.

The requirements for the M.Eng. and M.Sc. degrees are 4 to 8 courses with a B standing or better and the submission of a thesis on a research project.

The requirements for the Ph.D. degree are 6 to 10 courses and the submission of a thesis on an original research topic for those with a B.Sc. degree.

The M.Eng. program is a part-time program designed for those who are working in industry and would like to enhance their technical education. The M.Eng. thesis is usually of the design type and related to the industrial activity in which the student is engaged. Further details of this program are available from the Department Head, or the Chairman of the Graduate Studies Committee.

Research Facilities

The Department of Chemical Engineering occupies one wing of the Engineering Complex. The building was designed to accommodate the installation and operation of research equipment with a minimum of inconvenience to the researchers. The Department has at its disposal an EA1 690 hybrid computer and a TR48 analog computer an Interdata 7132 mini computer for data acquisition and control and numerous direct access terminals to the University's Honeywell level 68 DPS computing system. In addition, a well equipped Machine Shop and Chemical Analysis Laboratory are operated by the Department. Other major research facilities include a highly instrumented and versatile multiphase pipeline flow loop, an automated pilot plant unit based on the Girbotol Process for natural gas processing, an X-ray scanning unit for studying flow in porous media, a fully instrumented adiabatic combustion tube for research on the in-situ recovery of hydrocarbons from oil sands, a laser anemometer unit, and environmental research laboratories for air pollution, water pollution and oil spill studies.

Financial Aid

Fellowships and assistantships are available with remuneration of up to $15,000 per annum, with possible remission of fees. In addition, new students may be eligible for a travel allowance of up to a maximum of $300. If required, loans are available from the Federal and Provincial Governments to Canadian citizens and Landed Immigrants. There are also a number of bursaries, fellowships, and scholarships available on a competition basis to full-time graduate students. Faculty members may also provide financial support from their research grants to students electing to do research with them.

Cost of Study

The tuition fees for a full-time graduate student are $756 per year plus small incidental fees. Most full-time graduate students to date have had their tuition fees remitted.

Cost of Living

Housing for single students in University dormitories range from $259/mo. for a double room, to $320/mo. for a single room, including board. There are a number of new townhouses for married students available, ranging from $240/mo. for a 1-bedroom, to $300/mo. for a 2-bedroom and to $278/mo. for a 3-bedroom unit, including utilities, major appliances and parking. Numerous apartments and private housing are within easy access of the University. Food and clothing costs are comparable with those found in other major North American urban centres.

Student Body

The University is a cosmopolitan community attracting students from all parts of the globe. The current enrollment is about 11,000 with approximately 1,280 graduate students. Most full-time graduate students are currently receiving financial assistance either from internal or external sources.

The Community

The University is a cosmopolitan community attracting students from all parts of the globe. The current enrollment is about 13,000 with ap- the Old West with the sophistication of a modern, dynamic urban centre. Beautiful Banff National Park is 60 miles from the city and the ski resorts of the Banff and Lake Louise areas are readily accessible. Jasper National Park is only five hours away by car via one of the most scenic highways in the Canadian Rockies. A wide variety of cultural and recreational facilities are available both on campus and in the community at large. Calgary is the business centre of the petroleum industry in Canada and as such has one of the highest concentrations of engineering activity in the country.

The University

The University operated from 1945 until 1966 as an integral part of the University of Alberta. The present campus situated in the rolling hills of northwest Calgary, was established in 1960, and in 1966 The University of Calgary was chartered as an autonomous institution by the Province of Alberta. At present the University consists of 14 faculties. Off-campus institutions associated with The University of Calgary include the Banff School of Fine Arts and Centre of Continuing Education located in Banff, Alberta, and the Kananaskis Environmental Research Station located in the beautiful Bow Forest Reserve.

Applying

The Chairman, Graduate Studies Committee
Department of Chemical and Petroleum Engineering
The University of Calgary
Calgary, Alberta T2N 1N4
Canada

UNIVERSITY OF CALIFORNIA

BERKELEY, CALIFORNIA

RESEARCH

ENERGY UTILIZATION

ENVIRONMENTAL PROTECTION

KINETICS AND CATALYSIS

THERMODYNAMICS

POLYMER TECHNOLOGY

ELECTROCHEMICAL ENGINEERING

PROCESS DESIGN AND DEVELOPMENT

SURFACE AND COLLOID SCIENCE

BIOCHEMICAL ENGINEERING

MATERIALS ENGINEERING

FLUID MECHANICS AND RHEOLOGY

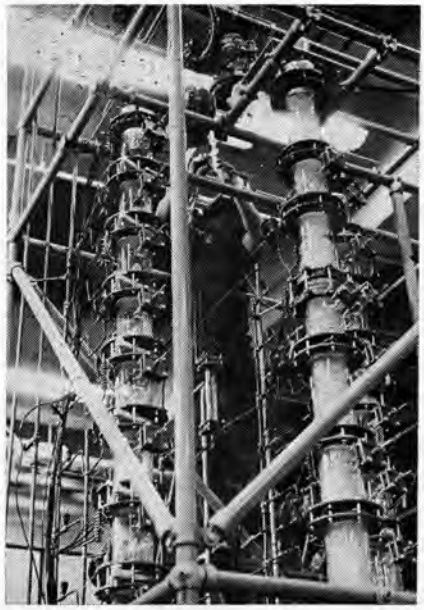
FACULTY

Alexis T. Bell (Chairman)
Harvey W. Blanch
Elton J. Cairns
Morton M. Denn
Alan S. Foss
Simon L. Goren
Edward A. Grens
Donald N. Hanson
Dennis W. Hess
C. Judson King
Scott Lynn
David N. Lyon
John S. Newman
Eugene E. Petersen
John M. Prausnitz
Clayton J. Radke
Edward K. Reiff, Jr
David S. Soong
Charles W. Tobias
Theodore Vermuelen
Charles R. Wilke
Michael C. Williams

FOR APPLICATIONS AND FURTHER INFORMATION, WRITE:

Department of Chemical Engineering
UNIVERSITY OF CALIFORNIA
Berkeley, California 94720

UNIVERSITY OF CALIFORNIA
DAVIS



Course Areas

Applied Kinetics and Reactor Design
Applied Mathematics
Biomedical, Biochemical Engineering
Catalysis
Fluid Mechanics
Heat Transfer
Mass Transfer
Process Dynamics
Separation Processes
Thermodynamics
Transport Processes in Porous Media

Faculty

RICHARD L. BELL, University of Washington
Mass Transfer, Biomedical Applications
RUBEN G. CARBONELL, Princeton University
Enzyme Kinetics, Applied Kinetics, Quantum Statistical Mechanics, Transport Processes in Porous Media
ALAN P. JACKMAN, University of Minnesota
Environmental Engineering, Transport Phenomena
BEN J. McCOY, University of Minnesota
Separation and Transport Processes
DAVID F. OLLIS, Stanford University
Catalysis, Biochemical Engineering
JOE M. SMITH, Massachusetts Institute of Technology
Applied Kinetics and Reactor Design
PIETER STROEVE, Massachusetts Institute of Technology
Mass Transfer, Colloids
STEPHEN WHITAKER, University of Delaware
Fluid Mechanics, Interfacial Phenomena, Transport Processes in Porous Media

Degrees Offered

Master of Science
Doctor of Philosophy

Program

UC Davis, with 17,500 students, is one of the major campuses of the University of California system and has developed great strength in many areas of the biological and physical sciences. The Department of Chemical Engineering emphasizes research and a program of fundamental graduate courses in a wide variety of fields of interest to chemical engineers. In addition, the department can draw upon the expertise of faculty in other areas in order to design individual programs to meet the specific interests and needs of a student, even at the M.S. level. This is done routinely in the areas of environmental engineering, food engineering, biochemical engineering and biomedical engineering.

Excellent laboratories, computation center and electronic and mechanical shop facilities are available. Fellowships, Teaching Assistantships and Research Assistantships (all providing additional summer support if desired) are available to qualified applicants.

Davis and Vicinity

The campus is a 20-minute drive from Sacramento and just over an hour away from the San Francisco Bay area. Outdoor sports enthusiasts can enjoy water sports at nearby Lake Berryessa, skiing and other alpine activities in the Sierra (2 hours from Davis). These recreational opportunities combine with the friendly informal spirit of the Davis campus to make it a pleasant place in which to live and study.

Married student housing, at reasonable cost, is located on campus. Both furnished and unfurnished one- and two-bedroom apartments are available. The town of Davis (population 36,000) is adjacent to the campus, and within easy walking or cycling distance.

