PN-AAP-243
ISN 33344

AN OVERVIEW OF ENERGY TRAINING PROGRAMS

Prepared For

AGENCY FOR INTERNATIONAL DEVELOPMENT
U.S. DEPARTMENT OF STATE

Contract No. AID/OTR-147-79-102

By

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October 1979

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PN AAP 243

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Preface

Human Resources Management, Inc., pursuant to a contract with the Agency for International Development reviewed existing data on the multitude of energy education programs in the United States and prepared this condensed profile of programs available to students from foreign countries. The report does not purport to cover all the dimensions of these programs, but seeks to identify prominent areas of energy training, identify public and private institutions that provide such training, and highlight the focus of these programs with respect to the nature and scope of their academic orientation.

I. Areas of Energy Training

A. Technical Training

1. Biomass

Training Programs in the area of Plant Genetics/ Biochemistry which are offered within institutions in the U.S. (See Appendix for listing.) However, it should be noted that Biomass Technology is such a relatively new area of training that while several universities are involved in research and demonstration projects, no formal courses have been developed.

2. Engineering - Electrical

The Joint Committee on International Activities of the American Society for Engineering Education (ASEE) surveyed the 409 U.S. and Canadian ASEE member institutions for purposes of providing quantitative information about international activities of engineering and engineering technology programs in the United States and Canada.

The report summarizes the principal survey results. An appendix contains more detailed statistical tabulations.

a. Response To Survey

As of July 15, the American Society for Electrical Engineers received 203 responses, or 49.6% of the mailing. Engineering College and E.C. Affiliate Members represent about 70% of the mailing and their 143 returned questionnaires about 70% of overall response. The 60 Technical College and T.C. Affiliate Member respondents represent about 30% of both overall membership and response. The sample thus represents nearly half the population, and the distribution of response parallels distribution of members between the two categories.

b. Institutions Conducting Formal International Programs

Forty-two institutions, or about 21% of all respondents, reported 56 formal programs. Thirty-three Engineering College (E.C.) Members reported 47 programs, and one E.C. Affiliate reported a single program. Six Technical College (T.C.) Members reported one program each, and three T.C. Affiliates one each. Thirty-four of the 48 Engineering College and E.C. Affiliate programs involve developing countries (LDC's) exclusively. Seven involve developed countries (DC's) and respondents did not indicate whether the remaining seven concern LDC's, DC's, or both. Among LDC's, OPEC countries account

for 18 programs and non-OPEC countries for 21*. One program includes both OPEC and non-OPEC countries, and in two programs, respondents did not name countries involved. Eight of the nine Technical College and T.C. Affiliate Member programs involve LDC's only; one program does not specify whether the involvement is LDC or DC.

c. Foreign Student Enrollments

Nearly all responding institutions reported some foreign students in attendance. One hundred thirty out of 132 Engineering College and E.C. Affiliate Members, or 98.5%, enroll some foreign undergraduates.

One hundred six of 108 or 98.1%, enroll foreign graduate students. Fifty of 56 Technical College and T.C. Affiliates, or 89.3%, enroll some foreign undergraduates. Ten of ten, 100% enroll foreign graduate students.

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* Respondents report involvement with the following OPEC countries:

Algeria	Iran	Libya	Saudi Arabia
Ecuador	Kuwait	Nigeria	Venezuela

Most Engineering and Technical College Member respondents report low percentages of foreign undergraduate students. Foreign graduate student percentages are more evenly distributed. More than three-quarters of Engineering College and E.C. Affiliate Member respondents report foreign undergraduate students in ranges from 0.1% to 15%, while nearly three-quarters of respondents in the same ASEE membership category report foreign graduate students in ranges between 16% and 70%. About one-half of the institutions in the latter category report foreign graduate student enrollments between 11% and 40%. Seventy-one percent of Technical College and T.C. Affiliate Member respondents report foreign undergraduate student percentages of 5% or below, while in the same membership category, four institutions report enrollments of 10% or below and six institutions report enrollments between 16% and 45%.

3. Engineering - Mechanical

There are 244 accredited programs leading to a degree in mechanical engineering in U.S. institutions.

Over the past twenty years, between 20 and 25 percent of all foreign students enrolled in degree programs in the U.S. chose engineering as their major course of study.[1] Understandably there has been a major increase in the percentage of foreign students from OPEC countries; in 1977, Iran headed the list of all countries with 11.5 percent of all foreign students; Nigeria was in third place with 5.8 percent; Venezuela was in 11th place with 2.8 percent; and Saudi Arabia was in 12th place with 2.3 percent.[2] Engineering and Technology programs are more popular among this group who are primarily supported by their governments.

Foreign student enrollments in U.S. engineering programs rose from 31,187 in 1973-1974 to 42,000 in 1975-1976 to a high of 48,990 in 1976-1977.[3]

1/ Institute of International Education, OPEN DOORS, New York: 1974, p. 5.

2/ Ibid.

3/ Institute of International Education, OPEN DOORS, New York: 1978, p. 22.

Enrollments are particularly significant in engineering at the graduate level. There are reportedly 18,230 foreign students in engineering in the U.S., which represents more than 33 percent of the total student enrollment in engineering.

Table 1 indicates that about 80-90 percent of foreign students studying engineering in the U.S. are from developing countries. Most foreign engineering students in the U.S. enter traditional engineering disciplines such as civil, electrical, mechanical and chemical engineering.

Several institutions attempted to design programs that are compatible with specific educational and development needs in foreign countries. This includes the engineering student exchange between the University of Wisconsin and Monterrey Tech. in Mexico.[4] It also includes degree programs particularly designed for LDCs, like the master degree program at Georgia Tech. which emphasizes industrialization; the Technology Adoption Program at Massachusetts Institute of Technology; and, the

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4/ The Role of U.S. Universities In Science and Technology For Development: Mechanisms and Policy Options, Washington University, September 1978.

Table 1

Distribution of Undergraduate and Graduate
Foreign Student Enrollments Among ASEE Member Institutions

% of Foreign Students Reported	Number of Engineering Colleges*		Number of Technical Colleges*		Total Number	
	undergraduate	graduate	undergraduate	graduate	undergraduate	graduate
0.1-5	57	15	34	3	91	18
6-10	32	6	8	1	40	7
11-15	19	14	2	-	21	14
16-20	8	11	-	2	8	13
21-25	8	10	-	1	8	11
26-30	2	15	1	1	3	16
31-35	2	7	-	-	2	7
36-40	2	10	2	1	4	11
41-45	-	3	1	1	1	4
46-50	-	5	-	-	-	5
51-55	-	2	-	-	-	2
56-60	-	4	-	-	-	4
61-65	-	2	-	-	-	2
66-70	-	1	-	-	-	1

*Full and Affiliate members combined.

Source: American Society of Electrical Engineers.

technology and international development program at Washington University.[5]

There are presently 124 technical and affiliated colleges that are members of the American Society for Engineering Education which offer engineering technology programs. In view of the linkage between traditional engineering programs, vocationally-oriented engineering technology programs are of potential interest to LDCs where "middle-level" manpower and technicians are often in high demand.

5/ Ibid.

4. Geology

Training Programs in the area of Geology are presently being offered at 113 universities in the U.S. (see Appendices for listing).

5. Geothermal

In addition to the 10 University Degree programs in the area of Geothermal energy, the Department of Energy is conducting a comprehensive research development and demonstration program to encourage the use of geothermal energy.[6]

During Fiscal Year 1978, a total of 99 research and development projects were funded as follows:

-- Academic Institutions	29
-- Government Agencies	15
-- Private Industry	46
-- National Laboratories	9

6/ Geothermal Energy Programs Summary, Department of Energy, June 1979.

6. Petroleum

a. Introduction

The oil-consumed countries of the world have been living on capital, not income. World oil production is expected to turn downward within 10 to 18 years, and severe regional shortages are likely to develop well before then. Eighty percent of the world's oil supply will have been consumed during the lifetime of the current generation. Consequently, it is critically important and morally obligatory for all countries, rich and poor, to invest a large fraction of the remaining oil in building an energy system that can be sustained in the post-petroleum era.

Many geologists believe that new petroleum deposits remain to be discovered within the boundaries or off the shores of poor countries that are not now oil producers. Some authorities believe that these areas may contain half the world's remaining undiscovered oil. Such estimates are necessarily speculative, and much more intensive exploration is clearly warranted. The Third World faces

difficult energy choices. With little capital, few trained technicians, scanty infrastructure, inadequate reserves of conventional fuels, and a large and rapidly growing population, there is reason for concern.(7)

b. Manpower-Supply and Demand

The Society of Petroleum Engineers (SPE), Engineering Manpower Survey, was conducted in 1978 as a logical first step toward creating a dialogue on engineering manpower supply and demand and to provide a data base of predicted engineering employment. To create this base, a survey was sent to 28 major integrated oil companies, 11 independent oil producers, 15 gas producing/transmitting companies, and 24 university departments of Petroleum Engineering.

This survey was undertaken by the SPE to provide industry, government, the profession and universities with a detailed breakdown of the demand for and supply of petroleum engineers. Data on petroleum engineers engaged in drilling and production engineering is not available from any other source in such complete detail.

7/ Worldwatch Paper 15. Energy for Development: Third World Options, December, 1977.

Hopefully this information will provide universities with an understanding of how academic institutions respond to the labor market and what future demand is likely to be for their graduates.

c. Engineering School Enrollments

Although graduate enrollment is significant, some 75 to 90 percent of it consists of international students. Very few American students are pursuing Master's and Ph.D. programs in Petroleum Engineering. Table 1 shows the cumulative number of students graduated from undergraduate and graduate programs, from most U.S. institutions. A few important institutions are not included in the Table, due to unavailability of data. Also the number of M.S. graduates for Stanford University also includes their Ph.D. graduates.(8) In spite of these discrepancies, the data show the M.S. graduates as about 13.8% of the B.S. graduates, while the Ph.D. graduates represent about 1.7% of the B.S. graduates. It should be remembered that Ph.D. programs in Petroleum Engineering are relatively young.

8/ American Petroleum Institute.

TABLE 1

Cumulative Number of Students Graduated in Petroleum Engineering

From U.S. Institutions * Through 1977

Institution	Cumulative Number of Degrees Granted		
	B.S.	M.S.	Ph.D.
University of Southern California	531	217	14
University of California, Berkeley	566	140	23
Louisiana State University	1473	85	-
Louisiana Tech University	216	24	1
University of S.W. Louisiana	253	27	-
Marietta College	410	-	-
Mississippi State University	141	13	2
University of Missouri-Rolla	779	85	10
Montana College of Nat. Sci. & Tech	293	10	-
New Mexico Institute of Mining & Tech	232	4	-
Oklahoma University	2697	248	27
Pennsylvania State University	700	150	50
University of Pittsburgh	920	152	6
Stanford University	161**	229***	-
University of Texas	2001	342	77
Texas A & I University	653	N/A	-
Texas A & M University	1710	156	44
Texas Tech University	811	-	-
The University of Tulsa	1129	268	16
West Virginia University	168	46	-
University of Wyoming	206	19	-
	16,050	2,215	270

* Some important institutions are not included due to unavailability of data.
** Total since 1958.
*** Total graduate degree.

Source: American Petroleum Institute.

Petroleum industry management has not been a proponent of graduate education for engineers entering drilling and production operations. Although it does hire Master's graduates for such jobs, Ph.D. graduates are seldom considered, and are felt to be over-educated for such responsibilities.

The undergraduate enrollments of essentially all universities having accredited programs in petroleum engineering have also tended to follow the national trend. The relative size of the five largest undergraduate programs is shown in Figure 1.

At present, the five largest programs include Texas A&M, The University of Texas at Austin, Louisiana State University, The University of Tulsa, and Oklahoma University. The number of B.S. degrees granted at these five largest schools in the recent past is given in Figure 2. (9) Note that the full impact of the recent surge in enrollments has not yet been felt on the number of graduates produced.

At present, the prevailing opinion among industry leaders is that the current industry need is

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9/ Louisiana State University, Dept. of Mechanical Engineering.

