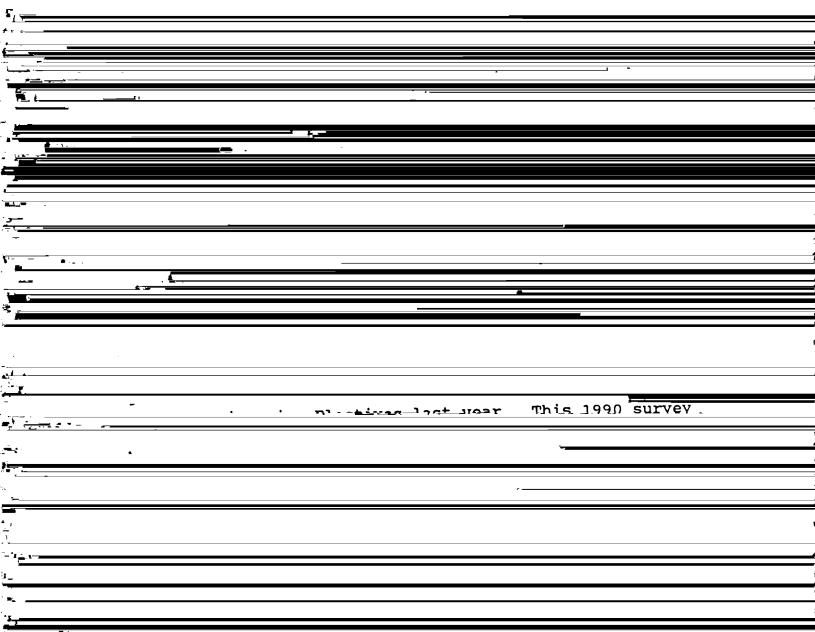
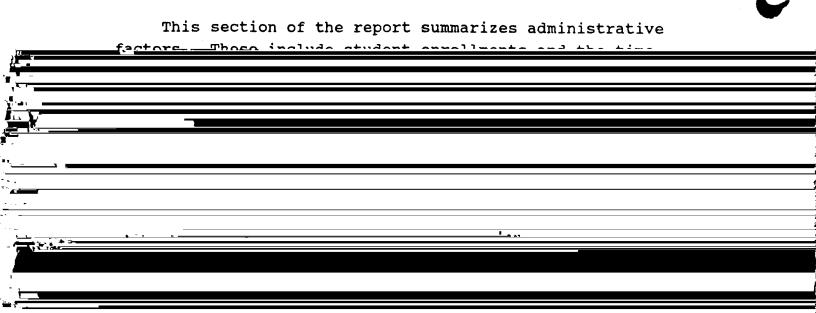


INTRODUCTION

This survey is the nineteenth in a series on undergraduate chemical engineering courses that began in 1971. Each survey attempts to present the current text materials, course credits, curriculum placement, student enrollments, topical content and special features of one of about ten standard chemical engineering courses. The first cycle began with Mass and Energy Balances in 1971 and ended with ghorical Engineering Electives in 1980. The second cycle



I. COURSE MECHANICS



Course Length.

COURSE LENGTH

About 19% of the departments responding operate on the quarter system. In every earlier survey, about 24% of the departments used the quarter system. Perhaps this reflects a trend from the quarter system to the semester system. The quarter lasts just over 10 weeks while the semester is less than 15 weeks long. Both time periods exclude final examinations.

COURSE LENGTH

(Quarter Basis)		(Semester Basis)	
<u>Length</u>	<u>Departments</u>	<u>Length</u>	<u>Departments</u>
9 weeks 10 weeks 11 weeks 12 weeks	1 18 4 6	13 weeks 14 weeks 15 weeks 16 weeks 17 weeks	12 31 47 9
Average	10.5 weeks	Average	14.4 weeks

	R OF COURSES ter Basis)		R OF COURSES ster Basis)
Number	<u>Departments</u>	Number	<u>Departments</u>
one two	12 13	one two	86 22

Course Level.

The Mass and Energy Balance course is usually taught at the sophomore level. Within the sophomore year, there is a preference for the first semester and the first quarter.

COURSE LEVEL (Semester Basis)

<u>Semester</u>	Courses
Freshman, Semester 1 Freshman, Semester 2	6 4
Sophomore, Semester 1 Sophomore Semester ?	63 45

Junior, Semester 1 7
Junior, Semester 2 2

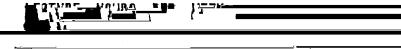
(Quarter Basis)

<u>Quarter</u>	Courses
Sophomore, Quarter 1 Sophomore, Quarter 2 Sophomore, Quarter 3	20 13 5
Junior, Quarter 1	4

Class Sessions.