For further details on graduate study at Davis, please write to:

Chemical Engineering Department
University of California
Davis, California 95616
or call (916) 752-0400

CHEMICAL ENGINEERING

UNIVERSITY OF CALIFORNIA LOS ANGELES

PROGRAMS

UCLA's Chemical Engineering Department maintains academic excellence in its graduate programs by offering diversity in both curriculum and research opportunities. The department's continual growth is demonstrated by the newly established Institute for Medical Engineering and the National Center for Intermedia Transport Research, adding to the already wide spectrum of research activities.

Fellowships are available for outstanding applicants. A fellowship includes a waiver of tuition and fees plus a stipend.

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

CONTACT

Admissions Officer
Chemical Engineering
5405 Boelter Hall
UCLA
Los Angeles, CA 90024

FACULTY

D. N. Bennion
Yoram Cohen
S. M. Dinh
S. Fathi-Afshar
T. H. K. Frederking
S. K. Friedlander
E. L. Knuth
J. W. McCutchan
Ken Nobe
L. B. Robinson
O. I. Smith
W. D. Van Vorst
V. L. Vilker
F. E. Yates
M. M. Baizer

RESEARCH AREAS

Thermodynamics and Cryogenics
Reverse Osmosis and Membrane Transport
Process Design and Systems Analysis
Polymer Processing and Rheology
Mass Transfer and Fluid Mechanics
Kinetics, Combustion and Catalysis
Electrochemistry and Corrosion
Biochemical and Biomedical Engineering
Aerosol and Environmental Engineering

UNIVERSITY OF CALIFORNIA
SANTA BARBARA

FACULTY AND RESEARCH INTERESTS

SANJOY BANERJEE
Ph.D. (Waterloo)
Two Phase Flow, Reactor Safety, Nuclear Fuel Cycle Analysis and Wastes

H. CHIA CHANG Ph.D. (Princeton)
Chemical Reactor Modeling, Applied Mathematics

HENRI FENECH Ph.D. (M.I.T.)
Nuclear Systems Design and Safety, Nuclear Fuel Cycles, Two-Phase Flow, Heat Transfer.

HUSAM GUROL Ph.D. (Michigan)
Statistical Mechanics, Polymers, Radiation Damage to Materials, Nuclear Reactor Theory.

OWEN T. HANNA Ph.D. (Purdue)
(Chairman)
Theoretical Methods, Chemical Reactor Analysis, Transport Phenomena.

GLENN E. LUCAS Ph.D. (M.I.T.)
Radiation Damage, Mechanics of Materials.

DUNCAN A. MELLICHAMP
Ph.D. (Purdue)
Computer Control, Process Dynamics, Real-Time Computing.

JOHN E. MYERS
Ph.D. (Michigan)
(Dean of Engineering)
Boiling Heat Transfer.

G. ROBERT ODETTE
Ph.D. (M.I.T.)
(Vice Chairman, Nuclear Engineering)
Radiation Effects in Solids, Energy Related Materials Development.

A. EDWARD PROFIO
Ph.D. (M.I.T.)
Bionuclear Engineering, Fusion Reactors, Radiation Transport Analyses.

ROBERT G. RINKER
Ph.D. (Caltech)
Chemical Reactor Design, Catalysis, Energy Conversion, Air Pollution.

ORVILLE C. SANDALL
Ph.D. (Berkeley)
Transport Phenomena, Separation Processes.

DALE E. SEBORG
Ph.D. (Princeton)
Process Control, Computer Control, Process Identification.

PROGRAMS AND FINANCIAL SUPPORT

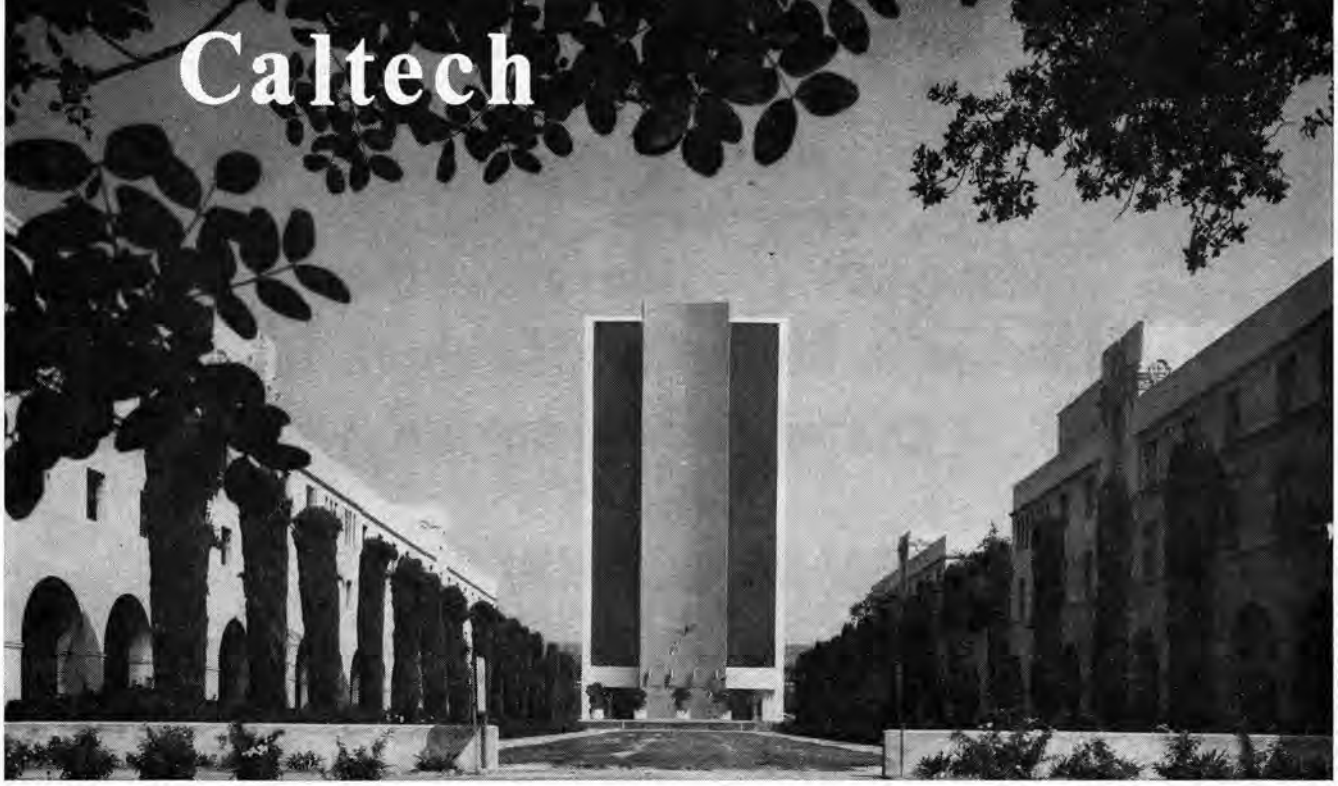
The Department offers M.S. and Ph.D. degree programs. Financial aid, including fellowships, teaching assistantships, and research assistantships, is available. Some awards provide limited moving expenses.

THE UNIVERSITY

One of the world's few seashore campuses, UCSB is located on the Pacific Coast 100 miles northwest of Los Angeles and 330 miles south of San Francisco. The student enrollment is over 14,000. 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:

Professor Owen T. Hanna, Chairman
Department of Chemical & Nuclear Engineering
University of California,
Santa Barbara, CA 93106



PROGRAM OF STUDY Distinctive features of study in chemical engineering at the California Institute of Technology are the creative research atmosphere and the strong emphasis on basic chemical, physical, and mathematical disciplines in the program of study. In this way a student can properly prepare for a productive career of research, development, or teaching in a rapidly changing and expanding tchnological society.

A course of study is selected in consultation with one or more of the faculty listed below. Required courses are minimal. The Master of Science degree is normally completed in one academic year and a thesis is not required. A special M.S. option, involving either research or an integrated design project, is a feature to the overall program of graduate study. The Ph.D. degree requires a minimum of three years subsequent to the B.S. degree, consisting of thesis research and further advanced study.

FINANCIAL ASSISTANCE Graduate students are supported by fellowship, research assistantship, or teaching assistantship appointments during both the academic year and the summer months. A student may carry a full load of graduate study and research in addition to any assigned assistantship duties. The Institute gives consideration for admission and financial assistance to all qualified applicants regardless of race, religion, or sex.

APPLICATIONS Further information and an application form may be obtained by writing

Professor L. G. Leal
Chemical Engineering
California Institute of Technology
Pasadena, California 91125

It is advisable to submit applications before February 15, 1982.

FACULTY IN CHEMICAL ENGINEERING

JAMES E. BAILEY, Professor
Ph.D. (1969), Rice University
Biochemical engineering; chemical reaction engineering.