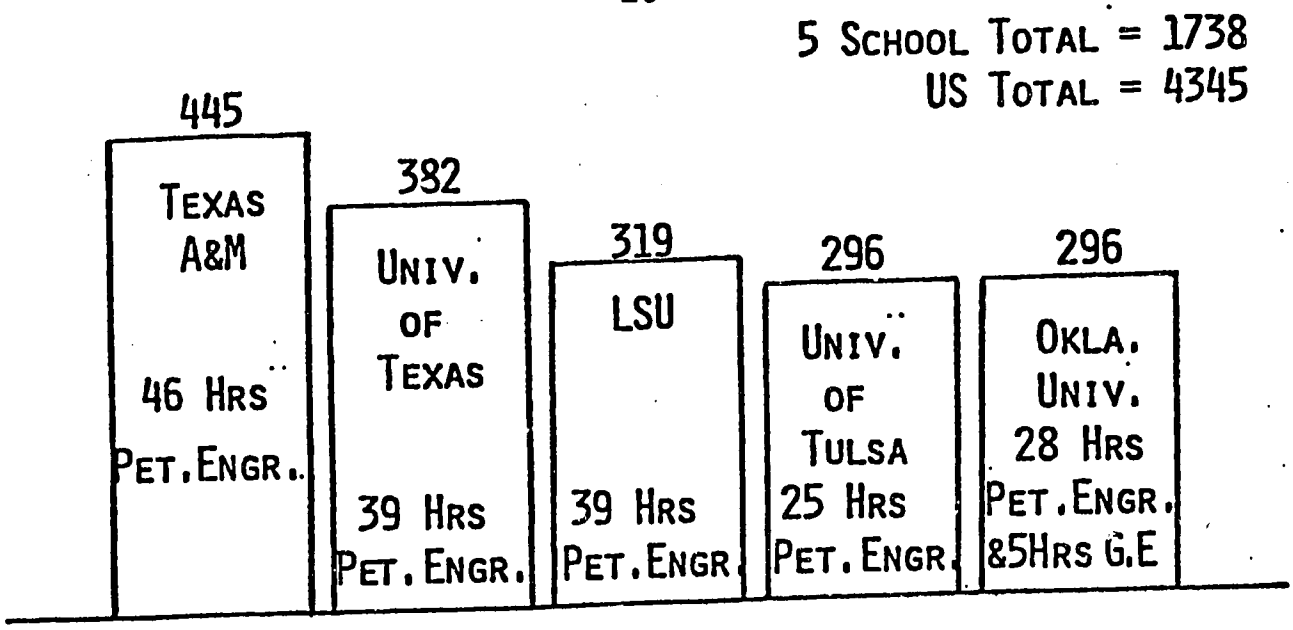


Figure 1 - Five Largest Petroleum Engineering Undergraduate Enrollments, Fall, 1977-78

	1975	1976	1977
5 School Total	125	171	176
US Total	267	418	421

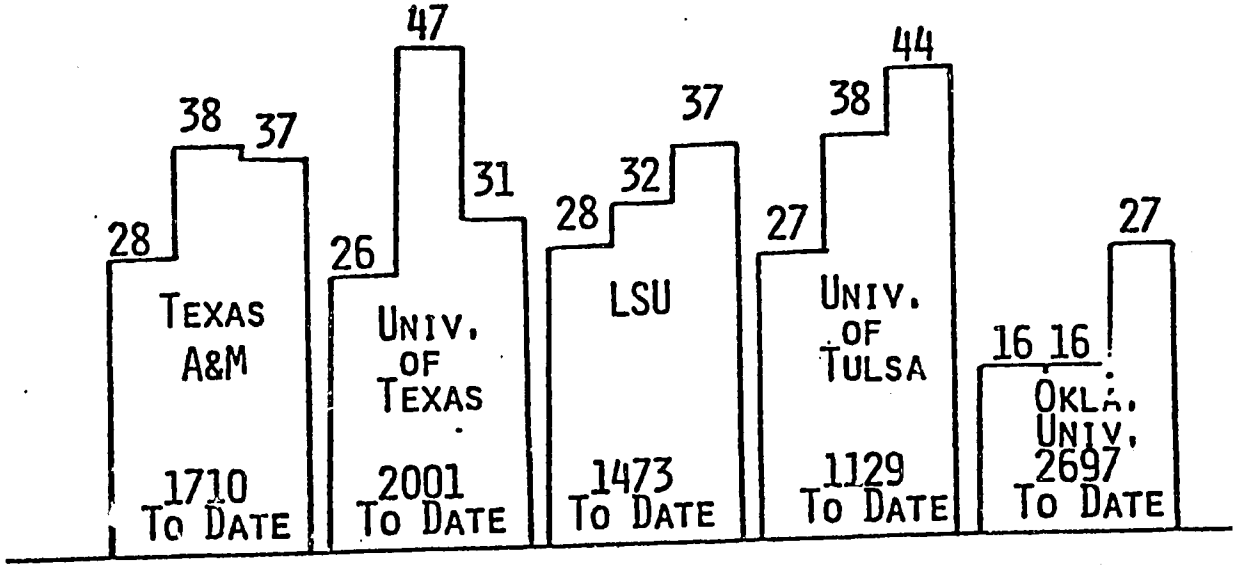


Figure 2 - BS Degrees Granted in Petroleum Engineering for Five Largest Schools During Past 3 Years (1975-1977)

primarily for B.S. graduates. Since at present there is not a large demand for graduate level petroleum engineering education, it logically follows that the number of graduate degree programs should be reduced.

Major Problems

The most severe problem facing petroleum engineering education is a severe faculty shortage. The second major problem facing petroleum engineering education is the low percentage of U.S. citizens in the national graduate enrollment.

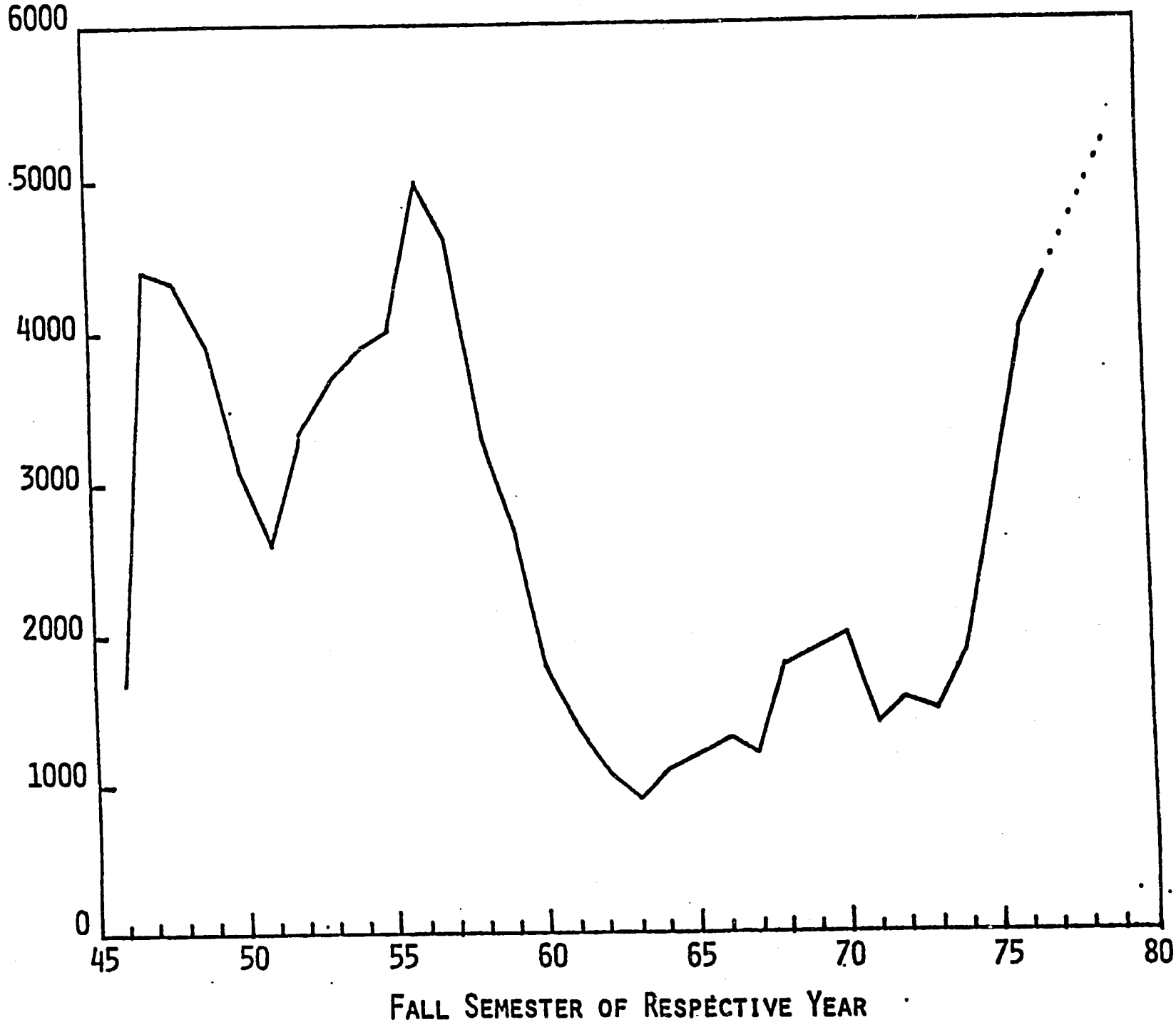


FIGURE 3 - TOTAL US PETROLEUM ENGINEERING UNDERGRADUATE ENROLLMENT

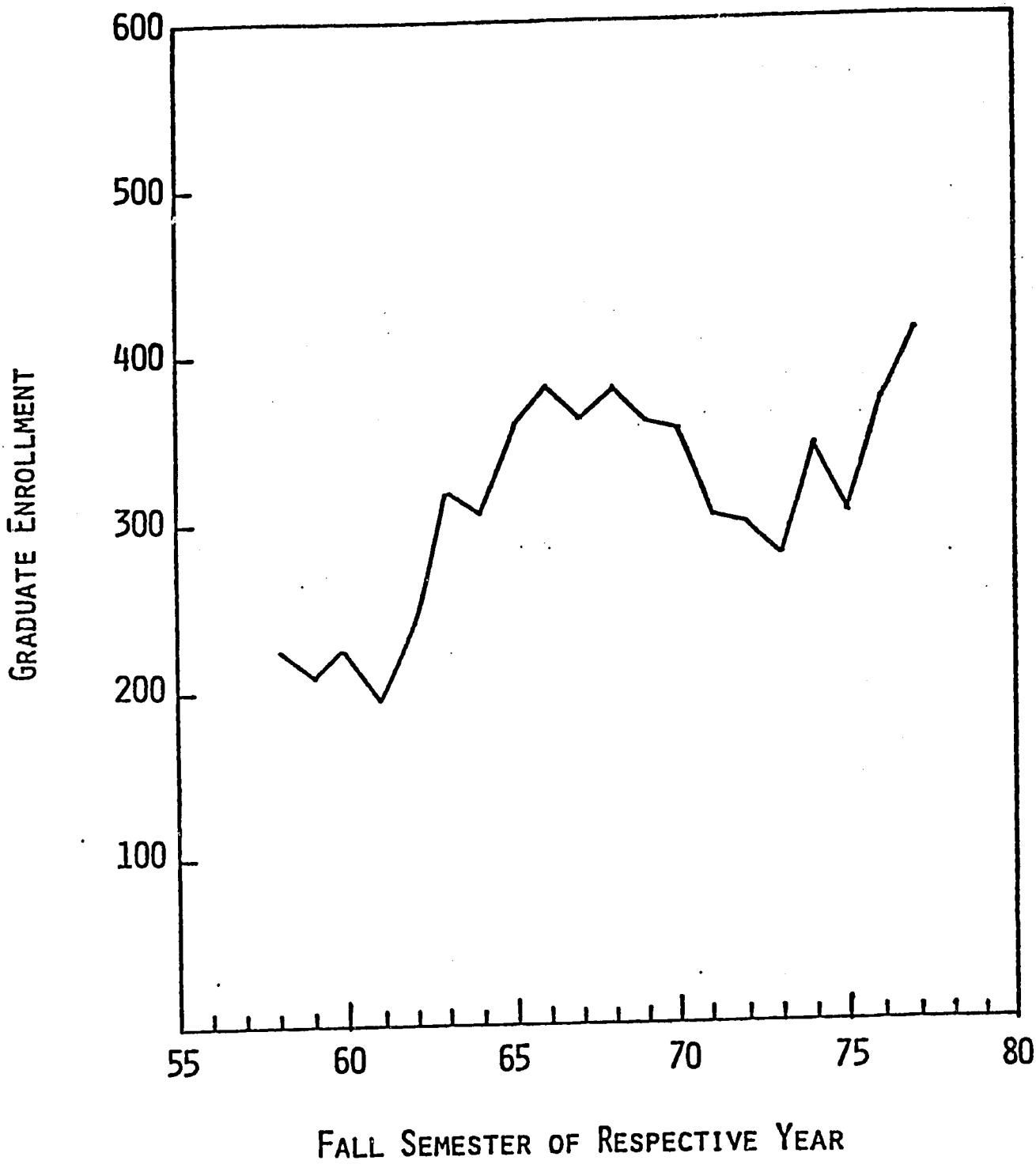
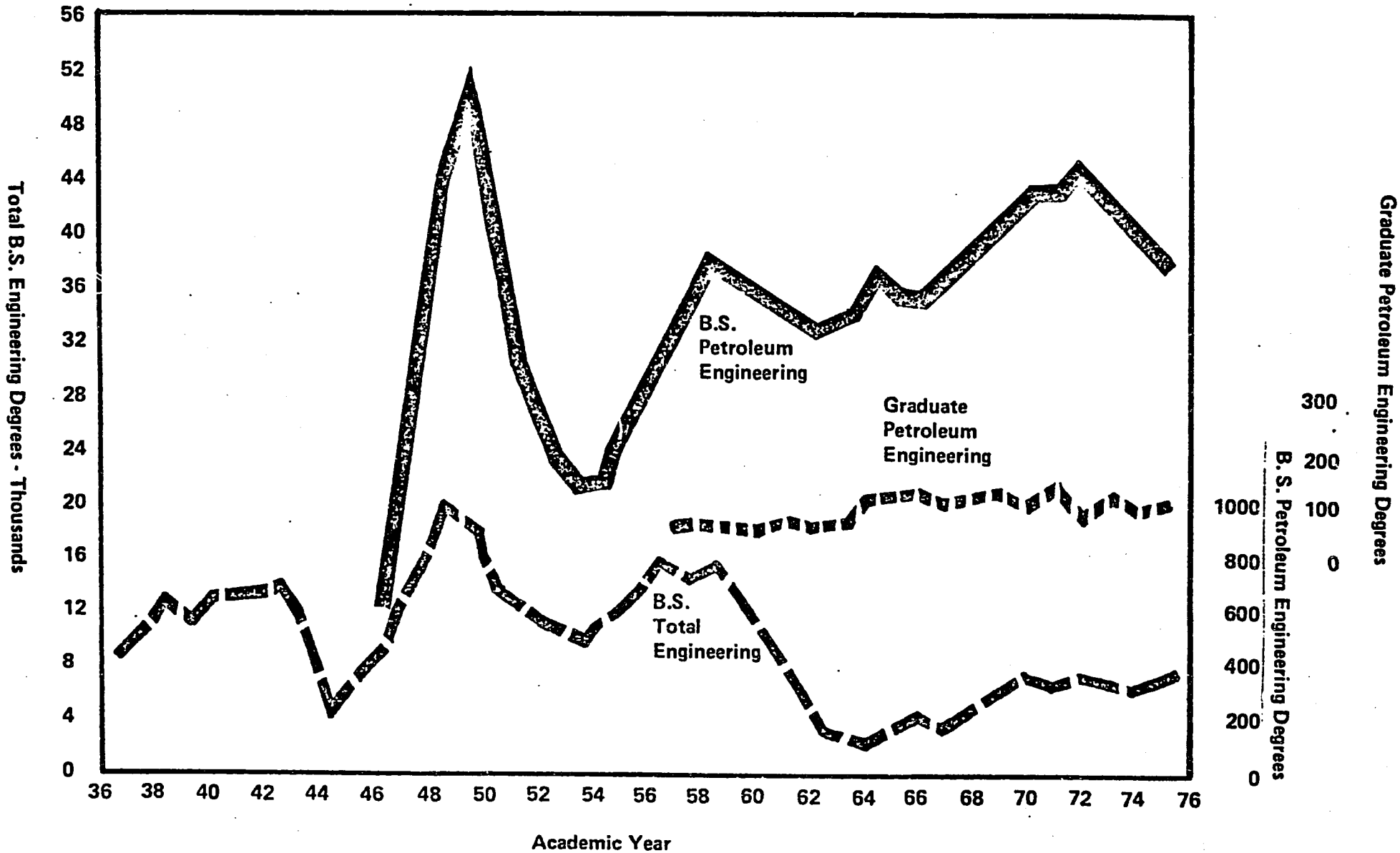