In 70% of the departments, the course meets for three

week. Just under half the departments offer no "laboratory" hours. 26 departments have 1 laboratory hour and 22 departments have two laboratory hours each week. Questionnaire responses show that the laboratory sessions are devoted to problem sessions.



Hours	<u>Department</u>
1	2
2	26
3	89
4	11

Average 2.85

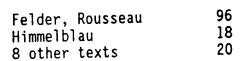
MATERIAL COVERED IN THE PROBLEM LABORATORY

Homework Computer programming instruction Case studies Approaches to problems

ADDITIONAL TEXTBOOK TOPICS

Safety
Computers
Open-ended problems
Environmental concerns
Combined mass and energy problems
Psychology of problem solving
Economics
Ethics

TEXTBOOK SELECTION



63% of the departments offer one section of Mass and Energy Balances annually. 25% offer two sections. Half of the sections have enrollments of 11 to 25 students.

NUMBER OF SECTIONS (1989-90)

<u>Sections</u>	<u>Departments</u>
1	85
2	34
3	9
4	3
5	2
6	2

COURSE ENROLLMENT (1989-90)

Enrollment	Courses	was and the second of the seco
1 - 10 11 - 15	17 28	

31 - 35 15 36 - 40 9 40 - 50 5 51 + 26

II. BACKGROUND

This section examines the technical background of students enrolled in Mass and Energy Balances.

Prerequisites.

Do you offer a formal course in computers to chemical engineering students?

<u>Departments</u>

Yes 101 No 22

In which year is the course offered?

<u>Departments</u>

Freshman year 71 Sophomore year 28

Which classes of programming are covered in the computer course?

Departments

Word Processing 36 BASIC 30 Pascal 17 Symbolic Math 15 Other 17

III. COURSE CONTENT

This section deals with several aspects of the course content. These include textbook selection, problem solving and design content.

	Textbook.
	In almost every survey conducted over the past 20 years, one textbook is used in a majority of the courses.
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F	
	* <u>*</u> —
-	
- -	seau was used in 96 courses. Nine other texts were men-
3 <u>a</u>	
~- \$3	

STRENGTHS AND WEAKNESSES OF THE TEXTBOOK

Clarity
Example problems
Typographical errors
Case studies
Greater detail
Language
Problems
Notation
Computer problems
Tables

their students own PC's.

Most departments (90%) encourage their students to use the computer in solving assignments in this course. However, most text problems are more appropriately solved with a

the computer for less than 30% of the assignments. PC ownership is not widespread among chemical engineering

Do you encourage students to use the comput-

What percent of the students own a PC?

Percent 0	Departments 30	
	-,.	
30	12	
40	4	
50+	18	

------ is more widely used than the English

system in solving problems. Many departments use both systems equally. Where one system is favored over the other, the SI system is usually favored.

> What percent of the problems you assign are solved in the SI system?

<u>Percent</u>	<u>Departments</u>
-40	19
50	46
60	14
70	15
80	20
90+	20

What percent of the problems would

The inclusion of design in the Mass and Energy Balances course was examined through the next four questions. Most

6

the text. 28% assign projects lasting one month or longer and 32% use case studies from the text. 36% of the departments claim no ABET design credit for the course. 40% claim 1/2 or 1 credit and 16% claim 1 1/2 or more credit.

If open-ended design problems were included in the text would you assign them

	Departments
Occasionally	80
Often	31
Never	16

Do you assign a project lasting one

<u>Departments</u>

^7

Do you use case studies from the textbook?

	Departments
Yes	43
No	90

How many ABET design credits do you assign to this course?

<u>Credits</u>	Departments
0.0	48
0.5	11
1.0	44
1.5	4
2.0	6
3.0	9
4.0	1

CASE STUDY IMPLEMENTATION

The following responses from the questionnaire indicate how different case studies are used at different universities.

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I assign one of the case study problems in the text. It usually involves the mass and energy balances for the preliminary design project

COMPARISONS WITH THE 1981 SURVEY

The 1981 questionnaire asked fewer and different ques-

are limited. The course level for the Mass and Energy course has changed very little. It is still an early sophomore course. In both years, a problem laboratory was included in 51% of the courses. COURSE LEVEL (Semester Basis)

<u>Semester</u>	<u>%</u> <u>of</u> 1990	<u>Courses</u> <u>1981</u>
Freshman, Semester 1 Freshman, Semester 2	4 3	4 8
Sephemone Commenter 1		4 7

Sophomore, Semester 2 34 Junior, Semester 1 6 8 Junior, Semester 2 2

A more significant difference occurs in the prerequisites for the course.