WILLIAM H. CORCORAN, Institute Professor
Ph.D. (1948), California Institute of Technology
Kinetics and catalysis; biomedical engineering; air and water quality.

GEORGE R. GAVALAS, Professor
Ph.D. (1964), University of Minnesota
Applied kinetics and catalysis; process control and optimization; coal gasification.

ERIC HERBOLZHEIMER, Assistant Professor
Ph.D. (1979), Stanford University
Fluid mechanics and transport phenomena

L. GARY LEAL, Professor
Ph.D. (1969), Stanford University
Theoretical and experimental fluid mechanics; heat and mass transfer; suspension rheology; mechanics of non-Newtonian fluids.

JOHN H. SEINFELD, Louis E. Nohl Professor, Executive Officer
Ph.D. (1967), Princeton University
Air pollution; control and estimation theory.

FRED H. SHAIR, Professor
Ph.D. (1963), University of California, Berkeley
Plasma chemistry and physics; tracer studies of various environmental problems.

GREGORY N. STEPHANOPOULOS, Assistant Professor Ph.D. (1978), University of Minnesota
Biochemical engineering; chemical reaction engineering.

NICHOLAS W. TSCHOEGL, Professor
Ph.D. (1958), University of New South Wales
Mechanical properties of polymeric materials; theory of viscoelastic behavior; structure-property relations in polymers.

W. HENRY WEINBERG, Chevron Professor
Ph.D. (1970), University of California, Berkeley
Surface chemistry and catalysis.

THE FINEST CHOICE

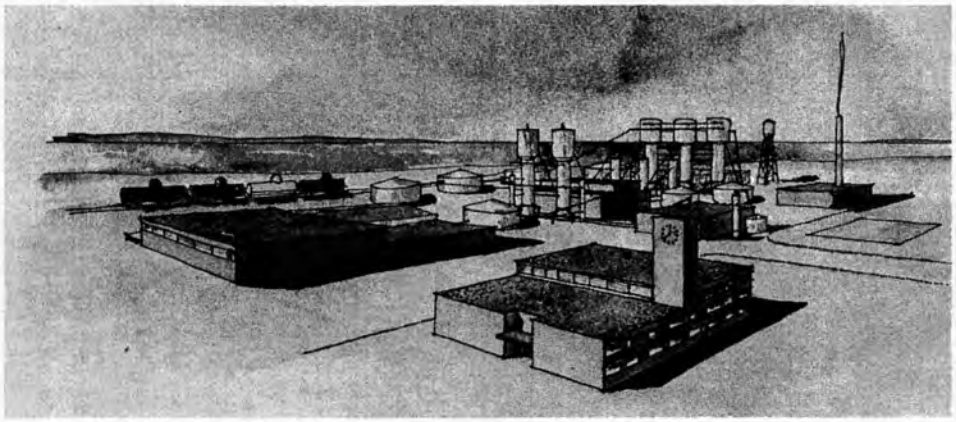
write

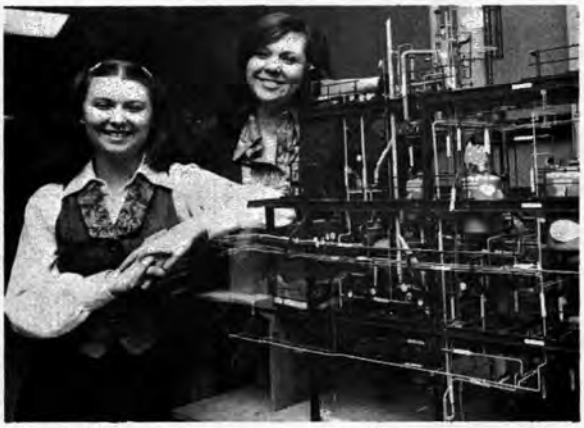
Graduate Chemical Engineering
Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213

The UNIVERSITY OF CINCINNATI

GRADUATE STUDY in Chemical Engineering

M.S. and Ph.D. Degrees





Research

Air Pollution Control
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Biomedical Engineering
Electrochemical Engineering
Energy Utilization
Environmental Engineering
Heat Transfer
Kinetics & Catalysis
Polymers & Rheology
Process Dynamics & Control

Faculty

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Kenneth M. Emmerich
Joel R. Fried
Rakish Govind
David B. Greenberg
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Joel Weisman

For Admission Information
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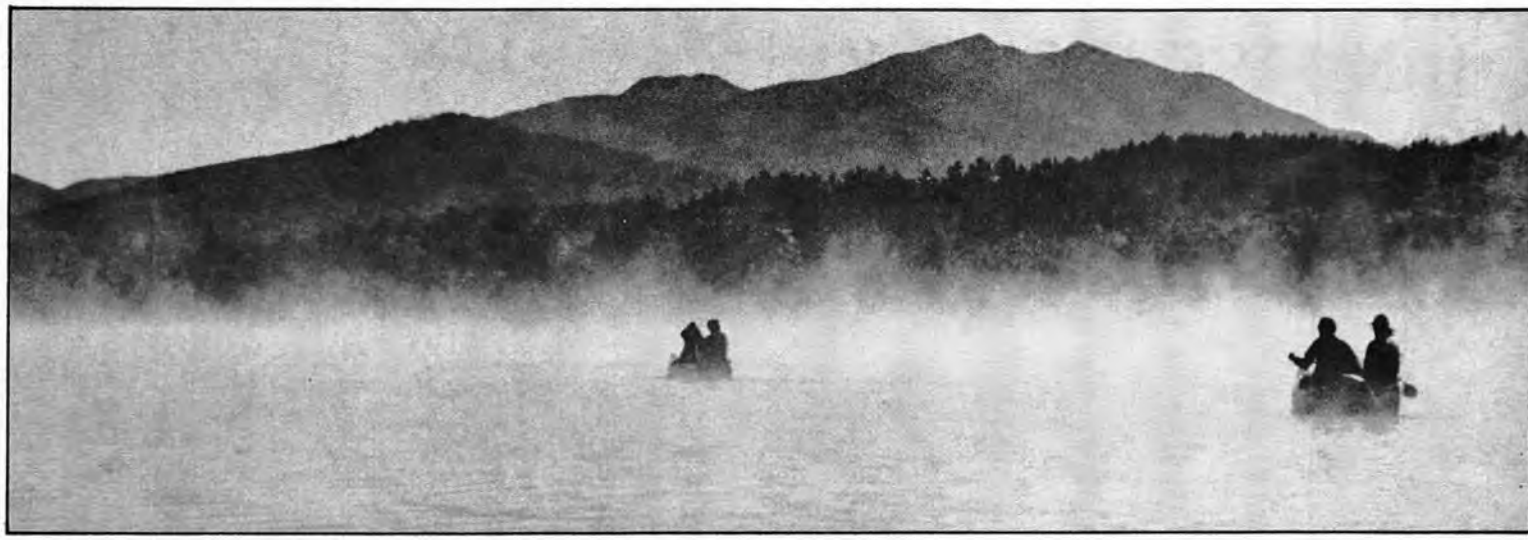
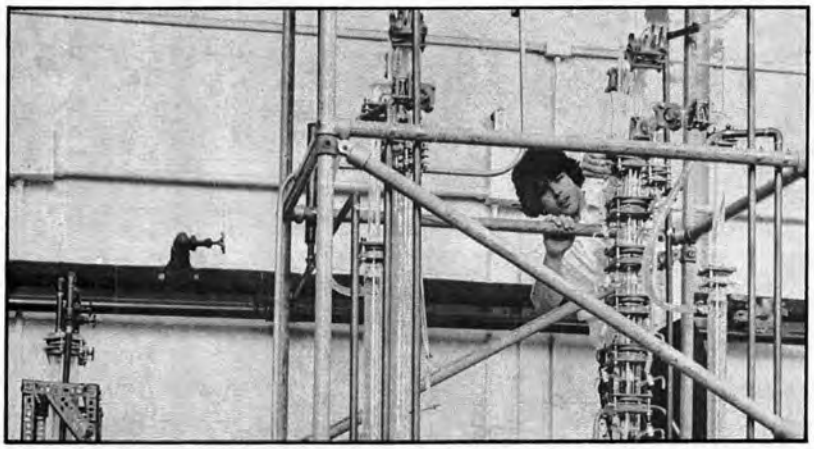
University of Cincinnati
Cincinnati, Ohio 45221





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Richard J. McCluskey	Thomas J. Ward
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Richard J. Nunge	William R. Wilcox
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Financial aid in the form of fellowships, research assistantships and teaching assistantships is available. For more details, please write to:

Dean of the Graduate School
Clarkson College of Technology
Potsdam, New York 13676

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P. F. Dickson, Professor and Head; Ph.D., University of Minnesota. Oil-shale, shale oil processing, petrochemical production from shale oil, heat transfer, heat exchanger design.