Figure 4 - TOTAL US PETROLEUM ENGINEERING GRADUATE ENROLLMENT

Figure 5

ENGINEERING DEGREES CONFERRED BY YEARS IN THE UNITED STATES



Source: American Society For Engineering Education.

d. The 1978-1982 Projections

The industry forecasts growth in engineering employment of 9.2 percent over the next five years. This is a sharp decline in growth when contrasted with the previous very large five year increase of 50.2 percent. Projected employment of petroleum engineers is more bouyant than total employment and the percentage increase in employment of petroleum engineers is expected to be 16.1 percent, a figure that is greater than the percentage increase for all degreed engineers. The industry forecasts that 70.7 percent of the total number of engineers to be added will be Petroleum Engineers.

The new demand for petroleum engineers in the next five years is only 56.1 percent of the new demand in the previous five years. The rate of increase, however, is expected to decline in the next five years and reflects the general decline in additions to employment. Figures are not available on the target quotas for all degreed engineers during the previous five years and a comparison cannot be made with future demand.(10)

10/ American Petroleum Institute.

A similar decline is predicted in the demand for recent or experienced petroleum engineers than for degreed engineers.

It is necessary at this point to remind the users of this data that forecasts by the industry are highly dependent on what general economic scenario is being used to predict demand by the forecaster in each of the companies.

The industry forecasts a demand for total new college graduates of 3815 in the next five years. Of this total, the industry expects to require 1709 new petroleum engineers or 44.8 percent. This forecast for all new graduates is slightly larger than total number of all recent graduates hired during the past five years and projected percentage of petroleum engineers to the total is 11 percent higher than the past five years.

According to the Department of Commerce Energy Forecast 1985 and 2000, there will be a decline in the requirement for Petroleum Engineers during the year 2000. The report notes the peak year as 1977 with a requirement of 2810, while reflecting only 1383 engineers for 2000 and an average increase to 2173 during the period 1978-2000.(11)

11/ Projected Annual Resource Requirements At the National and Regional Level, Energy Forecast 1985 and 2000, U.S. Dept. of Commerce, Office of Ocean, Resource and Scientific Policy Coordination.

The largest percentage increases in technical labor requirements for construction are for mining engineers, followed by requirements for civil, electrical, and mechanical engineers. The requirements for chemical and nuclear engineers decline in relative terms while requirements for geological and petroleum engineers are shown to decline in absolute terms.

Projected labor requirements by region are presented in Figure 6. As can be seen in this Figure, the shift in labor requirements follows the same general pattern described for investment resources. Requirements in the West South Central (7) region remain relatively constant, reflecting the decline in projected oil and gas production levels, while requirements increase in other regions, primarily in the East. The largest percentage increases in labor requirements occur in the Northeast (1), South Atlantic (3), and in the Northern Mountain (8) regions, which have average growth rates of 4.8, 4.5, and 5.3 percent, respectively. The increases in regions 1 and 3 are related primarily to the construction and operation of coal-fired and nuclear power plants, while increases in region 8 are due to the labor requirements for coal mining.

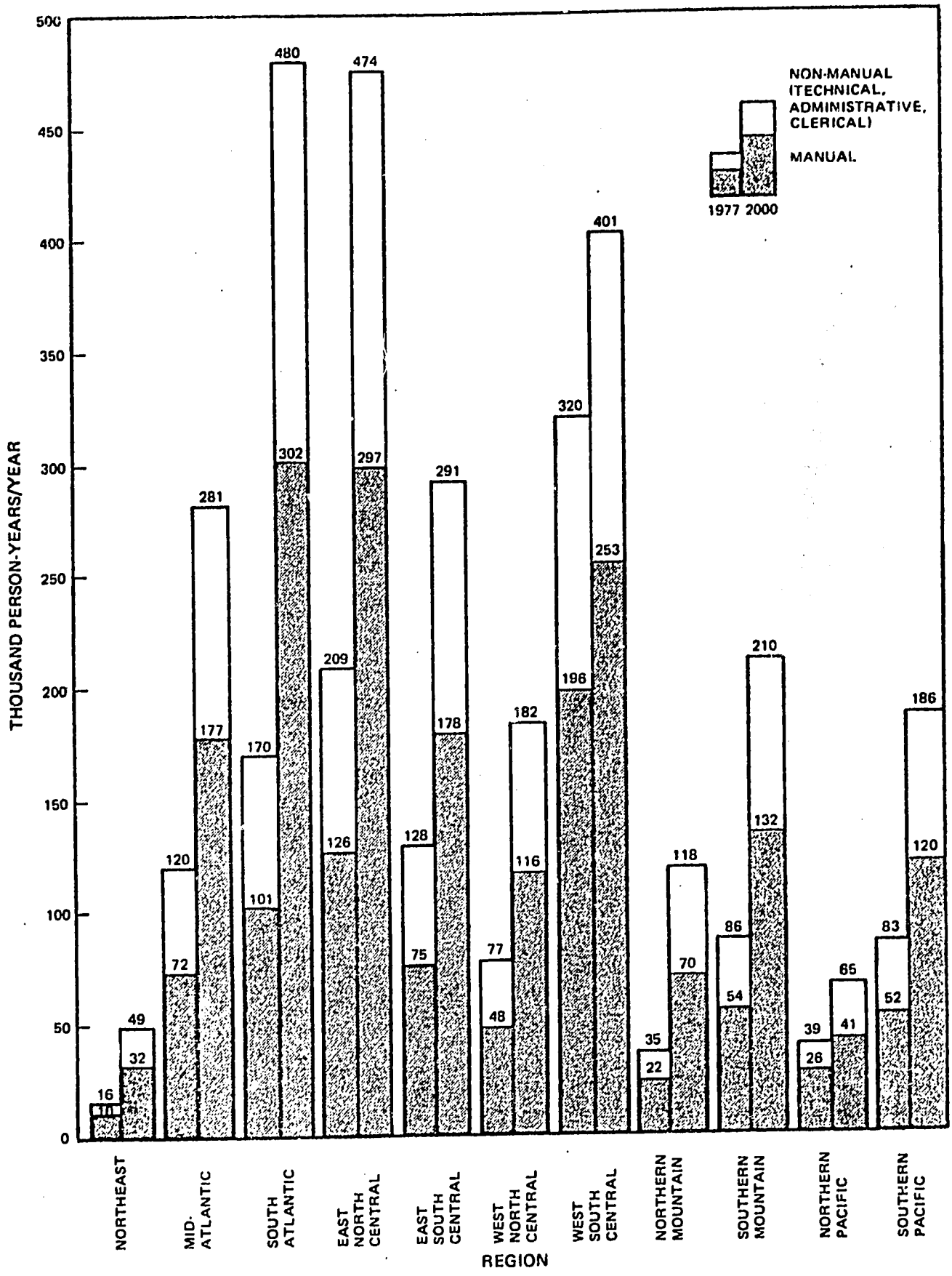


Figure 6
PROJECTED LABOR REQUIREMENTS
(CONSTRUCTION AND OPERATIONS IN THOUSAND PERSON-YEARS BY REGION)

*DOES NOT INCLUDE LABOR REQUIREMENTS FOR OFFSHORE OPERATIONS

COMMERCE LIKELY U.S. ENERGY CASE

PETROLEUM

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Table A-1

PETROLEUM SOURCES

VALUES IN MMBPD

	1976	1980	1985	2000	AVERAGE ANNUAL GROWTH
CONVENTIONAL OIL RECOVERY	5.00	4.15	3.32	1.50	-4.89%
SECONDARY OIL RECOVERY	1.60	1.50	1.30	0.70	-3.39%
ENHANCED OIL RECOVERY	0.30	0.30	0.60	1.00	5.14%
ONSHORE CRUDE	6.90	5.95	5.22	3.20	-3.15%
OFFSHORE CRUDE	1.30	1.40	2.00	1.20	-0.33%
ALASKAN OIL	0.0	1.20	1.30	1.50	------
SHALE OIL	0.0	0.0	0.08	0.30	------
DOMESTIC CRUDE	8.20	8.55	8.60	6.20	-1.16%
NATURAL GAS LIQUIDS	1.60	1.50	1.40	1.00	-1.94%
COAL LIQUIDS	0.0	0.0	0.0	0.0	------
DOMESTIC PETROLEUM PRODUCTION	9.60	10.05	10.00	7.20	-1.28%
CRUDE IMPORTS	5.30	6.50	5.50	3.80	-1.38%
REFINED PRODUCT IMPORTS	2.00	2.50	2.50	2.30	0.58%
PETROLEUM IMPORTS	7.30	9.00	8.00	6.10	-0.75%
OIL PRODUCTION AND IMPORTS	17.10	19.05	18.00	13.30	-1.04%

CRUDE OIL

SOURCES

DOMESTIC CRUDE	8.20	8.55	8.60	6.20	-1.16%
CRUDE IMPORTS	5.30	6.50	5.50	3.80	-1.38%
TOTAL CRUDE	13.50	15.05	14.10	10.00	-1.24%

USES

CRUDE TO REFINERIES	13.50	14.64	14.10	10.00	-1.24%
CRUDE TO STOCKPILE	0.0	0.41	0.0	0.0	------
CRUDE FOR DIRECT USE	0.0	0.0	0.0	0.0	------
TOTAL CRUDE	13.50	15.05	14.10	10.00	-1.24%

Projected Annual Resource Requirements At the National and Regional Level, Energy Forecast 1985 and 2000, U.S. Department of Commerce, Office of Ocean, Resource and Scientific Policy Coordination.

Sharp reductions in new additions of Petroleum Engineers to the petroleum and gas industries were expected to begin immediately in 1978.(12) Hiring quotas and new campus hires were expected to decline this year with smaller declines anticipated further into the future. These expected reductions are consistent with previous labor market experience for technical personnel.

On the projection side of the market for new college graduates, an annual percentage increase of 6.4 percent a year is predicted. This is a decline from the 9.3 percent annual increase in the past five years. The schools, however, expect to graduate increasing numbers of students in the next five years, a 100 percent increase between 1978 and 1982.

If the projections of the number of new graduates are compared with projected industry demand, a surplus of petroleum engineers can be expected. Universities expect to graduate 3856 BS or MS candidates while industry will seek to employ only 1709 new petroleum engineers. The schools are increasing their supply while industry demand has turned down. (13)

12/ Ibid.

13/ Ibid.

The nature of the supply of new candidates is such that there is a lag of supply behind demand since it takes at least four years to make the shift. By 1981-82 the twenty schools project a slowdown in the number of graduates.

e. Conclusions

Drilling and production operations involve a rapidly changing and evermore complex technology. Recent innovations include computerized drilling optimization, application of numerical simulation techniques to production problems and reservoir engineering, introduction and field testing of many new enhanced oil recovery methods. Bachelor's level engineers can receive valuable education through on-the-job training and company courses. However, these trends will require more petroleum engineers with Master's degrees and some with Ph.D. degrees.

f. Summary

Major problems facing petroleum engineering education are (1) severe faculty shortages and (2) low enrollment of U.S. citizens in graduate programs. However, at larger schools which have maintained a "critical mass" of faculty, very favorable conditions exist which provide unique opportunities for growth and improvements in educational quality.

