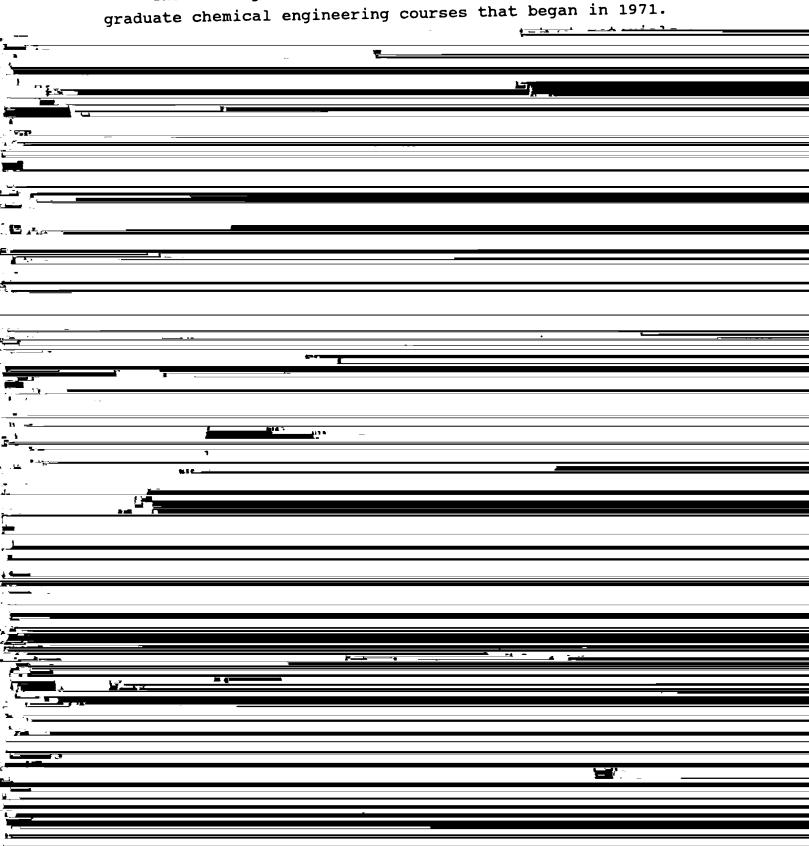
CHEMICAL ENGINEERING THERMODYNAMICS

A Survey Prepared by the
Chemical Engineering Education Projects Committee
American Institute of Chemical Engineers
November 5, 1992

INTRODUCTION

This survey is the twenty-first in a series on undergraduate chemical engineering courses that began in 1971.



I. COURSE MECHANICS

This section of the report summarizes administrative factors. These include student enrollments and the time allocated to the course.

Course Length.

COUPSE LENGTH

About 19% of the departments responding operate on the quarter system. The quarter lasts just over 10 weeks while the semester is less than 15 weeks long. Both time periods exclude final examinations periods.

| (Quarter Basıs̀∎ | (Semester Basis) | |
|--------------------|----------------------------------|---|
| Length Departments | <u>Length</u> <u>Departments</u> | |
| 9 weeks _ 1 | 12 weeks 3 | • |
| 10 weeks 13 | 13 weeks 8 | |
| 11 weeks 4 | 14 weeks 22 | |
| | 15 weeks 30 | |
| | 135 <u></u> | |

Average 14.6 weeks

Number of Courses

Many departments report two courses in thermodynamics. The first course is often a core course taken by chemical, mechanical and other engineers. The second course is then for chemical engineers only. Other departments report just one course in thermodynamics. In this survey, 46% of the

NUMBER OF COURSES

| Courses | <u>Departments</u> |
|---------|--------------------|
| 1 | 52 |
| 2 | 44 |

Course Level.

The Chemical Engineering Thermodynamics course is

semesters of the junior year, respectively. An alternative is to teach the courses in the second sophomore semester and the first junior semester. In 1982, 49% of the first courses were taught in the first junior semester and 54% of the second courses were taught in the second junior semes-

COURSE LEVEL (Two Courses, Semester Basis)

| Semeste | er | Course | <u>#1</u> | Course | <u>#2</u> |
|------------|----|--------|--------------|--------|-----------|
| Sophomore, | | | (10) (14) | | (8) |
| | | | | | |

Junior, Semester 2

12 (10) 18 (31)

Senior, Semester 1

2 (4) 1 (5)

(1982 results in parentheses)

(Two Courses, Quarter Basis)

| <u>Quarter</u> | Course #1 | Course #2 |
|---|-----------|-------------|
| Sophomore, Quarter 3 | 5 | |
| Junior, Quarter 1 Junior, Quarter 2 Junior, Quarter 3 | 1 10 | 2 4 5 |
| Senior, Quarter 1 | | 1 |

Class Sessions.

In 76% of the departments, thermodynamics meets for three hours lecture per week. No laboratory experience was reported.

LECTURE HOURS PER WEEK (Based on 50-minute periods)

Class Sections and Enrollment.

78% of the departments offer one section of Chemical Engineering Thermodynamics annually. 16% offer two sections. Two-thirds of the sections have enrollments of 30 students or less. The average enrollment per section is 45.

NUMBER OF SECTIONS (1991-92)

| Sections | <u>Departments</u> | |
|----------|--------------------|--|
| 1 | 74 | |
| 2 | 15 | |
| 3 | 3 | |
| 4+ | 3 | |

COURSE ENROLLMENT (1991-92)

| | <u>Enrollment</u> | Courses | |
|---|-------------------|---------|--|
| | | | |
| * | 11 - 20 | 24 | |
| | 21 - 30 | 36 | |
| | 31 - 40 | 20 | |
| 4 | 41 - 50 | 15 | |
| | 51 - 60 | 16 | |
| | 61 - 80 | 12 | |
| | 81 - 100 | 6 | |
| | 100+ | 14 | |
| | Average | 45 | |
| | | | |

Only four departments used graduate teaching assistants in the thermodynamics course. In each case the TA's gave less than 30% of the lectures.