J. H. Gary, Professor; Ph.D., University of Florida. Upgrading of shale oil and coal liquids, petroleum refinery processing operations, heavy oil processing.

A. J. Kidnay, Professor; D.Sc., Colorado School of Mines. Thermodynamic properties of coal-derived liquids, vapor-liquid equilibria in natural gas systems, cryogenic engineering.

R. M. Baldwin, Associate Professor, Ph.D., Colorado School of Mines. Coal liquefaction by direct hydrogenation, mechanisms of coal liquefaction, kinetics of coal hydrogenation, relation of coal geochemistry to liquefaction kinetics, upgrading of coal-derived asphaltenes.

M. S. Graboski, Associate Professor; Ph.D., Pennsylvania State University. Coal and biomass gasification processes, gasification kinetics, thermal conductivity of coal liquids, kinetics of SNG upgrading.

M. C. Jones, Associate Professor; Ph.D., University of California at Berkeley. Heat transfer and fluid mechanics in oil shale retorting, radiative heat transfer in porous media, free convection in porous media.

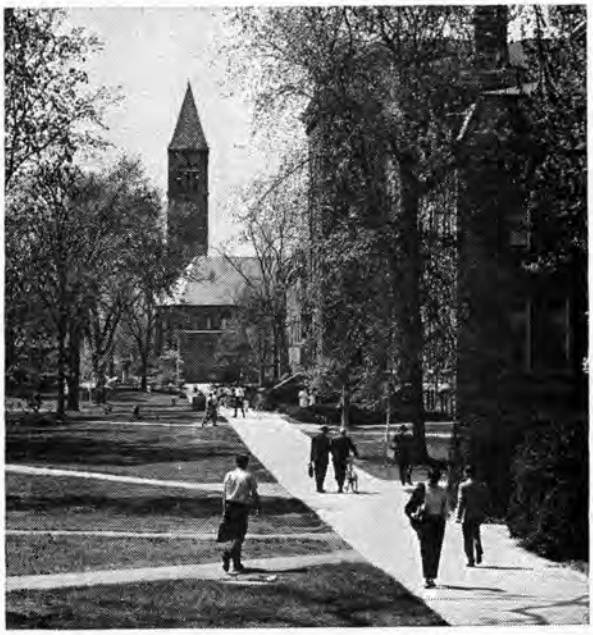
E. D. Sloan, Jr., Associate Professor; Ph.D., Clemson University. Phase equilibrium thermodynamics measurements of natural gas fluids and natural gas hydrates, thermal conductivity measurements for coal derived fluids, adsorption equilibria measurements, stagewise processes, education methods research.

V. F. Yesavage, Associate Professor; Ph.D., University of Michigan. Kinetic studies of shale oil, phase behavior and enthalpy of synthetic fuels.

A. L. Bunge, Assistant Professor; Ph.D., University of California at Berkeley. Enhanced oil recovery.

For Applications and Further Information On M.S., and Ph.D. Programs, Write

Chemical and Petroleum Refining Engineering
Colorado School of Mines
Golden, CO 80401



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Chemical Reaction Engineering, Kinetics and Simulation
Catalytic Science and Technology
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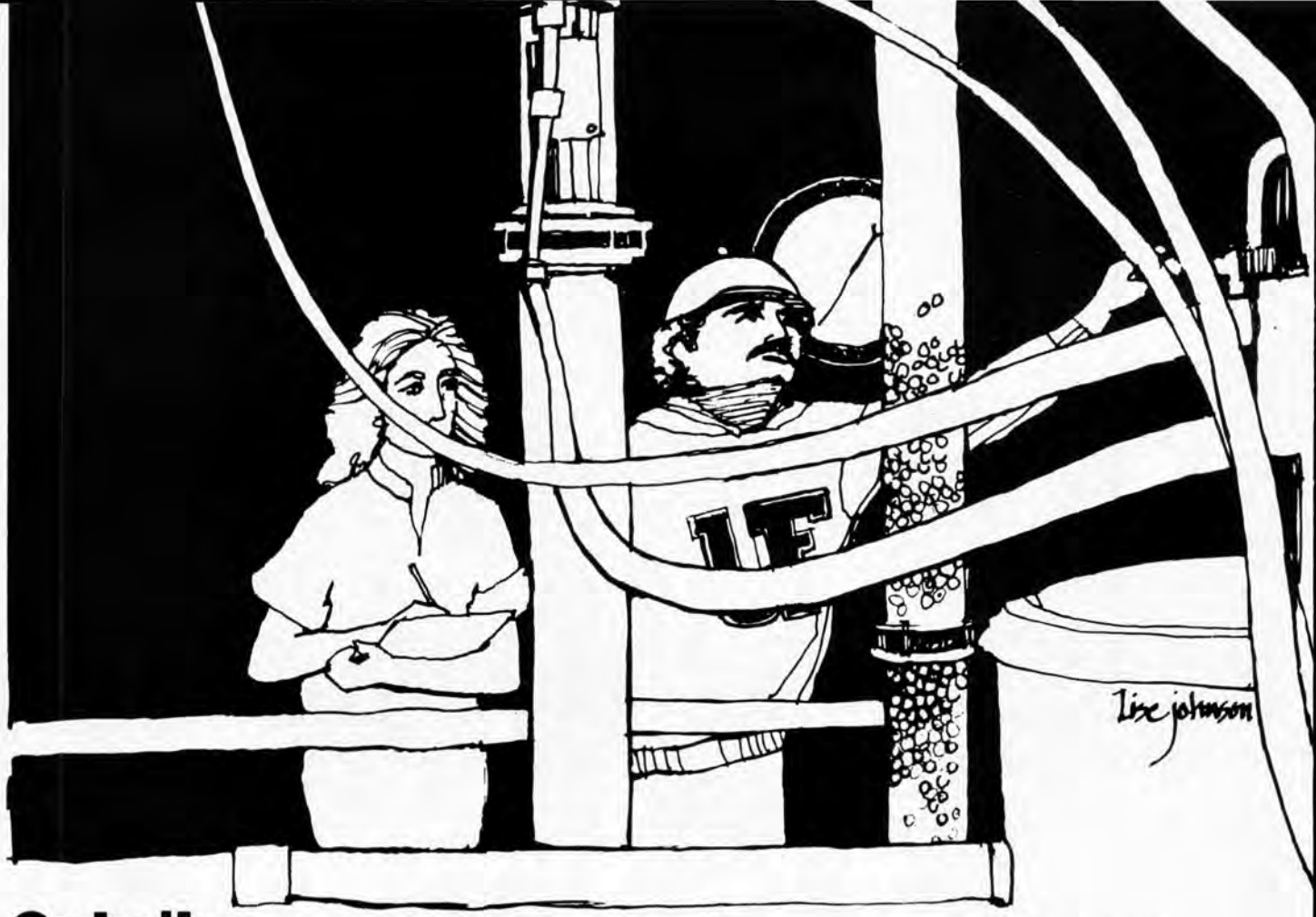
Department of Chemical Engineering
University of Delaware
Newark, Delaware 19711



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Mass Transfer
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Gainesville, FL 32611
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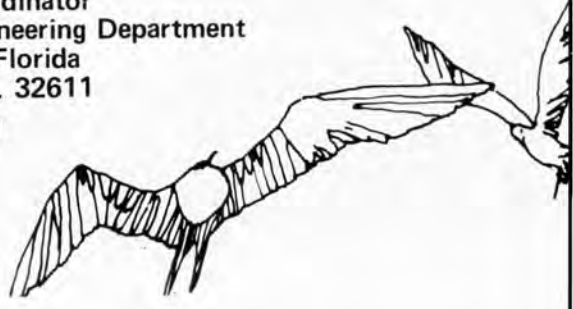