Undergraduate enrollments are strong and growing and may soon surpass the peak enrollments experienced in the mid-fifties. These high enrollments tend to cause a favorable reallocation of university resources. Also, financial support from industry remains high, tending to be significantly higher than for other engineering disciplines. In addition, new opportunities for externally funded research are plentiful and should allow the gradual strengthening of graduate programs.[14] (Footnote)

14/ "Petroleum Engineering Manpower Supply And Demand - The Critical Balance", Paper presented at Engineer Manpower Conference, Society of Petroleum Engineers, Houston, Texas, June 1978.

7. Solar Programs

In response to a part of the Congressionally-mandated Solar Energy Information Data Bank (SEIDB), the Solar Energy Research Institute (SERI) conducted a survey of more than 3,200 educational institutions in July, 1978. The results of that survey culminated in the publication of the 1978-79 National Solar Energy Education Directory. Currently, there are 125 Degree Programs being offered and over 600 short term programs, i.e., workshops, seminars.

The basic problem of energy planning for the nations of the world is to provide for future energy supplies on an earth that is rapidly depleting its limited deposits of oil and natural gas, while demanding constantly increasing amounts of energy. In the future, solar energy might also play an important part in what has been called the hydrogen economy, a term that describes the situation that might develop in the future as a kind of alternative to the electric economy. It therefore seems evident that solar energy utilization would have a role to play.....it is reasonable to hope that the solar energy programs will succeed. (15)

15/ Eaton, William, Solar Energy, Energy Planning for the Future, Department of Energy.

B. SUMMARY OF TRAINING PROGRAMS

	Degree Programs	Short Term Workshops, Seminars	Ability to Expand Foreign Students Enrollment and Develop Specialized Curriculum
Technical			
Biomass (16)	42	2	COMMENT: While the 4-year institutions have higher foreign student enrollment, the Junior and Community Colleges appear to have more flexibility in terms of specialized curriculum development.
Electrical Engineering (17)	249	Conducted by Industry	
Mechanical Engineering (18)	244	Conducted by Industry	
Geology (19)	113	10	
Geothermal (21)	10	99	
Petroleum (22)	24	Conducted by Industry	
Solar (20)	125	600	
Managerial			
Marketing Management (23)	387	15	
Public Administration (24)	62	24	
Refinery Management (25)	24	Conducted by Industry	
Utility Management (26)	24	Conducted by Industry	
Energy Management (27)	10	4	

16-19/ Directory of Energy-Related Course Offerings, Brookhaven National Laboratory, December 1978.

20/ National Solar Energy Education Directory, Solar Energy Institute, January 1979.

21/ Geothermal Energy Program Summary, Department of Energy, June 1979.

22/25/ 26/ American Petroleum Institute.

23/24/ Index of Majors, 1979-80 Edition, The College Board, N.Y.

27/ The Status of Energy Management Academic Programs in U.S. Institutions of Higher Education, University of Pennsylvania, September 1978.

II. Institutions

A. Academic

1. Colleges/Universities

A survey conducted by the American Association of Community and Junior Colleges (AACJC) noted that over 214 courses and program offerings in various energy-related fields are conducted at two-year colleges and technical institutions. In addition, more than 70 new courses are being planned by these institutions for inclusion in the immediate academic program for 1978 and 1979.[28]

However, the number of energy-related course offerings is not impressive when specific fields are isolated. The majority of course offerings are in the popular areas of energy such as solar energy and conservation. Other energy fields, such as petroleum, coal, nuclear, wind, geothermal and applied (general combination of all fields) are not in demand.

Within the course offerings categorized by field, there is also an uneven distribution of type offerings. Non-credit community service courses lead, followed by short credit courses (parts of other degree programs) with two-year degree programs and less than two-year certificate programs failing far short.

28/ Hamilton, Bette Everett, A Survey of Energy Programs In Two-Year Colleges and Technical Institutes, Dec. 1978.

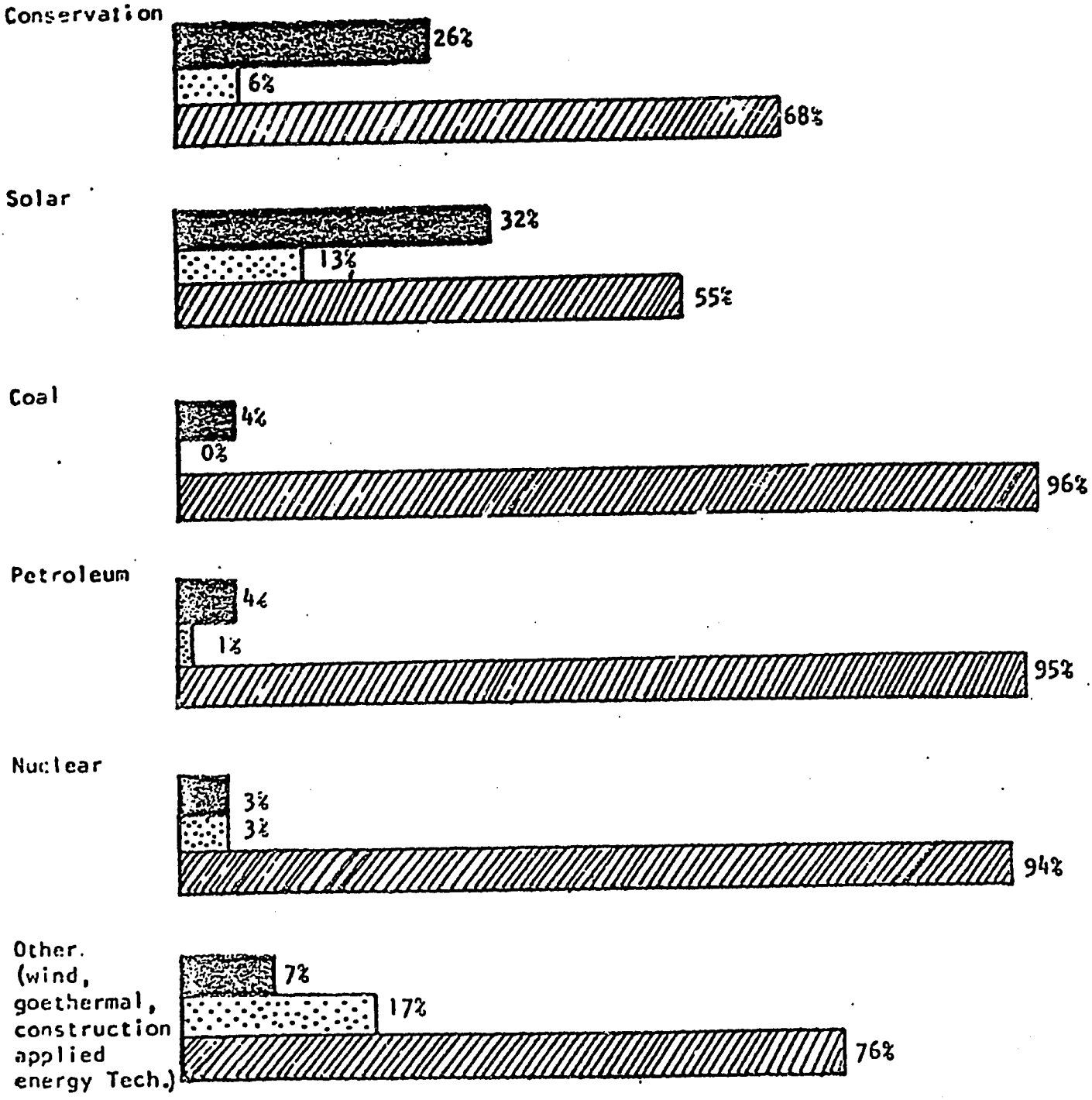
It is also important to examine the geographic distribution of energy-related course offerings. Some states have not been as aggressive as others in their course offerings. Alaska, Colorado, Texas, Nebraska, Minnesota, and Illinois seem to show an above average interest in providing energy-related technical training. The New England states, by comparison, seem to have less demand show for energy-related training.

Figure 1 indicates the percentage of institutions that presently offer, plan to offer, or do not plan to offer courses (credit, non-credit, degree, and certificate programs) by energy field (conservation, solar, coal, petroleum, nuclear, and other). The "other" category includes wind, geothermal, construction technology, and applied energy technology (a combination).

Source: American Association of Community and Junior Colleges, December, 1978.

Figure: 1

Institutions Offering Energy Related Programs*



*Includes degree programs, certificate programs, short credit courses, non-credit courses, workshops and seminars.

Key
presently offered
planned for future
no programs & no plans

Source: AACJC, December 1978.

Table 1 provides a breakdown of the various levels of energy-related offerings by energy field. Credit courses, as a category, are single course offerings in non-energy related degree programs. Non-credit community service offerings are short courses, forums, and/or workshops, usually open to the general public for which there is no academic credit awarded. Certificate programs which have emerged over the last two years are integrated within the heavy concentration in a specific energy field. Two-year degree programs entail a full series of energy-related courses in addition to the standard academic requirements which are a prerequisite for a Bachelor's degree.

Source: American Association of Community and Junior Colleges, December, 1978.

TABLE 1

NUMBER OF INSTITUTIONS OFFERING ENERGY CURRICULI BY FIELD AND KINDS OF OFFERING

FIELD	CREDIT COURSES*	DEGREE PROGRAMS	CERTIFICATE PROGRAMS	NON-CREDIT COMMUNITY SERVICE	ALL KINDS TOTAL
CONSERVATION	ACTUAL 31 / PLANNED 9	ACTUAL 4 / PLANNED 2	ACTUAL 3 / PLANNED 1	ACTUAL 34 / PLANNED 4	ACTUAL 72 / PLANNED 16
SOLAR	ACTUAL 37 / PLANNED 12	ACTUAL 6 / PLANNED 9	ACTUAL 6 / PLANNED 7	ACTUAL 38 / PLANNED 7	ACTUAL 87 / PLANNED 35
COAL	ACTUAL 3 / PLANNED 0	ACTUAL 8 / PLANNED 0	ACTUAL 0 / PLANNED 0	ACTUAL 0 / PLANNED 0	ACTUAL 11 / PLANNED 0
PETROLEUM	ACTUAL 2 / PLANNED	ACTUAL 7 / PLANNED 1	ACTUAL 1 / PLANNED 1	ACTUAL 2 / PLANNED 2	ACTUAL 12 / PLANNED 4
WIND	ACTUAL 1 / PLANNED 0	ACTUAL 0 / PLANNED 0	ACTUAL 0 / PLANNED 0	ACTUAL 0 / PLANNED 0	ACTUAL 1 / PLANNED 0
GEO-THERMAL	ACTUAL 0 / PLANNED 0	ACTUAL 0 / PLANNED 1	ACTUAL 0 / PLANNED 1	ACTUAL 0 / PLANNED 1	ACTUAL 0 / PLANNED 3
NUCLEAR	ACTUAL 1 / PLANNED 5	ACTUAL 5 / PLANNED 1	ACTUAL 0 / PLANNED 0	ACTUAL 2 / PLANNED 2	ACTUAL 8 / PLANNED 8
CONSTRUCTION ENERGY	ACTUAL 2 / PLANNED 0	ACTUAL 2 / PLANNED 1	ACTUAL 0 / PLANNED 0	ACTUAL 1 / PLANNED 0	ACTUAL 5 / PLANNED 1
APPLIED ENERGY TECHNOLOGY (COMBINATION OF WIND, SOLAR, GEO-THERMAL, AND NUCLEAR)	ACTUAL 5 / PLANNED 4	ACTUAL 1 / PLANNED 5	ACTUAL / PLANNED 2	ACTUAL 6 / PLANNED 2	ACTUAL 12 / PLANNED 13
TOTAL NUMBER ALL KINDS	ACTUAL 81 / PLANNED 32	ACTUAL 32 / PLANNED 16	ACTUAL 10 / PLANNED 12	ACTUAL 91 / PLANNED 17	ACTUAL 214 / PLANNED 77

*Credit courses, as a category, are single course offerings in non-energy related degree programs.

**Certificate programs are credit courses in energy fields less than 2 years in duration.

Source: AACJC, December 1978.

Table II indicates operational two-year degree programs by energy field that are currently operational. Generally, the coal and petroleum degree programs have been well-established in the academic institutions surveyed. The solar, conservation, and nuclear degree programs are relatively new to the higher education community.

Source: American Association of Community and Junior Colleges, December, 1978.

TABLE II.

OPERATIONAL TWO-YEAR DEGREE PROGRAMS BY ENERGY FIELD

FIELD	INSTITUTION	DEGREE
Conservation	Brevard Community College, Florida	A.S.
	Charles S. Mott Community College, Michigan	A.S.
	North Carolina*	A.A.S.
	Clark Technical College, Ohio	A.S.
Solar	Mississippi County Community College, Arkansas	A.A.S.
	Cerro Coso College, California	A.S.
	Scott Community College, Iowa	A.A.S.
	Charles S. Mott Community College, Michigan	A.S.
	Central Texas College, Texas	A.S.
	Navarro College, Texas	A.S.
	Parkersburg Community College, West Viginia	A.A.S.
Coal	Kenai Peninsula Community College, Alaska	A.A.S.
	Lees Junior College, Kentucky	A.S.
	Roane State Community College, Tennessee	A.S.
	College of Eastern Utah, Utah	A.S.
	Mt. Empire Community College, Virginia	A.A.S.
	West Virginia Northern Community College, West Virginia	A.A.S.
	Casper College, Wyoming	A.A.S.
Petroleum	Kenai Peninsula Community College, Alaska	A.A.S.
	Tanana Valley Community College, Alaska	A.A.S.
	Diablo Valley, California	A.A.
	Taft College, California	A.A.
	Schoolcraft College, Michigan	A.A.S.
	Casper College, Wyoming	A.A.S.
	Lincoln Trail College, Illinois	A.A.S.
Nuclear	Chabot College, California	A.A.
	Central Florida Community College, Florida	A.S.
	North Carolina*	A.A.S.
	Central Virginia Community College, Virginia	A.A.O.
Construction Energy	Olney Central College, Illinois	A.A.S.
Applied Energy Technology (wind, solar, geo-thermal, and nuclear)	Kenai Peninsula Community College, Alaska	A.A.S.
Wood-Chip Burning Technology	Paul Smith's College, New York	N/A

*Information supplied by state community college board. Participating institution not named. Source: AACJC, Dec. 1978.

