EDUCATION IN FUELS ENGINEERING AT THE UNIVERSITY OF UTAH

David M. Bodily

Department of Mining, Metallurgical and Fuels Engineering
University of Utah
Salt Lake City, Ut 84112

The Fuels Engineering Program at the University of Utah was established in 1946. The need was recognized for students with specialized training in fossil fuel technology . The B.S., M.S., and Ph.D. degrees were offered through the Department of Fuel Technology which became part of the State College of Mines and Mineral Industries. The Department rapidly distinguished itself for research and graduate study, although student enrollments were not large. Since its inception, 13 B.S. degrees, 12 M.S. degrees, and 44 Ph.D. degrees have been granted. During recent years, the program has grown in size and the undergraduate program has been revitalized and strengthened. Recent enrollment trends are shown in table 1. The name of the degree has been changed from Fuel Technology to Fuels Engineering and the program is now part of the Department of Mining, Metallurgical and Fuels Engineering.

Undergraduate Program

With the influx of students into the undergraduate program, the curriculum has been revised and new courses have been instituted. Fuels students take a common core program with Chemical and Metallurgical Engineers during the Freshman and Sophomore years and about one-half of the Junior years. This consists of the Liberal Education requirements of the University; general, organic and physical chemistry; mathematics through calculus and differential equations; engineering physics; and engineering courses such as process engineering, thermodynamics, strength of materials, mass transfer, fluid mechanics and heat transfer. During the Junior and Senior years the student takes required advanced undergraduate fuels courses from the list shown in table 2. Eleven of the 17 courses are required. The student also must fill technical elective requirements from fuels or related courses.

The energy problems of the United States have brought attention to energy studies and attracted many students to fuels engineering. Several scholarships are available to outstanding students. This has attracted students of high ability to the program.

"Energy and Man" is a course designed for non-science or engineering students as part of the Liberal Education program. Enrollments were low when it was first introduced in 1970, but in recent years it has been offered each quarter to large enrollments. The purpose of this course is to provide non-technical students with a background concerning energy problems so that they may function more effectively as citizens and as energy consumers.

Graduate Program

Graduate students enter the program with degrees primarily in chemical engineering or chemistry. Chemistry majors must take several basic engineering courses in addition to the graduate degree requirements. About one-third of the course work for an advanced degree must come from outside fuels engineering. The graduate committee of each graduate student must also have representation from outside fuels engineering. Graduate courses are shown in table 2.

Major areas of research for graduate degrees at the present time include liquefaction and gasification of coal, analysis of coal-derived liquids, upgrading of synthetic liquid fuels, tar sand processing, coal structure and reactions, and catalysis.

SUMMARY

The Fuels Engineering program attempts to train professionals with a basic background in engineering and the physical sciences and specialized training in the chemistry and processing of fossil fuels. It is experiencing rapid growth at both the undergraduate and graduate level. The teaching and research faculty has grown to nine persons. Future growth is difficult to predict due to many uncertain factors. The demand for professionals with this type of training is expected to be strong.

TABLE 1. - Fuels Engineering Enrollment

	73/74	74/75	75/76	76/77
Freshman	1	4	12	18
Sophomore	1	6	8	12
Junior	2	2	8	6
Senior	1	2	4	7
Total undergraduate	5	14	32	43
M.S. candidates	7	7	10	15
Ph.D. candidates	14	13	16	17
Total graduate	21	20	26	32

TABLE 2. - Fuels Engineering Courses

Lower Division

Introduction to Process Engineering
Energy and Man
Fundamentals of Process Engineering
Physical Chemistry of Mineral Systems

Advance Undergraduate and Beginning Graduate

Senior Project
Field Trip
Introduction to Heterogeneous Catalysis
Recovery of Fossil Fuels
Chemicals from Petroleum
Catalyst Preparation, Characterization, and Testing
Catalysis Laboratory
Chemistry of Fossil Fuels
Mineral Fuel Testing
Mineral Instrumentation
Conversion of Coal to Other Energy Forms
Energy Resources and Their Utilization
Modern Petroleum Refining
Flames, Combustion and Combustion Reactions
Fuels and Lubricants
Laboratory Safety
Corrosion of Metals, Theory and Practice

Advance Graduate

Theoretical and Applied Aspects of Catalysis
Kinetics and Interretation of Catalytic Reactions
Chemicals from Petroleum
Fundamental of Coal Liquefaction and Gasification
Properties and Reactions of Coal and Coke
Oil Shale and Bituminous Sands