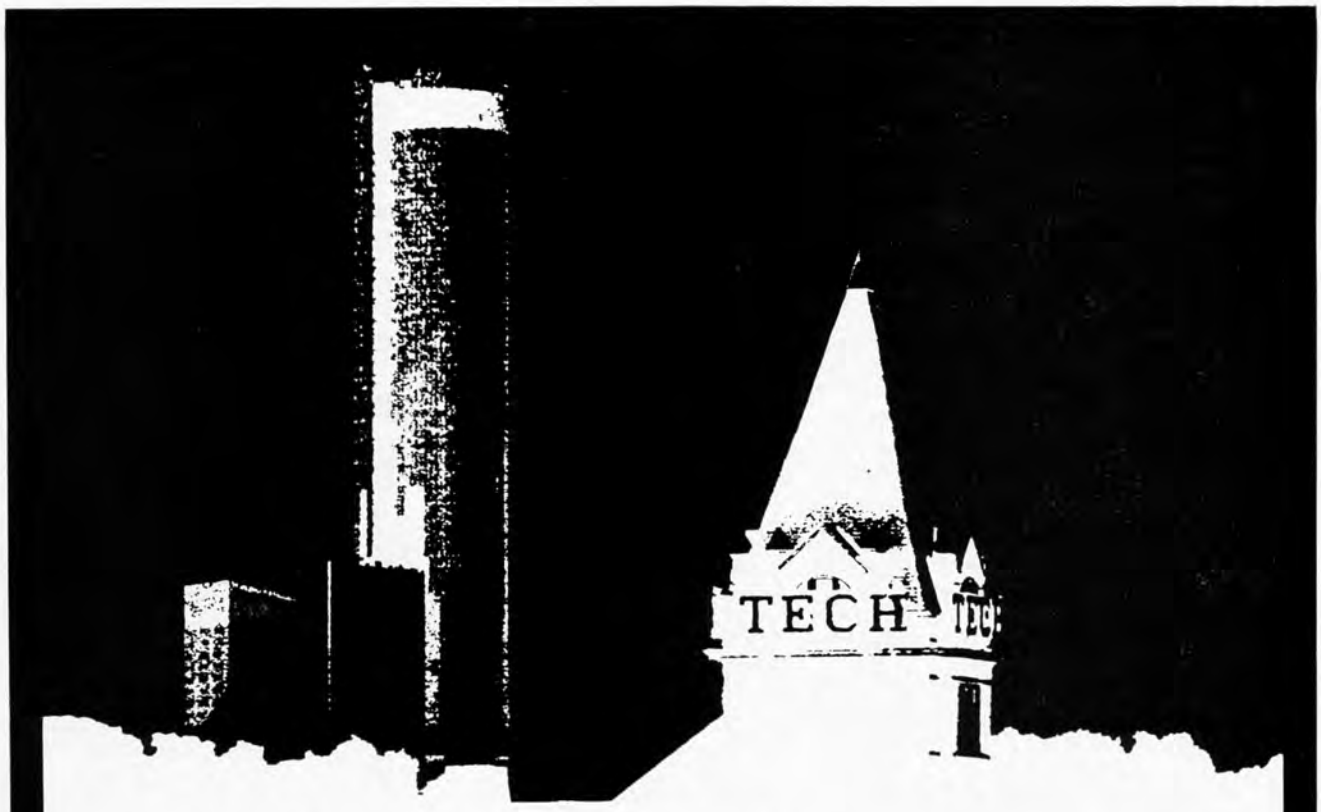

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For more information write:

Dr. Gary W. Poehlein
School of Chemical Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332

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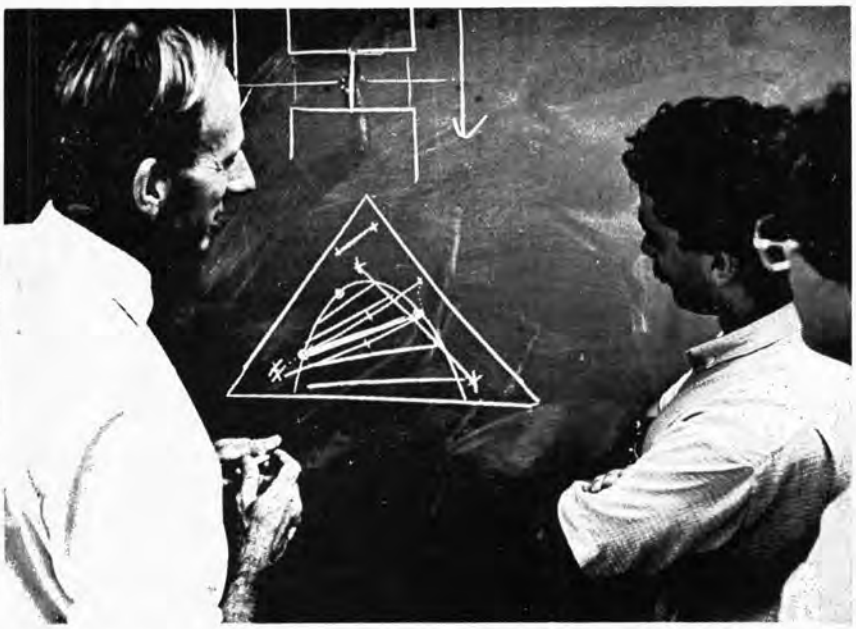

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F. M. Tiller
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Director, Graduate Admissions
Department of Chemical Engineering
University of Houston
4800 Calhoun
Houston, Texas 77004
(Phone 713/749-4407)

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Ph.D., University of Wisconsin, 1964
Professor and Head of the Department

Slurry transport, suspension and complex fluid flow and heat transfer, porous media processes, mathematical analysis and approximation.

Francisco J. Brana-Mulero
Ph.D., University of Wisconsin, 1980
Assistant Professor

Fluid mechanics, combustion, turbulence, chemically reacting flows

Paul M. Chung
Ph.D., University of Minnesota, 1957
Professor and Dean of the College of Engineering

Interfacial Phenomena, multiphase flows, flow through porous media, suspension rheology

T. S. Jiang
Ph.D. Northwestern University, 1981
Assistant Professor

Kinetics of gas reactions, energy transfer processes, molecular lasers

John H. Kiefer
Ph.D., Cornell University, 1961
Professor

Thermodynamics and statistical mechanics of fluids, solids, and solutions, kinetics of liquid reactions, solar energy

G. Ali Mansoori
Ph.D., University of Oklahoma, 1969
Professor

Process synthesis, operations research, optimal process control, optimization of large systems, numerical analysis, theory of nonlinear equations.

Sohail Murad
Ph.D., Cornell University, 1979
Assistant Professor

Thermodynamics and transport properties of fluids, computer simulation and statistical mechanics of liquids and liquid mixtures

Satish C. Saxena
Ph.D., Calcutta University, 1956
Professor

Transport properties of fluids and solids, heat and mass transfer, isotope separation, fixed and fluidized bed combustion

Stephen Szepe
Ph.D., Illinois Institute of Technology, 1966
Associate Professor

Catalysis, chemical reaction engineering, energy transmission, modeling and optimization

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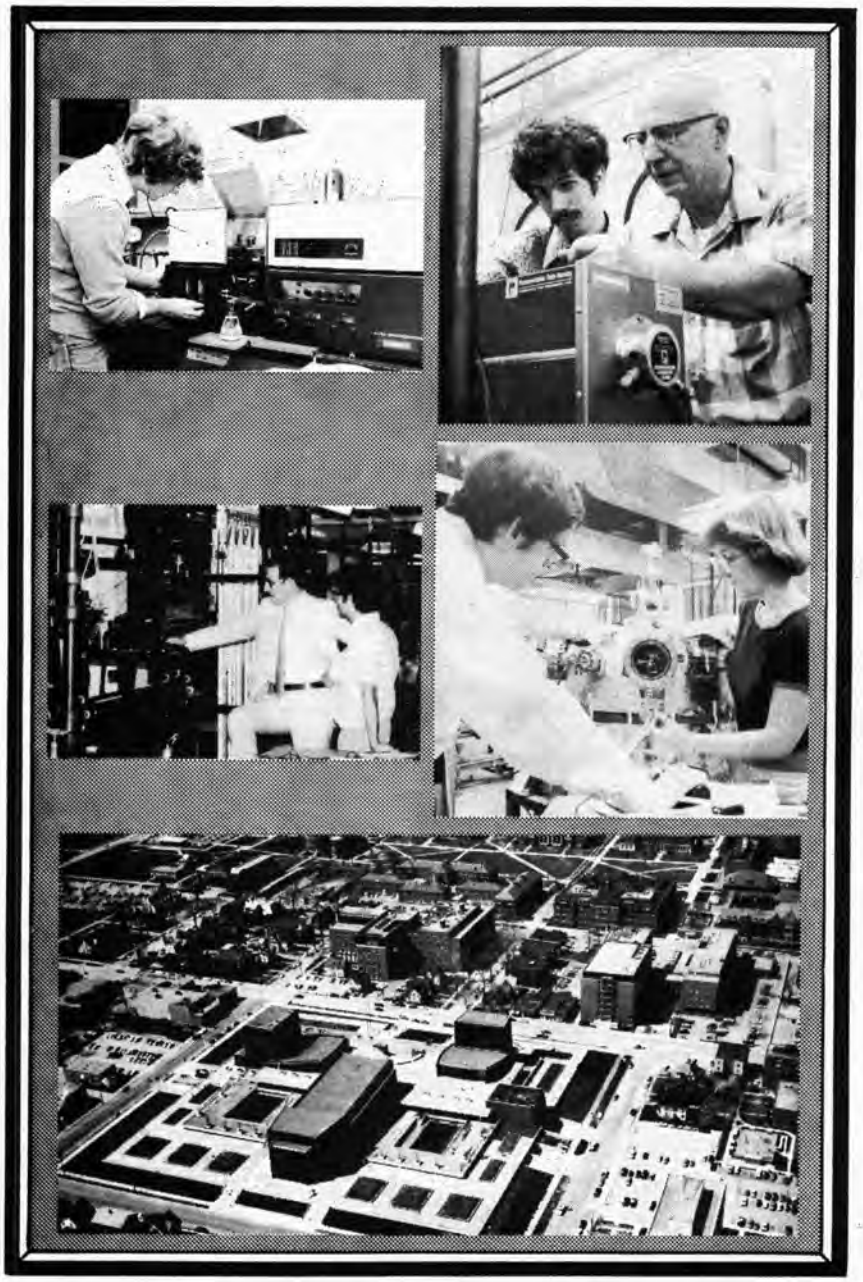
Professor G. Ali Mansoori, Chairman
The Graduate Committee
Department of Energy Engineering
University of Illinois at Chicago Circle
Box 4348, Chicago, Illinois 60680