Geographical Distribution of Petroleum Engineering Programs

States	Credit Courses	Degree Programs	Certificate	Non-Credit	Community Services
Alaska		2A	1A		
Arkansas	1A				1A
California		2A			
Colorado		1P	1P		
Illinois		1P			
Minnesota		1A			
Montana	1A				
New Jersey				1P	
South Carolina				1P	
Texas				1A	
Wyoming		1A			

A = Actual P = Planned

Total Actual:	Credit Courses	2
	Degree Programs	6
	Certificate	1
	Non-Credit	1
	Community Service	1
Total Planned:	Degree Programs	2
	Certificate	1
	Non-Credit	2
	Total:	16

Table III.

Supply: Students Enrolled (Spring 1978)
in Energy-Related Programs and Faculty Employed

	Credit Courses	Degree Programs	Certificates	Community Service
Conservation				
Students	939	170	680	4647
Faculty	15.5	4	4	47
*Non-respondents	/10/	/1/		/10/
Solar				
Students	1317	709	172	3314
Faculty	21.5	9	9	37
*Non-respondents	/4/		/1/	/9/
Coal				
Students	18	1040		
Faculty	N/A/	23		
*Non-respondents		/1/		
Petroleum				
Students		207	87	526
Faculty		9.5	3	15
*Non-respondents	/1/			
Nuclear				
Students	30	216		100
Faculty	1	9		1
*Non-respondents				
All Others				
Students	58			90
Faculty	1			5
*Non-respondents	/4/	/2/		/2/
Totals				
Students	2362	2342	939	8677
Faculty	40	54.5	16	105

*Note: Non-respondents are institutions that indicated programs offerings but did not provide student enrollment or faculty data.

Source: AACJC, December 1978.

Nearly every respondent stressed the need for cold, hard data on the demand-side for energy technicians. There was no response from the following states: Delaware, District of Columbia, Georgia, Hawaii, Idaho, Louisiana, New Mexico, New Hampshire, and Rhode Island. Lack of response is understandable in view of the fact that none of the above states have extensive Community College systems.

Response rates from the other states were as follows: (29)

Alabama	6%	Nebraska	82%
Alaska	29%	New Jersey	33%
Arizona	43%	New York	38%
Arkansas	27%	Nevada	25%
California	26%	North Carolina	42%
Colorado	50%	North Dakota	60%
Connecticut	29%	Ohio	43%
Florida	38%	Oklahoma	20%
Illinois	37%	Oregon	23%
Indiana	50%	Pennsylvania	40%
Iowa	42%	South Carolina	18%
Kansas	27%	South Dakota	100%
Kentucky	12%	Tennessee	35%
Maine	50%	Texas	36%
Maryland	38%	Utah	25%
Massachusetts	28%	Vermont	25%
Michigan	40%	Virginia	39%
Minnesota	30%	Washington	9%
Mississippi	15%	West Virginia	50%
Missouri	24%	Wisconsin	11%
Montana	67%	Wyoming	29%
	Puerto Rico 11%		

29/ Hamilton, Bette Everett, A Survey of Energy Programs In Two-Year Colleges and Technical Institutes, December 1978.

B. U.S. Government Sponsored Programs

1. National Laboratories

National Laboratories have a long history of cooperation with universities in education and research programs.

The laboratory's primary objectives in their university cooperative research and training is to help assure an adequate supply of manpower in the various science and engineering disciplines.

Statistical Data on the types of program offerings, numbers of enrolles, etc. can only be obtained by conducting a very comprehensive survey of the educational institutions having contracts with the more than 15 DOE laboratories for research and development in energy-related areas.

C. Private Industry

1. Private Corporations

In-service program information not sufficiently available for inclusion in this report.

2. Other Private Institutions or Foundations

In-service program information not sufficiently available for inclusion in this report.

E. Summary

1. Expansion of Foreign Student Enrollment

Currently, 132,760 foreign students are studying in the United States.

56% - Undergraduate
43% - Graduate
24% - Engineering

Table 1

TWO YEAR

	Number	Percentage of 37,446
Miami-Dade Community College	3,456	9.2
Montgomery College, Rockville	1,149	3.1
Northern Virginia Community College	875	2.3
Oscar Rose Junior College	660	1.8
Pima Community College	647	1.7
El Camino College	642	1.7
Central YMCA Community College	600	1.6
San Jacinto College	490	1.3
Oklahoma City Southwestern College	463	1.2
Santa Ana College	439	1.2
TOTAL	9,421	25.1

FOUR YEAR

	Number	Percentage of 198,063
University of Southern California	3,180	1.6
University of Wisconsin, Madison	2,345	1.2
Indiana University, Bloomington	2,244	1.1
University of Michigan, Ann Arbor	2,033	1.0
Howard University	1,884	1.0
University of Washington	1,840	0.9
Harvard University	1,829	0.9
University of Texas, Austin	1,805	0.9
University of Houston, Main Campus	1,789	0.9
New York University	1,711	0.9
TOTAL	20,660	10.4

PUBLIC

	Number	Percentage of 147,613
Miami-Dade Community College	3,456	2.3
University of Wisconsin, Madison	2,345	1.6
Indiana University, Bloomington	2,244	1.5
University of Michigan, Ann Arbor	2,033	1.4
University of Washington	1,840	1.2
University of Texas, Austin	1,805	1.2
University of Houston, Main Campus	1,789	1.2
University of Minnesota, Minneapolis and St. Paul	1,613	1.1
Texas Southern University	1,580	1.1
University of California, Berkeley	1,494	1.0
TOTAL	20,199	13.6

PRIVATE

	Number	Percentage of 87,896
University of Southern California	3,160	3.6
Howard University	1,884	2.1
Harvard University	1,829	2.1
New York University	1,711	1.9
Columbia University, Main Division	1,700	1.9
George Washington University	1,645	1.9
Stanford University	1,627	1.9
University of Pennsylvania	1,550	1.8
Massachusetts Institute of Technology	1,477	1.7
American University	1,342	1.5
TOTAL	17,945	20.4

Table 1 lists the Ten Institutions most populated by Foreign Students.

Source: OPEN DOORS, 1977-78, INSTITUTE OF INTERNATIONAL EDUCATION.

Table 2 notes that the OPEC nations sent 31.2% of all the foreign students to the U.S., in 1971, they sent 12.4%.

Table 2

Foreign Students From Organization of Petroleum Exporting Countries (OPEC)

	1971/72	1976/77	1977/78
Algeria	47	770	1,680
Ecuador	468	710	800
Gabon	2	...	...
Indonesia	583	1,090	1,820
Iran	6,365	23,310	36,220
Iraq	268	720	1,190
Kuwait	406	1,240	1,810
Libya	494	1,610	2,090
Nigeria	2,894	11,870	13,510
Qatar	36	200	180
Saudi Arabia	821	4,590	6,560
U.A.E.	5	180	270
Venezuela	1,703	5,750	7,420
OPEC Total	14,090	52,040	73,550
Total Foreign Student Enrollment	114,024	203,068	235,509
OPEC as a % of World Total	12.4%	25.6%	31.2%

Source: OPEN DOORS, 1977-78, INSTITUTE OF INTERNATIONAL EDUCATION.

Obviously those institutions listed in Table 1 can expand their enrollment of foreign students, particularly colleges and universities located where more than 20% of foreign students reside.

A previous survey of educational institutions notes that the following institutions expressed a desire to expand their foreign student enrollments.

-- Catholic University

-- Florida Institute of Technology

-- Georgia Institute of Technology

-- University of North Carolina

-- University of Pennsylvania

-- Rice University

-- Southern Methodist

-- State University of New York (Stonybrook)

-- Texas A and M

2. Curriculum Development

Several colleges and universities have the capability of developing short term courses, curricula, research projects and specialized industry training designed to meet the needs of students from developing countries.

However, in order to proceed, grant money is needed to conduct feasibility studies and run pilot courses. Several institutions that are presently offering Workshops, Seminars and Short-Term Courses in response to academic public and private requests are:

-- University of Akron

-- University of Alabama

-- Auburn University

-- California Institute of Technology

-- Catholic University

-- Colorado School of Mines

-- University of Delaware

-- Embry Riddle Aerospace Institute

-- George Washington University

-- Georgia Institute of Technology

-- University of Illinois at Chicago Circle

-- Loyola University

-- Midlands Technical College Education Center

-- Norwalk State Technical College

-- Rose-Hulman Institute of Technology

-- St. Peterburg Jr. College

3. Evaluation of Programs

Top Ten Universities
(Rating: American Council on Education) (30)

	Enrollments/Degrees Granted (31) (Fall, 1978)	
Massachusetts Institute of Technology[1]	1,853	517
Stanford University[2]	1,660	847
California Institute of Technology[2]	360	152
University of California (Berkeley)[2]	1,467	158
University of Michigan[2]	1,045	494
University of Minnesota[2]	639	189
Brown University[2]	77	27
Howard University[2]	137	41
University of Illinois at Chicago Circle[2]	396	50
Purdue University[2]	1,131	427

30/ Roose, Kenneth D. & Andersen, Charles J., Rating of Graduate Schools and Programs, American Council on Education, 1971.

31/ Engineering Education, March 1979, American Society for Engineering Education.

[1]Master's only.

[2]Master's, Professional and Doctorate.

F. National Trends

In the fall of 1975, the United States formally proposed the establishment of an International Energy Institute to help developing countries solve their problems.[32]

It was suggested that the institute be staffed by experts drawn from government, industry and academic life in both industrialized and developing countries in order to provide training for local and regional technicians or specialists in energy problems.

No significant move was made to implement any of the earlier recommendations, and the most recent proposal is still a matter of discussion within the U.S. Government. It is therefore timely, the panel believes, to emphasize the necessity for decentralizing not only the power supply systems, but also the proposed International Energy Institute. This decentralization is essential if a country is to take advantage of alternative technologies for exploiting renewable energy resources. An International Energy Institute would undoubtedly serve a valuable function as a "central point of contact" for coordination of research, energy-policy studies, analysis of energy systems, and training of developing

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32/ Energy For Rural Development, Ad Hoc Panel of the Advisory Committee on Technology Innovation, National Academy of Sciences, Washington, D.C. 1976.

country personnel in these and energy management skills. [33]

Administration of Energy Education

Energy education must be distinguished from the promotion of program missions within the Department of Energy. To accomplish this, an Energy Education Office should be established, administratively separate from DOE mission-oriented programs. It might be located within DOE, or in another agency, such as the Office of Education or the National Science Foundation. All energy education materials and programs should be prepared outside mission-oriented entities of government or industry.

Energy education should be directed at increasing public understanding of energy choices in their broadest context. Thus, education must place factual information within the perspectives given by contextual information about the economic, social, environmental, political, international, ethical, and other issues and forces which shape policy and determine the ultimate effects of energy decisions.

33/ Kissinger, Henry. 1975. Global consensus and economic development Speech before the United Nations General Assembly, Seventh Special Session, September 1, Washington, D.C., U.S. Department of State, Bureau of Public Affairs, Office of Media Services.

The national energy education effort must also attend all major technical and policy options, specifically including all technologies to which substantial federal commitment is being made. The national effort must attend to both national issues and regional-local questions, giving equitable emphasis to all the various types of local and regional energy concerns.

Affiliation of Attendees: [34]

Educators	44%	Public Interest	5%
Industry	15%	Labor	2%
Government	11%	Unidentified	21%

In 1977-78, foreign student enrollments in U.S. institutions of higher education totalled 235,509 -- 28% of those enrolled are in engineering programs. [35] However, the total number of foreign students studying in the U.S. topped 200,000 for the first time, rising rapidly over the past three years. In 1976-77, engineering, agriculture, and the natural and life sciences accounted for 24.1%, 3.2% and 11.3% respectively of all foreign student enrollments. There has been an increasing number of students enrolling in two year as opposed to four year curricula. [36]

34/ Education, paper prepared by the Public Energy Education Task Force, presented at the National Energy, Education, Business and Labor Conference, Washington, D.C., January, 1979.

35/ OPEN DOORS: 1977-1978, Institute For International Education, Washington, D.C. 1979.

36/ The Role of U.S. Universities In Science And Technology For Development: Mechanisms and Policy Options, Washington University, 1978.

SUMMARY

Objectives

The purpose of this report was to summarize existing information on energy training programs currently offered in the United States, which are available for students from developing countries.

Methodology

The objective was achieved by an examination of previous energy-related education surveys, discussions with government agencies, educational institutions and professional societies, including a review of existing statistical data in the fields of engineering and management.

Conclusions

One of the prominent movements in American education today is the globalization of education. Implied in this movement is the belief that the effectiveness of a mutually beneficial and supportive international relationship depends, in large measure, on the quality, quantity, and accessibility of this nation's educational system to international students. The kinds and scope of programs available to the international community is inherently linked to the increasing emphasis on the development of new energy sources and the effective utilization of current energy sources in the United States and abroad. Additionally, developed countries are more cognizant of the fact that they cannot afford the luxury of ignoring the educational/energy needs in less developed countries.

