

A SURVEY ON EMERGING TECHNOLOGIES
IN CHEMICAL ENGINEERING

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SURVEY ON EMERGING TECHNOLOGIES

IN CHEMICAL ENGINEERING

Chemical engineering is experiencing a change. There is a sharp decrease in demand for B.S. chemical engineers by the chemical and petrochemical industries. Decreased demand for gasoline and refined petroleum products has shut down 104 refineries in the United States since 1980, leaving about 190 in operation. Unemployment in Gulf Coast cities, whose economy is strongly dependent on oil, hovers at 13%, almost twice the national average. Finally, freshman enrollment in chemical engineering has decreased by 50% between 1980 and 1984.

Traditional employers of chemical engineers have sharply reduced their recruiting. Academia must identify new areas of employment and provide appropriate training so B.S. chemical engineers can compete for these positions.

The Chemical Engineering Education Projects Committee of AIChE conducted a survey in March, 1985 on emerging technologies in chemical engineering and two other subjects. A questionnaire was sent to 169 chemical engineering departments in the United States and Canada. Seventy-six replies were received.

The purpose of the survey is to inform the academic community of existing courses, to observe trends, and to stimulate sharing of resource material in these areas among chemical engineering departments. Information was collected about courses in bioengineering, biomedical engineering, processing of microprocessor materials, advanced separation techniques, alternate energy sources, microcomputer interfacing, etc. Conventional elective courses in areas like process design, advanced unit operations and applied mathematics were excluded from consideration.

The titles of all courses named on the completed questionnaires are listed by department at the end of this paper. Anyone interested in specific courses can contact the respective department for further information.

Of the 76 replies received, 15 departments indicated they offered no courses in the emerging technologies. It is perhaps poor form to speculate on "non-replies". In this case, however, it may be appropriate to conclude that 20% of the departments have not identified which technologies will be of sufficient future importance to warrant specialized course offerings.

TABLE 1
BIOTECHNOLOGY

Courses	
Graduate	3
Senior	50
Junior	3
	—
	56
Elective	52
Required	1
Times Taught	<u>1980-85</u>
Never	8
1	9
2	10
3	10
4	2
5	15

TABLE 2
MICROELECTRONIC MATERIALS

Courses	
Graduate	2
Senior	18
Junior	6
	—
	23
Elective	21
Required	0
Times Taught	<u>1980-85</u>
Never	5
1	7
2	7
3	2
4	0
5	1

UNIVERSITY OF AKRON

Electrochemical Engineering
Digitized Data
Biochemical Engineering
Synfuels

Sr/S1
Jr/S2
Jr/S1
Jr/S2

CLARKSON UNIVERSITY

Biochemical Engineering
Integrated Circuit Manufacturing
Packaging of Electronics
Microprocessor Applications

Sr/S2
Sr/S1
Sr
Sr/S2

UNIVERSITY OF ALBERTA

Energy Resource Development
Intro. to Real-time Computer Applications

Sr/S1
Sr/S1

CLEVELAND STATE UNIVERSITY

Biochemical Engineering
Principles of Solar Engineering

Sr
Sr

ARIZONA STATE UNIVERSITY

Semiconductor Material Processing
Electronic Materials
Biomaterials

Sr
Grad
Sr

COLORADO STATE UNIVERSITY

Fundamentals of Biochemical Engineering
Introduction to Semiconductor Physics and
IC Processing

Sr/S1
Sr/S1

UNIVERSITY OF ARKANSAS

Biochemical Engineering

Sr

UNIVERSITY OF COLORADO, BOULDER

Recent Advanced in Biotechnology
Animal Engineering
Molecular Basis of Behavior

Sr
Jr
Sr

UNIVERSITY OF CALIFORNIA AT DAVIS

Biochemical Engineering Fundamentals
Chemical Engineering in Integrated Circuit
Fabrication Technology

Sr
Sr

CORNELL UNIVERSITY

Microbial Engineering
Polymers in Electronics and Related Areas

Sr/S1
So/S2

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Biochemical Engineering
Real-time Computing

Sr/S2
Sr/S1

DREXEL UNIVERSITY

Microcomputer Applications in Chemical Engr.
Transport Phenomena in Biological Systems
Bio-Reactor Engineering

Sr
Sr
Sr

UNIVERSITY OF NEW BRUNSWICK

Thermodynamics of Waste Heat Recovery
Nuclear Engineering
Adsorption and Adsorption Separation Processes

Novel Separations
Photochemical and Photoelectrochemical
(Utilization of Solar Energy)

Sr

Sr

NEW JERSEY INSTITUTE OF TECHNOLOGY

Introduction to Biochemical Engineering
Unit Operations in Food Engineering
Special Topics in Mass Transfer

Sr/S2
Sr/S2
Sr/S2

Biochemical Engineering

Grad

UNIVERSITY OF NEW MEXICO

Semiconductor Phenomena
VLSI Material Process Technology
Vacuum Science Technology

Jr/S2
Sr/S1
Sr/S2

Biochemical Engineering
Separation Processes

Sr/S2
Sr/S1

STATE UNIVERSITY OF NEW YORK

Biochemical Engineering

Sr/S1

Fundamentals of Biochemical Engineering
Air Pollution Engineering Control

Sr/Q2
Sr/Q2

NORTH CAROLINA STATE UNIVERSITY

Introduction to Biochemical Engineering

Sr

Polymers

Introduction to Fusion Power
Separations in Biological and Chemical
Processes

Sr/S1
Sr/S1

Sr/S1

NORTHWESTERN UNIVERSITY

Transport Phenomena in Living Systems
Solar Energy Principles and Applications
Chemical Process Structures and Information
Flows

Sr/Q1
Sr/Q3
Sr/Q3

PURDUE UNIVERSITY

Biochemical Reactor Engineering
Fundamentals of Microelectronic Processing