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Department of Chemical Engineering
113 Roger Adams Laboratory
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Urbana, Illinois 61801-3791

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Harry G. Drickamer, Professor
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Fluid Mechanics, Applied Mathematics

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Assistant Professor
Chemical Kinetics

Richard I. Masel,
Assistant Professor
Catalysis, Surface Science

Anthony J. McHugh,
Associate Professor
Polymer Crystallization, Transport of Particles

Joseph A. Shaeiwitz,
Assistant Professor
Mass Transfer, Interfacial and Collodial Phenomena

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D. T. WASAN	*Mass Transfer and Surface and Colloid Phenomena*
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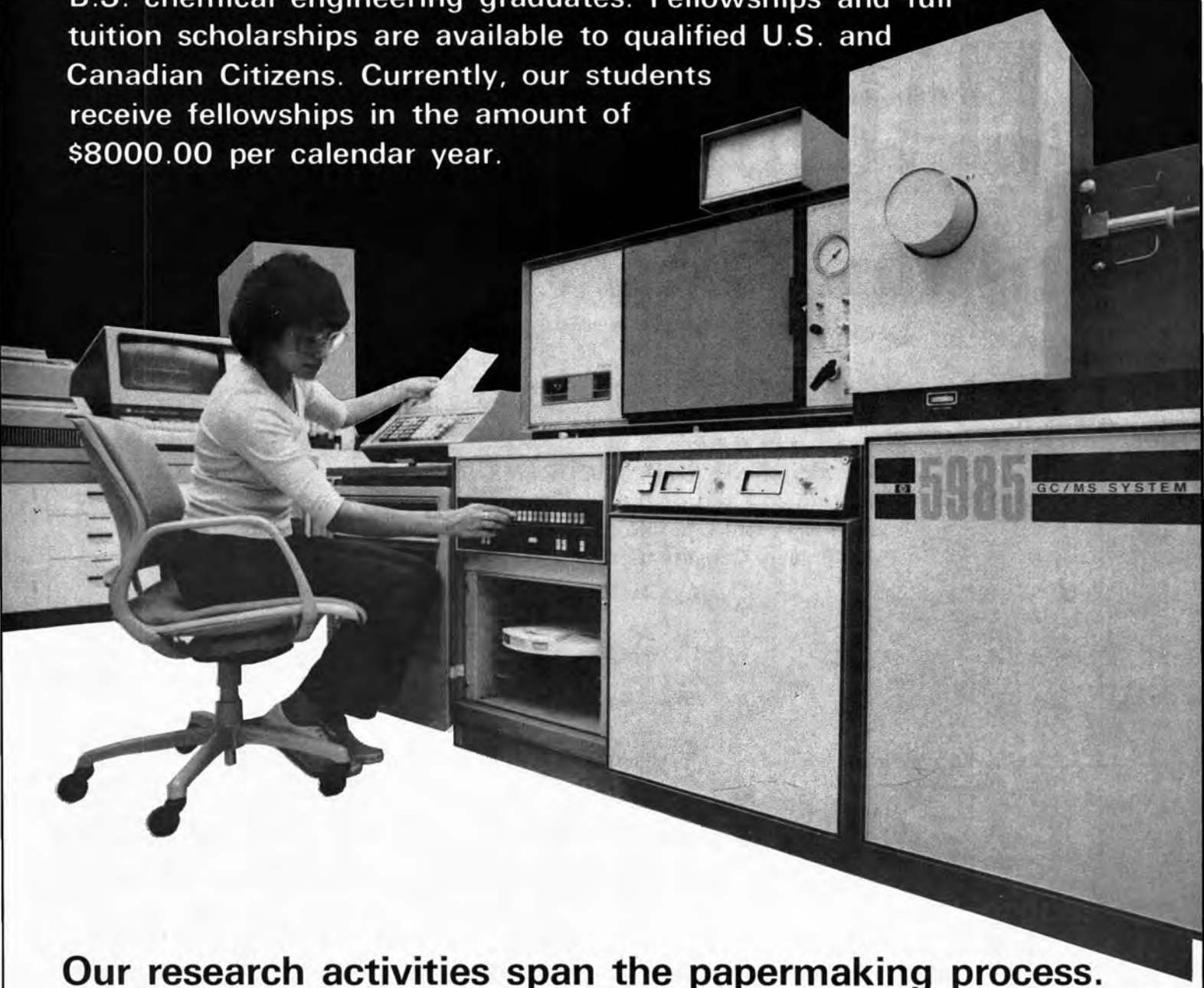

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Charles E. Glatz

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(Enzyme Technology)

Charles E. Glatz
Peter J. Reilly

Polymerization Processes

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Crystallization Kinetics

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Lawrence E. Burkhart
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Catalysis

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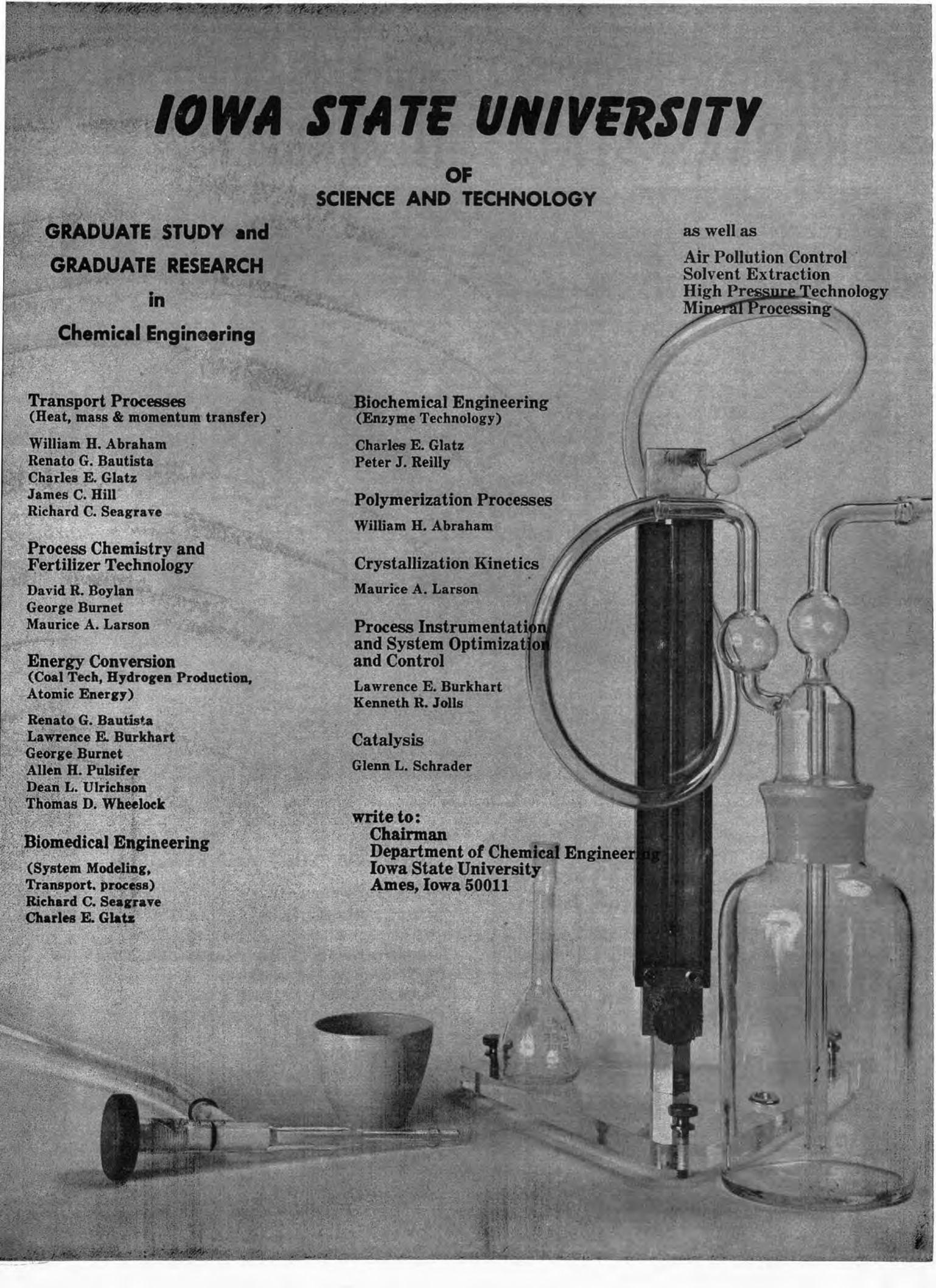
Chairman
Department of Chemical Engineering
Iowa State University
Ames, Iowa 50011