Ideally, Federal activities should be designed to encourage expansion of management and delivery of energy education programs and technical assistance to pre-/post-occupational students in developing countries. This nation's educational policymakers should endeavor to identify current and future issues in the area of energy education and then determine whether -- and to what extent -- programs are being designed to address the existing and future needs of developing countries.

APPENDIX I

ENGINEERING MANPOWER SURVEY

Society of Petroleum Engineers of AIME

Engineering Manpower Survey

Academic Survey

Question 1: Year-End Total, Petroleum Engineering Graduates, U.S. National or Equivalent

Type of Graduate	1973	'73 - '74		1974	'74 - '75		1975	'75 - '76		1976
		Ab.	%		Ab.	%		Ab.	%	
BS	247	1	.80	249	-11	4.62	238	50	21.0	288
MS	27	7	25.9	34	1	2.94	35	-1	2.9	34
Total	274	9	3.28	283	-10	3.66	273	49	17.9	322

	'76 - '77		1977	Total 1973-1977		Average Annual	
	Ab.	%		Ab.	%	Ab.	%
BS	72	25.0.	360	113	45.7	22.6	9.1
MS	8	23.5	42	15	55.5	3	11.1
Total	80	24.8	402	128	46.7	25.6	9.3

Response Rate: 20 of 24 departments of petroleum engineering -- 83.33%

Note: of the 20 respondents, 2 do not have graduate degree programs.

NEW ENTRANTS INTO PETROLEUM ENGINEERING

Year	Source			
	SPE[a]	EJC[b]	NCES[c]	EJCP[d]
1973				
BS	247	328	307	
MS	27	95	58	
Total	274	423	365	
1974				
BS	249	299	307	
MS	34	60	58	
Total	283	359	365	
1975				
BS	238	309	307	
MS	35	76	58	
Total	273	385	365	
1976				
BS	288	359	260	
MS	34	98	50	
Total	322	457	310	
1977				
BS	360		220	661
MS	42		50	
Total	402		270	
1978				
BS	567		270	766
MS	54		50	
Total	621		310	
1979				
BS	699		290	1010
MS	69		50	
Total	768		340	
1980				
BS	731		310	1027
MS	77		50	
Total	808		360	
1981				
BS	752			
MS	88			
Total	840			
1982				
BS	728			
MS	91			
Total	819			

a. Society of Petroleum Engineers, Survey of 20 schools.
b. Engineering Manpower Commission, Engineers Joint Council, Survey of 289 schools.
c. National Center for Educational Statistics projected 1973-1974 reported as average 1970-75.
d. Projected from EJC enrollments reported for Fall 1976, assumption that all enrollees graduate.

Society of Petroleum Engineers of AIME

Engineering Manpower Survey

SURVEY SAMPLE SIZE

Type of Company	Number of Companies Sent Questionnaire
Major Integrated	28
Independent	11
Gas Transmission/Producing	15
Service	17

RATE OF RETURN

Type of Company	Number of Companies Responding To Questionnaire	Return
Major Integrated	24	85.71
Independent	8	72.72
Gas Transmission/Producing	10	66.66
Service	6	35.29

APPENDIX II

LISTING OF EDUCATIONAL INSTITUTIONS

EXISTING PROGRAMS

Biomass (Biochemistry)

Auburn U. .....Alabama
Bard College.....New York
California, U. of
Berkeley, Davis,
Riverside).....California
California State Poly
Coll. (San Luis
Obispo).....California
California State U. (Los
Angeles).....California
Canisius Coll.....New York
Chicago, U. of.....Illinois
City Coll.....New York
Colgate U. .....New York
Colorado Coll. .....Colorado
Cornell U. .....New York
Georgia, U. of.....Georgia
Harvard U. .....Massachusetts
Idaho, U. of.....Idaho
Iowa State U. .....Iowa
Kansas, U. of.....Kansas
Kansas State U. ....Kansas
Louisiana State U. .Louisiana
Maine, U. of.....Maine
Maryland, U. of.....Maryland
Massachusetts, U. of Massachusetts
Michigan State U. ..Michigan
Mills Coll. .....California
Mt. Holyoke.....Massachusetts
Nebraska, U. of.....Nebraska
New Hampshire, U. of New Hampshire
Oberlin Coll. .....Ohio
Ohio State U. .....Ohio
Oklahoma State U. ..Oklahoma
Pennsylvania, U. of.Pennsylvania
Pennsylvania State
U. .....Pennsylvania
Purdue U. .....Indiana
Rice U. .....Texas
Saint Leo. Coll. .....Florida
Smith College.....Massachusetts
Southern Connecticut State
College.....Connecticut
St. Procopius College.....Illinois
Tennessee State U. .....Tennessee
Texas A&M.....Texas
Vassar College.....New York
Virginia Poly Tech. Inst. .....Virginia
Washington State U. .....Washington
Wheaton Coll. .....Massachusetts
Wisconsin, U. of (Madison).....Wisconsin
Wyoming, U. of.....Wyoming

EXISTING PROGRAMS

Energy Management

California, U. of
(Berkeley) .....California
Eastern Illinois U. .....Illinois
George Washington U. .....District of Columbia
New Mexico, U. of .....New Mexico
New York U. .....New York
Pennsylvania, U. of .....Pennsylvania
Pittsburgh, U. of .....Pennsylvania
Poly. Inst. of New York .....New York
Pomona State College .....California
Washington, U. of .....Washington

EXISTING PROGRAMS

Engineering (Electrical)

Air Force Inst. of Tech....Ohio
Akron, U. of.....Ohio
Alabama, U. of at U. ....Alabama
Alaska, U. of.....Alaska
Arizona, U. of.....Arizona
Arizona State U. .....Arizona
Arkansas, U. of.....Arkansas
Auburn U. .....Auburn
Bradley.....Illinois
Bridgeport, U. of....Connecticut
Brigham Young U. .....Utah
Brooklyn Poly Inst. .....New York
Brown.....Rhode Island
Bucknell.....Pennsylvania
California, U. of
(Berkeley, Davis, Irvine, Santa Barbara).....California
California State Poly. Coll.
(San Luis Obispo, Pomona).....California
California State U. (Chico, Fresno, Long Beach, Sacramento, San Diego, San Jose)..California
Carnegie-Mellon U. ..Pennsylvania
Case Western Reserve U. ...Ohio
Catholic U. ....District of Columbia
Christian Bros. Coll. ..Tennessee
Cincinnati, U. of.....Ohio
City College.....New York
Clarkson Coll. of.....New York
Clemson.....South Carolina
Cleveland State U. .....Ohio
Colorado, U. of.....Colorado
Colorado State U. .....Colorado
Columbia.....New York
Connecticut, U. of...Connnecticut
Cooper Union.....New York
Cornell.....New York
Dayton, U. of.....Ohio
Delaware, U. of.....Delaware
Denver, U. of.....Colorado
Detroit, U. of.....Michigan
Drexel U. .....Pennsylvania
Duke.....North Carolina
Evansville, U. of.....Indiana
Fairleigh Dickinson....New Jersey
Florida, U. of.....Florida
Florida Inst. of Tech. ..Florida
Gannon.....Pennsylvania
Geo. Washington U. ..District of Columbia
Georgia Inst. of Tech. ....Georgia
Hartford, U. of.....Connecticut
Hawaii, U. of.....Hawaii
Houston, U. of.....Texas
Howard U. .....District of Columbia
Idaho, U. of.....Indiana
Illinois, U. of.....Illinois
Illinois Inst. of Tech. ...Illinois
Iowa, U. of.....Iowa
Iowa State U. .....Iowa
Johns Hopkins.....Maryland
Kansas, U. of.....Kansas
Kansas State U. .....Kansas
Kentucky, U. of.....Kentucky
Lafayette.....Pennsylvania
Lamar U. .....Texas
Lehigh.....Pennsylvania
Louisiana State U. .....Louisiana
Louisiana Tech. U. .....Louisiana
Louisville, U. of.....Kentucky
Lowell Tech. Inst. .....Massachusetts
Loyola U. .....California
Maine, U. of.....Maine
Manhattan.....New York
Marquette.....Wisconsin
Maryland, U. of.....Maryland
Massachusetts, U. of at Amherst.....Massachusetts
Massachusetts Inst. of Tech. .....Massachusetts
Memphis State U. .....Tennessee
Merrimack Coll. .....Massachusetts
Miami, U. of.....Florida
Michigan, U. of.....Michigan
Michigan State U. .....Michigan
Michigan Tech. U. .....Michigan
Minnesota, U. of.....Minnesota
Mississippi, U. of.....Mississippi
Mississippi State U. .....Mississippi
Missouri, U. of (Columbia Rolla).....Missouri
Montana State U. .....Montana
Nebraska, U. of at Lincoln..Nebraska
Nevada, U. of.....Nevada
New Hampshire, U. of.....New Hampshire
New Mexico, U. of.....New Mexico
New Mexico State U. .....New Mexico
New York U. .....New York
Newark Coll. of Engrg. ....New Jersey
North Carolina A&T State U. North Carolin
North Carolina State U. (Raleigh).....North Carolina

Engineering (Electrical) - continued...

North Dakota, U. of..North Dakota
North Dakota State...North Dakota
Northeastern.....Massachusetts
Northwestern U. .....Illinois
Norwich.....Vermont
Notre Dame, U. of.....Indiana
Ohio Northern.....Ohio
Ohio State U. .....Ohio
Ohio U. .....Ohio
Oklahoma, U. of.....Oklahoma
Oklahoma State U. .....Oklahoma
Oregon State U. .....Oregon
Pacific, Coll. of the..California
Pennsylvania, U. of..Pennsylvania
Pennsylvania State U. Pennsylvania
Pittsburgh, U. of....Pennsylvania
Pratt.....New York
Princeton.....New Jersey
Puerto Rico, U. of....Puerto Rico
Purdue.....Indiana
Rensselaer Poly. Tech. ..New York
Rhode Island, U. of..Rhode Island
Rice U. .....Texas
Rochester, U. of.....New York
Rose-Hulman Inst. of
Tech. .....Indiana
Rutgers.....New Jersey
Santa Clara, U. of.....California
Seattle U. .....Washington
South Carolina, U.
of.....South Carolina
South Dakota Sch. of
Mines.....South Dakota
South Dakota State U.South Dakota
Southeastern
Massachusetts U. ..Massachusetts
Southern California U.
of.....California
Southern Illinois U.
(Carbondale).....Illinois
Southern Methodist.....Texas
Southern U. .....Lousiania
Southwestern Lousiania,
U. of.....Louisiana
St. Louis U. .....Missouri
Stanford.....California
State U. of New York
(Buffalo).....New York
Syracuse U. .....New York
Tennessee, U. of.....Tennessee
Tennessee Tech. U. .....Tennessee
Texas, U. of Arlington,
Austin, El Paso).....Texas
Texas A&I U. .....Texas
Texas A&M.....Texas
Texas Tech. U. .....Texas
Toledo, U. of.....Ohio
Tufts.....Massachusetts
Tulane.....Louisiana
Tulsa, U. of.....Oklahoma
Tuskagee Inst. .....Alabama
Union.....New York
U.S. Air Force Acad. .....Colorado
U.S. Naval Acad. .....Maryland
U.S. Naval Postgraduate Sch. California
Utah, U. of.....Utah
Utah State U. .....Utah
Valparaiso U. .....Indiana
Vanderbilt.....Tennessee
Vermont, U. of .....Vermont
Villanova.....Pennsylvania
Virginia, U. of.....Virginia
Virginia Poly. Inst. .....Virginia
Washington, U. of.....Washington
Washington State U. .....Washington
Washington U. .....Missouri
Wayne State U. .....Mississippi
West Virginia Inst. of
Tech. .....West Virginia
West Virginia U. .....West Virginia
Western New England Coll. Massachusetts
Wichita State U. .....Kansas
Wisconsin, U. of (Madison,
Milwaukee).....Wisconsin
Worcester Poly. Inst. ....Massachusetts
Wyoming, U. of.....Wyoming
Youngstown State U. .....Ohio

EXISTING PROGRAMS

Engineering (Mechanical)

Akron, U. of.....Ohio
Alabama, U. of.....Alabama
Arizona, U. of.....Arizona
Arizona State U. ...Arizona
Arkansas, U. of.....Arkansas
Auburn U. .....Alabama
Bradley.....Illinois
Bridgeport, U. of...Connecticut
Brigham Young U. ...Utah
Brooklyn Poly Inst..New York
Brown.....Rhode Island
Bucknell.....Pennsylvania
California U. of
(Berkeley, Davis, Santa
Barbara).....California
California State Poly U.
(San Luis Obispo and
Pomona.....California
California State U. (Long
Beach, Chico, Fresno,
Sacramento, San Diego,
San Jose).....California
Carnegie-Mellon U. .Pennsylvania
Case Western Reserve U..Ohio
Catholic U. ...District of
Columbia
Christian Brothers
College.....Tennessee
Cincinnati, U. of...Ohio
City College.....New York
Clarkson College of
Technology.....New York
Clemson.....South Carolina
Cleveland State U. ..Ohio
Colorado, U. of...Colorado
Colorado State U. Colorado
Columbia.....New York
Connecticut, U.
of.....Connecticut
Cooper Union.....New York
Cornell.....New York
Dayton, U. of.....Ohio
Delaware, U. of.....Delaware
Denver, U. of.....Colorado
Detroit, U. of....Michigan
Drexel U. .....Pennsylvania
Duke.....North Carolina
Evansville, U. of..Indiana
Fairleigh
Dickinson.....New Jersey
Florida, U. of.....Florida
Gannon.....Pennsylvania
George Washington
U. .....District of Columbia
Georgia Inst. of Tech...Georgia
Hartford, U. of.....Connecticut
Hawaii, U. of.....Hawaii
Houston, U. of.....Texas
Howard U.....District of Columbia
Idaho, U. of.....Idaho
Illinois, U. of.....Illinois
Illinois Inst. of Tech..Illinois
Iowa, U. of.....Iowa
Iowa State U. .....Iowa
Kansas, U. of.....Kansas
Kansas State U. ....Kansas
Kentucky, U. of.....Kentucky
Lafayette.....Pennsylvania
Lehigh.....Pennsylvania
Louisiana State U. .Louisiana
Louisiana Tech. U. .Louisiand
Louisville, U. of ..Kentucky
Lowell Tech. Inst. .Massachusetts
Loyola U. .....California
Maine, U. of.....Maine
Manhattan College...New York
Marquette.....Wisconsin
Maryland, U. of.....Maryland
Massachusetts, U.
of.....Massachusetts
Massachusetts Inst.
of Tech. .....Massachusetts
Miami, U. of.....Florida
Michigan, U. of.....Michigan
Michigan State U. ..Michigan
Michigan Tech. U. ..Michigan
Minnesota, U. of....Minnesota
Mississippi, U. of..Mississippi
Mississippi State U.Mississippi
Missouri, U. of
(Columbia, Rolla)..Missouri
Montana State U. ...Montana
Nebraska, U. of
(Lincoln).....Nebraska
Nevada, U. of.....Nevada
New Hampshire, U. of.New Hampshire
New Haven, U. of....Connecticut
New Mexico, U. of...New Mexico
New Mexico State U. .New Mexico
New York U. .....New York

Engineering (Mechanical) - continued...