II. BACKGROUND



This section examines the technical background of students enrolled in Chemical Engineering Thermodynamics.

Prerequisites.

| | The position of Chemical Engineering Thermodynamics in |
|------------------|--|
| • | the first_or second semester of the junior year is reflected |
| 1 | |
| | |
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| | |
| - | in the courses students have taken during their freshman and |
| | contained ware and Engrav Palance has been complet |
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| 71 | |
| ····· | |
| TA . | |

half the students have completed Differential Equations, Physical Chemistry and Organic Chemistry and at least two

semesters of Calculus.

III. COURSE CONTENT

| | This section deals with several aspects of the course content. These include textbook selection, problem solving, |
|---------------------------------------|---|
| | |
| | A - |
| | |
| | |
| | |
| | Textbook. |
| | In almost every survey conducted over the past 20one textbook is used in a significant majority of the |
| | t are |
| | courses. This survey was no exception. The text by Smith |
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| | was used in 30 courses (22%). Six other texts were used in 12 courses. |

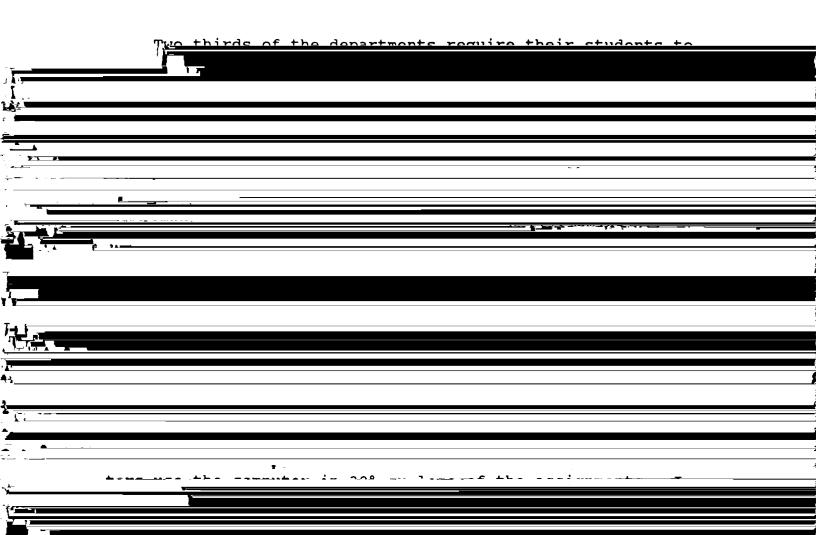
TEXTBOOKS

Computer Use.

Four questions on the questionnaire dealt with the use of computers in thermodynamics courses.

What computer languages/programs do students use in this course?

| | FORTRAN | <u>Departments</u> 58 20 | |
|---|---------|--------------------------------|--|
| • | - 2 | 4 - * | |
| | Pascal | 4 | |
| | Other | 40 | |



What percent of the students own a PC?

| Percent | Departments |
|---------|-------------|
| 0 | 34 |
| 10 | 14 |
| 20 | 14 |
| | |
| • | |
| 40 | 6 |
| 50+ | 20 |

The English system is more widely used than the SI system in solving problems. Many departments (75%) would like to use the SI system over 50% of the time.



| <30 | 8 |
|-------|----|
| 40 | 3 |
| 50 | 24 |
| 60-70 | 11 |
| 80 | 24 |
| 90 | 8 |
| 100 | 18 |

What percent of the problems <u>would</u> you <u>like to see</u> solved in the SI system?

| Percent | <u>Departments</u> |
|---------|--------------------|
| <30 | 10 |
| 40 | 2 |
| 50 | 31 |
| 60-70 | 6 |
| 80 | 19 |

How many major tests do you give in this course?

| Number | Departments |
|--------|-------------|
| 1 | 7 |
| 2 | 26 |
| 3 | 34 |
| 4 | 24 |
| 5 | 4 |

Do you cover reaction equilibria in this course?

| | <u>Departments</u> |
|-----|--------------------|
| Yes | 52 |
| No | 44 |

Do you use self-paced instruction in this course?

| | <u>Departments</u> | | |
|-----|--------------------|--|---|
| Yes | 4 | | _ |
| NO | ρQ | | _ |

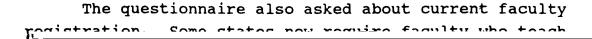
er program (such as PRO/II) in this course?

| | <u>Departments</u> |
|-----|--------------------|
| Yes | 14 |
| No | 81 |

Do you assign a project lasting one month or longer in this course?

| | <u>Departments</u> |
|-----|--------------------|
| Yes | 12 |
| No | 83 |

experience for a professional engineer's license. questionnaire sought to determine how many chemical engineering seniors take the first exam, the EIT exam. About half the replies presented data on both the number of B.S. chemnical engineering graduates in 1991-92 and the number nia- demonstrate remire seniors to take



engineering or engineering design to be registered PE's.

FACULTY REGISTRATION (PE)

Total faculty 727

Percent 29.4 %

Two previous surveys provided limited data on registration. A 1982 survey showed that 33.5 % of chemical engineering seniors take the EIT exam. A 1985 survey showed that 33.2 % of chemical engineering faculty are registered PE's