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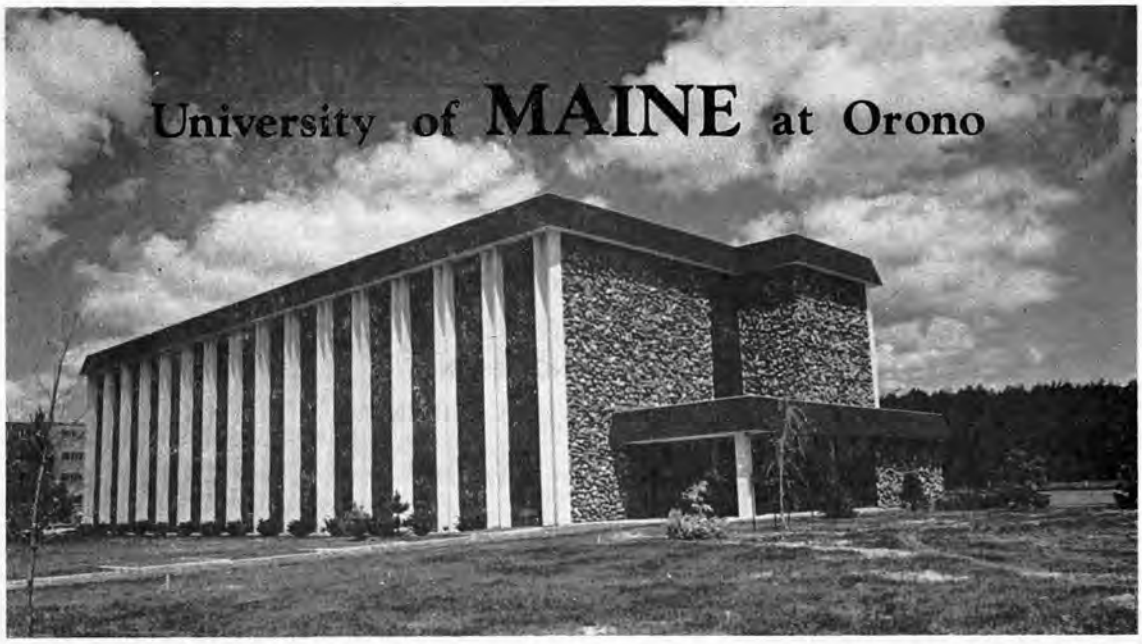

Department of

CHEMICAL ENGINEERING

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- Polymer processing

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115 Jenness Hall
University of Maine
Orono, ME 04469

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The Chemical Engineering Department at the University of Massachusetts offers graduate programs leading to M.S. and Ph.D. degrees in Chemical Engineering. Active research areas include polymer engineering, catalysis, design, and basic engineering sciences. Close coordination characterizes research in polymers which can be conducted in either the Chemical Engineering Department or our prestigious Polymer Science and Engineering Department. Financial aid in the form of research assistantships and teaching assistantships is available. Course of study and area of research are selected in consultation with one or more of the faculty listed below.

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J. M. DOUGLAS
Process design and control, Reactor engineering

J. W. ELDRIDGE
Kinetics, Catalysis, Phase equilibria

V. HANSEL
Catalysis, Kinetics

R. S. KIRK
Kinetics, Ebullient bed reactors

J. R. KITTRELL
Kinetics and catalysis, Catalyst deactivation

R. L. LAURENCE*
Polymerization reactors, Fluid mechanics

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Polymer synthesis, Kinetics of polymerization

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Rheology, Polymer processing, Design

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Enhanced oil recovery, Two-phase flows, Fluid mechanics

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Mixing, Fluid mechanics, Polymer engineering

M. VANPEE
Combustion, Spectroscopy

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Polymer rheology and processing, Heat transfer

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Polymer composites, Mechanical properties, Elastomers

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Polymer synthesis, catalysis, polymer modification

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Polymer spectroscopy, Polymer structure analysis

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Polymer transitions, Polymer blends, Conducting polymers

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Viscoelastic and mechanical properties of polymers

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I. C. SANCHEZ
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R. STEIN
Polymer crystallinity and morphology, Characterization

E. L. THOMAS*
Electron microscopy, Polymer morphology, Polyurethanes

O. VOGL
Polymer synthesis, degradation and stabilization of polymers

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Dept. of Chemical Engineering
University of Massachusetts
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Prof. R. Farris
Dept. of Polymer Science and Engineering
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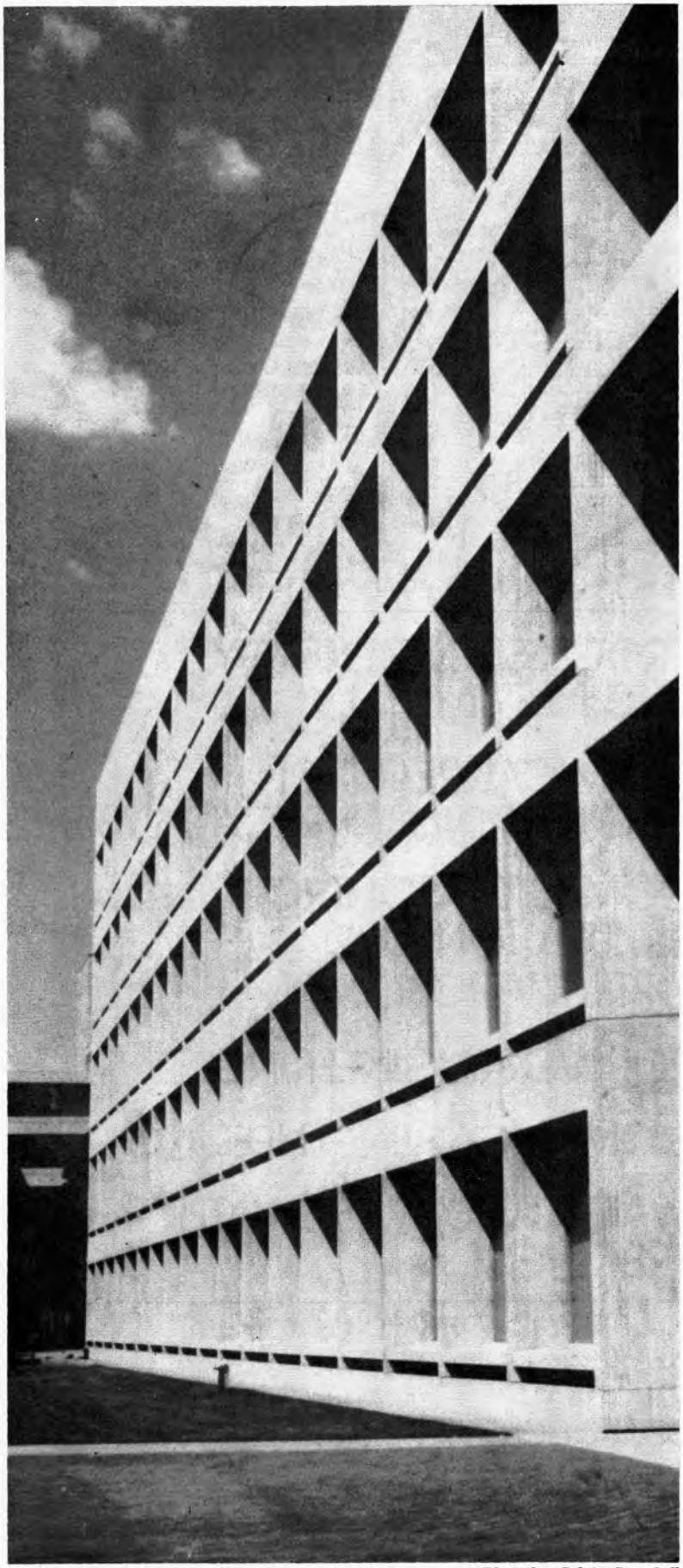