Newark Coll. of Engineering.....New Jersey
North Carolina A&T State U. .....North Carolina
North Carolina State U. (Raleigh).....North Carolina
North Dakota, U. of..North Dakota
North Dakota State U. .North Dakota
Northeastern.....Massachusetts
Northwestern.....Illinois
Norwich.....Vermont
Notre Dame, U. of...Indiana
Ohio Northern.....Ohio
Ohio State U. .....Ohio
Ohio U. .....Ohio
Oklahoma, U. of.....Oklahoma
Oklahoma State U. ...Oklahoma
Oregon State U. .....Oregon
Pennsylvania, U. of..Pennsylvania
Pennsylvania State U. Pennsylvania
Pittsburgh, U. of....Pennsylvania
Pratt.....New York
Princeton.....New Jersey
Puerto Rico, U. of...Puerto Rico
Purdue.....Indiana
Rensselaer Poly Inst. ..New York
Rhode Island,U. of...Rhode Island
Rice U. .....Texas
Rochester, U. of.....New York
Rochester Inst. of Tech. .....New York
Rose Hulman Inst. of Tech. .....Indiana
Rutgers.....New Jersey
Santa Clara, U. of...California
Seattle U. .....Washington
South Carolina, U. of.....South Carolina
South Dakota Schl of Mines.....South Dakota
South Dakota State U. .....South Dakota
Southeastern Massachusetts U. .....Massachusetts
Southern California of.....California
Southern Methodist..Texas
Southern U. .....Louisiana
Southwestern Louisiana, U. of.....Louisiana
Stanford.....California
State U. of New York (Buffalo).New York
Syracuse U. ....New York
Tennessee, U. of.....Tennessee
Tennessee Tech. U. .....Tennessee
Texas, U. of (Arlington, Austin, El Paso).....Texas
Texas A&M.....Texas
Texas Tech. U. .....Texas
Toledo, U. of.....Ohio
Tri-State College.....Indiana
Tufts.....Massachusetts
Tulane.....Louisiana
Tulsa, U. of.....Oklahoma
Tuskegee Inst. .....Alabama
Union.....New York
U.S. Naval Acad. ....Maryland
U.S. Naval Post Graduate Sch. .....California
Utah, U. of.....Utah
Utah State U. .....Utah
Valparaiso U. .....Indiana
Vanderbilt.....Tennessee
Vermont, U. of.....Vermont
Villanova.....Pennsylvania
Virginia, U. of.....Virginia
Virginia Poly. Inst. .Virginia
Washington, U. of.....Washington
Washington State U. ..Washington
Washington U. .....Missouri
Wayne State U. .....Mississippi
West Virginia Inst. of Tech. .....West Virginia
West Virginia U. .West Virginia
Western New England College.....Massachusetts
Wichita State U. .....Kansas
Wisconsin, U. of (Madison).....Wisconsin
Worcester Poly. Inst. Massachusetts
Wyoming, U. of.....Wyoming
Youngstown State U. .....Ohio

EXISTING PROGRAMS

Geology

Alabama, U. of .....Alaska
Allegheny Coll. .....Pennsylvania
Arizona, U. of .....Arizona
Arizona State U. .....Arizona
Arkansas, U. of .....Arkansas
Baylor U. .....Texas
Boston Coll. .....Massachusetts
Bowling Green State .....Ohio
Brigham Young .....Utah
Brooklyn Coll. .....New York
Brown .....Rhode Island
California, U. of (Berkeley, Davis, Los Agneles, Riverside, Santa Barbara)..California
California State U. (Los Angeles, Chico, Fresno, Humboldt, San Diego, San Francisco, San Jose, Northridge) .....California
Campbell Coll. .....North Carolina
Case Western Reserve U. .....Ohio
City Coll. .....New York
Colorado, U. of .....Colorado
Colorado Coll. .....Colorado
Colorado State U. .....Colorado
Dartmouth .....New Hampshire
Dayton, U. of .....Ohio
Dickinson Coll. .....Pennsylvania
Florida, U. of .....Florida
Fork Hays Kansas State Coll..Kansas
Franklin and Marshall .....Pennsylvania
Georgia, U. of .....Georgia
Hofstra U. .....New York
Idaho State U. .....Idaho
Illinois, U. of .....Illinois
Indiana State U. .....Indiana
Indiana U. .....Indiana
Iowa, U. of .....Iowa
Kansas State U. .....Kansas
Kent State U. .....Ohio
Kentucky, U. of .....Kentucky
Lamar State .....Texas
Lehman Coll. .....New York
Long Island U. .....New York
Louisiana Poly. Inst. .....Louisiana
Louisiana State U. .....Louisiana
Marshall U. .....West Virginia
Massachusetts, U. of .....Massachusetts
Miami, U. of .....Florida
Miami U. .....Ohio
Michigan State U. .....Michigan
Michigan U. .....Michigan
Minnesota, U. of .....Minnesota
Missouri, U. of .....Missouri
Monmouth Coll. .....Illinois
Montana, U. of .....Montana
Nebraska, U. of .....Nebraska
Nevada, U. of .....Nevada
New Hampshire, U. of .....New Hampshire
New Mexico, U. of .....New Mexico
New Mexico Inst. Mining and Tech. .....New Mexico
New Mexico State U. .....New Mexico
North Carolina, U. of ....North Carolina
North Carolina State U. ..North Carolina
North Dakota, U. of .....North Dakota
Northeast Louisiana State .....Louisiana
Northern Arizona U. .....Arizona
Northern Illinois U. .....Illinois
Ohio State U. .....Ohio
Ohio U. .....Ohio
Oklahoma, U. of .....Oklahoma
Oklahoma State U. .....Oklahoma
Oregon State .....Oregon
Pennsylvania, U. of .....Pennsylvania
Pennsylvania State .....Pennsylvania
Princeton U. .....New Jersey
Queens Coll. .....New York
Rensselaer Poly. Inst. .....New York
Rhode Island, U. of .....Rhode Island
Rice U. .....Texas
Rochester, U. of .....New York
Rutgers State .....New Jersey
Smith Coll. .....Massachusetts
South Carolina, U. of ....South Carolina
South Florida, U. of .....Florida
Southern California, U. of .....California
Southern Colorado State .....Colorado
Southern Illinois U. .....Illinois
Southern State .....Arizona

EXISTING PROGRAMS

Geology - con't.

Southwestern Louisiana, U. of ...Louisiana
St. Joseph's Coll. .....Indiana
St. Louis U. .....Missouri
Stanford .....California
State U. of New York
(Binghamton, New Paltz,
Potsdam) .....New York
Temple U. .....Pennsylvania
Tennessee, U. of .....Tennessee
Texas, U. of (Arlington,
Austin and El Paso) .....Texas
Texas A&M U. .....Texas
Texas Tech. U. .....Texas
Toledo, U. of .....Ohio
U. Vermont & State
Agri. Coll. .....Vermont
Utah, U. of .....Utah
Utah State U. .....Utah
Virginia Poly. Inst. .....Virginia
Washington, U. of .....Washington
Washington State U. .....Washington
Wayne State U. .....Michigan
West Texas State .....Texas
West Virginia U. .....West Virginia
Western State Coll. .....Colorado
Western Washington State .....Washington
Wichita State U. .....Kansas
William & Mary Coll. .....Virginia
Wisconsin, U. of (Oshkosh,
Superior) .....Wisconsin
Wittenberg U. .....Ohio
Wyoming, U. of .....Wyoming

EXISTING PROGRAMS

Petroleum Technology

California, U. of (Berkeley) .....California
Colorado Sch. of Mines .....Colorado
Kansas, U. of .....Kansas
Louisiana State U. .....Louisiana
Louisiana Tech. U. .....Louisiana
Marietta Coll. .....Ohio
Mississippi State U. ....Mississippi
Missouri, U. of (Rolla) .....Missouri
Montana Coll. of Nat. Science and Tech. .....Montana
New Mexico Inst. of Mining .....New Mexico
Oklahoma, U. of .....Oklahoma
Pennsylvania State U. ...Pennsylvania
Pittsburgh, U. of .....Pennsylvania
Southern California, U. of .....California
Southwestern Louisiana U. .....Louisiana
Stanford .....California
Texas, U. of .....Texas
Texas A&M .....Texas
Texas A&I .....Texas
Texas Tech. U. .....Texas
Tulsa, U. of .....Oklahoma
West Virginia U. .....West Virginia
Wyoming, U. of .....Wyoming

EXISTING PROGRAMS

Public Administration

Alabama, U. of.....Alabama
American U. .....District of Columbia
Arizona, U. of.....Arizona
Arkansas, U. of.....Arkansas
Bernard Baruch.....New York
Boise State.....Idaho
Brigham Young U. .....Utah
California, U. of (Berkeley, Irvine, Los Angeles).California
California State U. (Long Beach, Fullerton, Chico, Fresno, Sacramento, San Diego, San Francisco, Hayward, Los Angeles)California
Cincinnati, U. of.....Ohio
Colorado, U. of.....Colorado
Cornell U. .....New York
Dayton, U. of.....Ohio
Denver, U. of.....Colorado
Detroit, U. of.....Michigan
Florida Atlantic U. .....Florida
George Washington U. District of Columbia
Georgtown U. .....District of Columbia
Georgia, U. of.....Georgia
Hartford, U. of.....Connecticut
Harvard.....Massachusetts
Houston, U. of.....Texas
Illinois, U. of.....Illinois
Illinois Inst. Tech. ...Illinois
John Jay Coll. of Criminal Justice.....New York
Kansas, U. of.....Kansas
Louisiana State U. ....Louisiana
Maine, U. of.....Maine
Maryland U. of.....Maryland
Miami U. .....Ohio
Michigan, U. of.....Illinois
Michigan State U. .....Illinois
Minnesota, U. of.....Minnesota
Missouri, U. of.....Missouri
New Hampshire, U. of..New Hampshire
New Haven.....Connecticut
New Mexico, U. of.....New Mexico
New York U. .....New York
North Carolina, U. of North Carolina
North Dakota, U. of....North Dakota
Ohio State U. .....Ohio
Oklahoma, U. of.....Oklahoma
Pennsylvania, U. of....Pennsylvania
Pennsylvania State U. .Pennsylvania
Pittsburgh, U. of.....Pittsburgh
Puerto Rico, U. of.....Puerto Rico
Rhode Island, U. of....Rhode Island
Roosevelt U. .....Illinois
Southern California, U. of.....California
Southwest Missouri State...Missouri
State U. of New York (Albany).....New York
Syracuse U. .....New York
Temple U. .....Pennsylvania
Tennessee, U. of.....Tennessee
Texas, U. of.....Texas
Texas Christian U. .....Texas
Virginia, U. of.....Virginia
Virginia Poly. Inst. .....Virginia
Washington, U. of.....Washington
Wayne State.....Michigan
Western Michigan U. .....Michigan
Youngstown U. .....Ohio

EXISTING PROGRAMS

SOLAR

----- A -----

Adams State College
Adelphi University
Adirondack Community College
Akron Main Campus, U. of
Alabama A&M University
Alabama in Birmingham, U.
Alaska Anchorage CC, U. of
Allegany Cmty. College
American River College
American Technological U.
Amherst College
Antelope Valley College
Antioch College
Appalachian St. University
Arizona State University
Arizona, University of
Arkansas Main Campus, U. of
Atlantic, College of the
Auburn U. at Montgomery
Augsborg College

----- B -----

Bakersfield College
Ball State University
Bard College
Barry College
Barton Co. Cmty. Jr. College
Bemidji State U.
Benedictine College
Bismarck Jr. College
Blue Ridge Cmty. College
Boston College
Boston University
Bradley University
Brenau College
Brevard Cmty. College
Bridgewater State
Bristol Cmty. College
Brookdale Cmty. College
Brown University
Brunswick Jr. College
Bucks County Cmty. College
Bunker Hill Cmty. College
Butte College

----- C -----

Cabrillo College
Cal. Poly. St. Uni. - San Luis Obispo
Cal. State C. - San Bernardino
Cal. State Poly. U. - Pomona
Cal. State U. - Los Angeles
California State College
Cape Cod Cmty. College
Carl Sandburg College
Carteret Technical Inst.
Casper College
Catholic U. of America
Cayuga Co. Cmty. College
Central Piedmont Cmty. College
Central Arkansas, U. of
Central Conn. St. College
Central Methodist College
Central Michigan University
Central Mo. St. University
Central Ohio Technical C.
Central Tech. Cmty. College
Central Texas College
Central Wesleyan College
Central Wyoming College
Cerro Coso Cmty. College
Chabot College-Valley Campus
Chaffey College
Charles S. Mott Cmty. College
Chicago State University
Chicago, University of
Cincinnati Main Campus, U. of
Citrus College
City C. Chicago Loop, C.
City College of Chicago - City Wide
Clackamas Cmty. College
Clark C. Cmty. College
Clark University
Clarkson College of Tech.
Clemson University
Cleveland St. Cmty. College
Coastal Carolina CC.
Coastline Cmty. College
Cochise College
Cogsell College
Colby College
College of Solar Energy
Colorado Mtn. College West Cam.

----- C ----- continued...

Colorado Technical College
Colo. - Colo. Springs, U. of
Colorado at Boulder, U. of
Colorado School of Mines
Colorado State University
Columbia Jr. College
Columbia U. Main Division
Columbia-Green CC
Conn. Main Campus, U. of
Cornell U. Statutory C.
Cosumnes River College
Crowder College
Cuesta College
CUNY Brooklyn College
CUNY C. of Staten Island
CUNY City College
CUNY New York City CC

----- D -----

Danville Cmty. College
Dartmouth College
Dayton, University of
De Anza College
DeKalb Cmty. College
Delaware Co. Cmty. College
Delaware, University of
Delgado College
Delta College
Delta State University
Denver North Campus, CC of
Denver Red Rocks Cam., CC of
Denver, University of
DePaul University
Des Moines Area CC.
Desert, College of the
Detroit, University of
Diablo Valley College
Dickinson College
Divine Word College
Dixie College
Drexel University
Duke University
Dundalk Cmty. College
DuPage, College of

----- E -----

Earlham College
East Carolina University
Eastern Ill. University
Eastern Michigan University
Edison Cmty. College
Emporia State University
Evergreen Valley College

----- F -----

Fairleigh Dickinson Teaneck Campus
Feather River College
Ferris State College
Ferrum College
Flathead Valley Cmty. College
Florida International U.
Florida Solar Energy Center
Florida Technological U.
Florida, University of
Foothill College
Fort Lewis College
Fort Steilacoom CC
Franklin Inst. of Boston
Fresno City College
Fullerton College

----- G -----

Georgia Inst. of Techn. Main. Camp.
Gannon College
Carden City Cmty. Jc.
Gaston College
Gavolan College
Genessee Community College
George Washington University
George Williams College
Geo la, University of
Gettysburg College
Glassboro State College
Glen Oaks Cmty. College
Glendale Cmty. College
Goddard College
Governors St. University
Grand Rapids Jr. College

----- G ----- continued...

Grand Valley St. Colleges
Grayson Co. Jr. College
Greenville College
Greenville Tech. College
Guam University of
Gulf Coast Cmty. College
Gustavus Adolphus College

----- H -----

Hall Institute
Hamilton College
Hartford Community College
Hartford Graduate Center
Harvard University
Harvey Mudd College
Hastings College
Hawaii at Manoa, U. of
Hawaii Honolulu CC, U. of
Hawaii Kauai CC, U. of
Hinds Jr. College
Horry-Georgetown Tech. C.
Houston Baptist University
Howard University
Humboldt State U.
Huntington College

----- I -----

Idaho State University
Idaho, University of
Ill. Chicago Circle, U. of
Ill, Estn. CC Olney Cen. C.
Ill. Estn. Lincoln Trail C.
Ill. Urbana Campus, U. of
Illinois Central College
Illinois State University
Ind. Voc. Tech. C - Evansville
Ind. Voc. Tech. - Sellersburg
Ind. - Purdue U. - Lafayette
Indiana U. of Pennsylvania
Ind. Voc. Tech. College-NW
Iowa State U. Sci. & Tech.
Iowa, University of

----- J -----

Jackson Community College
John A. Logan College
Jordan College

----- K -----

Kankakee Cmty. College
Kansas Main Campus, U. of
Kansas St. U. Agr. & App. Sci.
Kansas Technical Inst.
Kent State U. Main Campus
Kentucky, University of
Keystone Jr. College
Kirkwood Cmty. College
Kutztown State College

----- L -----

La Verne College
Lakeland Cmty. College
Lakewood Cmty. College
Lansing Cmty. College
Laramie Co. Cmty. College
Lawrence Inst. Technology
Lawrence University
Lee College
Lehigh Co. Cmty. College
Lewis University
Linn-Benton Cmty. College
Loma Linda University
Long Beach City College
Loras College
Lord Fairfax Cmty. College
Los Angeles Pierce College
Louisiana State U.
Louisiana Tech. University
Lowell, University of
Loyola College
Loyola Marymount U.
Luther College
Lynchburg College

----- M -----

Macomb Co. CC-South Campus
Maine at Fort Kent, U. of
Maine at Orono, U. of
Manhattan College
Mankato State University
Marin, College of
Marlboro College
Marquette University
Massachuseets Amherst Camp., U. of
Massachusetts Inst. of Technology
Mayville State College
McHenry County College
Maryland College Park Camp., U. of
Memphis State University
Merced College
Mesa College
Metropolitan St. College
Metropolitan Technical CC
Miami - Dade Cmty. College
Miami, University of
Michigan State University
Michigan Technological U.
Michigan - Ann Arbor, U. of
Michigan - Dearborn, U. of
Michigan - Flint, U. of
Mid Michigan Cmty. College
Mid Plains CC - N. Platte
Middle Tenn. St. University
Middlebury College
Middlesex County College
Midland Lutheran College
Midlands Tech. College
Milwaukee Sch. of Engineering
Minn. Mnpls. St. Paul, U. of
Minnesota Duluth, U. of
Miss. Co. Cmty. College
Mississippi St. University
Missouri Southern St. College
Missouri - Columbia, U. of
Missouri - Kansas City, U. of
Missouri - Rolla, U. of
Missouri - St. Louis, U. of
Modesto Jr. College
Mohave Cmty. College
Mohawk Valley Cmty. College
Monroe Cmty. College
Montana State University
Montana, University of
Montclair State College
Montevallo, University of
Moorhead State University
Moorpark College
Moraine Park Tech. Inst.
Moraine Valley Cmty. College
Motlow State Cmty. College
Mt. San Antonio College
Mt. San Jacinto College
Muscatine Cmty. College

----- N -----

Napa College
Navarro College
Nazareth C. of Rochester
North Carolina Agrl. & Tech. State U.
North Carolina at Greensboro, U. of
North Carolina State U. Raleigh
North Dakota State U. Main Camp.
Nebraska - Lincoln, U. of
Nevada-Las Vegas, U. of
Nevada, Reno, U. of
New England College
New Haven, University of
New Mexico Highlands U.
New Orleans, University of
New York University
New Hampshire Plymouth St. College, U.
Nicolet College - Tech. Inst.
New Mexico Main Campus, U. of
New Mexico State U. Main Campus
North Adams State College
North Central Tech. Inst.
North Florida, U. of
North Lake College
North Seattle CC
North Shore Cmty. College
North Texas St. University
Northeastern University
Northern Arizona University
Northern Colorado, U. of
Northern Ill. University
Northern Iowa, U. of
Northern Kentucky University
Northern Michigan University
Northern New Mexico Cmty. College
Northern Virginia Cmty. College
Northland Pioneer College
Northrup University
Northwest Cmty. College
Northwest Tech. College
Northwestern University
Notre Dame, University of

----- O -----

Oakland University
Odessa College
Ohio Northern University
Ohio State U. Main Camp.
Ohio State U. Mansfield Br.
Ohlone College
Oklahoma State U. Main Campus
Oklahoma Norman Camp., U. of
Old Dominion University
Olympia Tech. Cmty. College
Orange Co. Cmty. College
Orange Coast College
Oregon Main Campus, U. of
Oregon State University
Otero Jr. College
Our Lady of Lake U.

----- P -----

Pennsylvania St. U. Shenango Vly. Cam.
Pennsylvania State U. Allentown Camp.
Pennsylvania State U. Capitol Campus
Pennsylvania State U. Main Campus
Pacific University
Parkersburg Cmty. College
Pasadena City College
Peninsula College
Pennsylvania, University of
Pensacola Jr. College
Piedmont Tech. College
Pittsburg St. University
Polytechnic Inst. New York
Potomac State College
Puerto Rico Mayaguez, U. of
Princeton University
Principia College
Purdue University-Main Campus

----- R -----

Ramapo C. of New Jersey
Randolph Technical Inst.
Ranger Jr. College
Redlands, University of
Redwoods, College of the
Rensselaer Poly Inst.
Rets Tech. Center
Rhode Island, U. of
Rice University
Rio Salado Cmty. College
Ripon College
Riverside City College
Rochester Cmty. College
Rochester Inst. Technology
Rochester, University of
Rockland Cmty. College
Rogue Community College
Rose-Hulman Inst. of Technology
Rutgers U. - New Brunswick

----- S -----

Sacramento City College
Saginaw Valley State College
St. Bonaventure University
St. Cloud St. University
St. John Fisher College
St. Joseph College
St. Louis CC - Meramec
St. Michael's College
St. Olaf College
St. Teresa, College of
St. Vincent College
Sampson Technical Inst.
San Bernardino Valley College
San Diego CC -- City College
San Diego State University
San Francisco State U.
San Francisco, University of
San Joaquin Delta College
San Jose City College
San Jose State University
Sangamon State University
Santa Ana College
Santa Clara, University of
Santa Fe Cmty. College
Santa Fe, College of
South Carolina at Sumter, U. of
South Carolina Main Campus, U. of
Schoolcraft College
Scott Cmty. College

----- S ----- continued...

South Dakota Main Campus, U. of
South Dakota Sch. Mines & Tech.
South Dakota University
Sequoias, College of the
Sheridan College
Sierra College
Sinclair Cmty. College
Siskiyous, College of the
St. Clair Co. Cmty. College
Southeast CC Milford Camp.
Southeast Mo. St. University
Southern California, U. of
Southern Illinois U. Carbondl
Southern Methodist University
Southern Mississippi, U. of
Southern New Jersey OIC
Southside Virginia Cmty. College
Southwestern College
Southwestern Michigan College
Southwestern Mo. St. Univ.
Spartanburg Tech. College
Spokane Fls. Cmty. College
Springfield College
Springfield Technical CC
Stanford University
Southeastern Mass. University
Southwest Texas St. University
Stockton State College
Sumter Area Tech. College
State U. of N.Y.-Agrl. & Tech. C Canton
State U. of N.Y.-Buffalo Main Camp.
State U. of N.Y.-Stonybrook Main Camp.
State U. of N.Y.-College at Oswego
State U. of N.Y.-College at Plattsburgh
Swarthmore College
Syracuse U. Main Campus

----- T -----

Tacoma Cmty. College
Temple University
Tenn. - Chattanooga, U. of
Tenn. - Knoxville, U. of
Tenn. - Nashville, U. of
Tennessee Technological U.
Texas St. Tech. Rio Grande
Texas A. University
Texas A. U. Main Campus
Texas at Dallas, U. of
Texas Christian U.
Texas State Technical Inst.
Texas Tech. University
Thames Valley State Tech. C.
Thomas Nelson Cmty. College
Toledo, University of
Tompkins-Cortland CC
Towson State University
Tri-County Tech. College
Tri-County Tech. Inst.
Trident Technical College
Trinidad State Jr. College
Trinity University
Triton College
Tulane U. of Louisiana
Tulsa, University of
Tyler Jr. College

----- U -----

U. of Alaska Kenai CC
U. of Alaska Northwest CC
U. of Alaska Tanana Valley, CC
U. of California - Los Angeles
U. of Houston Central Campus
Union College
U.S. Air Force Academy
Utah State University
Utah Tech. College Salt Lake
Utah, University of

----- V -----

Virginia Poly Inst. & State U.
Virginia Western Cmty. College
Valencia Cmty. College
Vance-Granvl. Cmty. College
Vanderbilt University
Vassar College
Vermont, Cmty. College of
Virginia Commonwealth U.
Virginia Main Campus, U. of

----- W -----

Walsh College
Washington St. University
Washington University
Washington, University of
Wayne State University
Weber State College
Webster College
Wesleyan University
West Florida, U. of
West Texas St. University
West Valley College
West Virginia University
Westchester Cmty. College
Western Cohn St. College
Western Ky. University
Western Mich. University
Western Montana College
Western St. College Colo.
Western Wyoming Cmty. College
Westminister College
Wichita State University
Widener College
Wilkes College
Williamsport Area CC
Wisconsin Eau Claire, U. of
Wisconsin Green Bay, U. of
Wisconsin La Crosse, U. of
Wisconsin Madison, U. of
William Rainey Harper College
Worcester Poly. Institute
Worcester State College
Western Carolina University
Wyoming, University of

----- X -----

Xavier University

----- Y -----

Yale University
Yavapai College
York Technical College
Youngstown St. University