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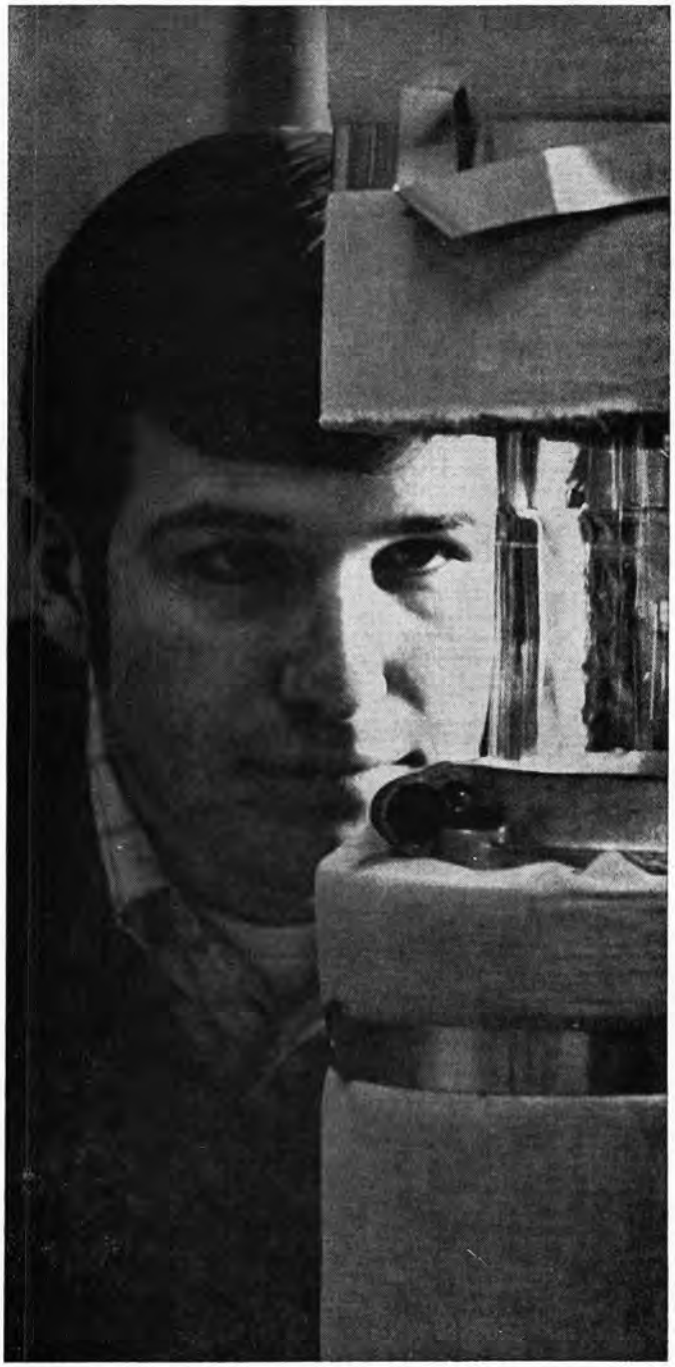

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The Chemical Engineering Faculty

B.L. Baker, Distinguished Professor Emeritus, Ph.D., North Carolina State University, 1955 (Process design, environment problems, ion transport).

M.W. Davis, Jr., Professor, Ph.D., University of California (Berkeley), 1951 (Kinetics and catalysis, chemical process analysis, solvent extraction, waste treatment)

J.H. Gibbons, Professor, Ph.D., University of Pittsburgh, 1961 (Heat transfer, fluid mechanics).

F.P. Pike, Professor Emeritus, Ph.D., University of Minnesota, 1949 (Mass transfer in liquid-liquid systems, vapor-liquid equilibria).

T.G. Stanford, Assistant Professor, Ph.D., The University of Michigan, 1977 (Chemical reactor engineering, mathematical modeling of chemical systems, process design, thermodynamics).

V. Van Brunt, Associate Professor, Ph.D., University of Tennessee, 1974 (Mass transfer, computer modeling, fluidization).

For further information contact:
Prof. J.H. Gibbons
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For additional information, contact:
Prof. F. T. Jones
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Surface Phenomena,
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for additional information:

Graduate Advisor
Department of Chemical Engineering
The University of Texas
Austin, Texas 78712

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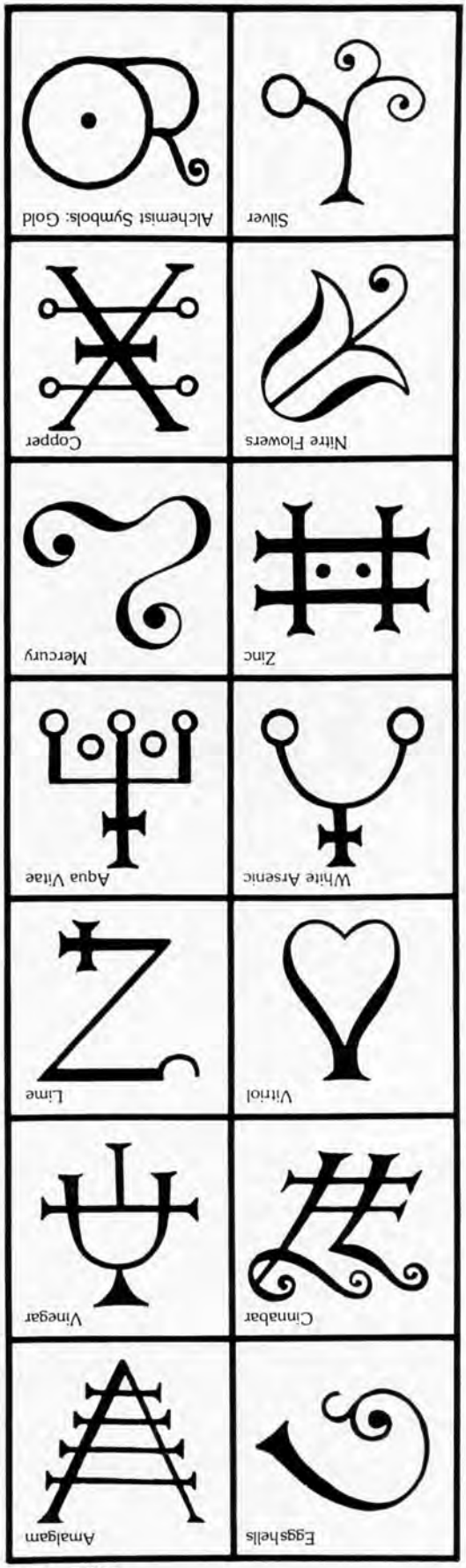

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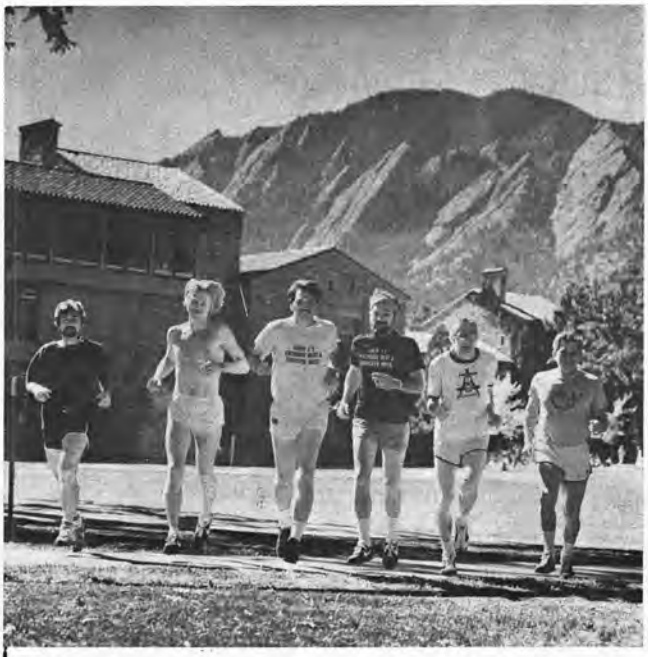

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