II. DIVERSIFICATION OF ACADEMIC PROGRAMS

NCE has developed over a period of fifty years from a college with a limited number of undergraduate engineering programs into an institution involved in an expanding array of technologically-oriented curriculums, from certificate programs through the doctorate. In the course of this transition the scope of academic work has broadened and become more sophisticated. New fields of academic concern in engineering and non-engineering fields have opened up and have led to changes in old departments and to the creation of new ones.

In its diversification of programs, the College must be careful to avoid duplication of effort with other public institutions. It would, for example, be inappropriate to develop undergraduate degrees in the liberal arts, since these are available at most other public institutions. On the other hand, it would seem quite appropriate to develop new degrees in architecture and industrial administration, since there is no conflict in these areas at present.

The growing system of 2-year county colleges in New Jersey is relieving some of the pressures for college enrollment. Although Rutgers and the State liberal arts colleges have not been able to accept all qualified county college graduates, NCE has made a special effort to accept all students qualified for its programs. However, the number has not been large. Through an increased diversification of programs, NCE hopes to provide a variety of opportunities for transfer students from county colleges. The new Bachelor of Technology degree is an example of a program specifically designed to articulate with the county colleges.

The very significant Master Plan for Higher Education in New Jersey (whose genesis and ramifications are discussed in detail on Pages 27-44) recognizes the special role that NCE will play in the State system. The College must continue to emphasize to State planners that its role will be broader than it has been in the past, as it diversifies its programs in its development as a technological university.

The recent decline in freshman engineering enrollments emphasizes the sense of urgency NCE has to diversify its academic offerings in order to attract a larger fraction of the college-bound population of New Jersey.

A. Undergraduate Programs

Between World Wars I and II, the College became an undergraduate engineering institution offering degrees in the four traditional disciplines of chemical, civil, electrical and mechanical engineering. Shortly thereafter, management engineering was added, first as an option within mechanical engineering and later as a department of industrial engineering in its own right.

As the quantity and sophistication of scientific and mathematical content have developed over the years, some engineering schools have moved toward a five-year integrated B.S.--M.S. program, with heavy concentration on the scientific--mathematical basics at the undergraduate level, and with coverage of the practical engineering disciplines at the graduate level.

At NCE, all evidence has indicated that the majority of the College's students look forward to entering the job market with the completion of the bachelor's degree, a fact which has prevented the College from implementing the five-year program concept. Only recently has a substantial minority of undergraduates shown an interest in continuing their education as full-time graduate students. This group has grown from an insignificant fraction fifteen years ago to about 25 percent today.

In the last decade, it became increasingly evident that some students who were scientifically and mathematically oriented were not interested in any of the traditional undergraduate programs. In 1967, in response to their interests and as part of a pattern of diversification, a curriculum leading to the B.S. in engineering science was approved. This is a highly flexible curriculum permitting concentration in the areas of physics, mathematics, chemistry and computer

science with at least a minimum prescribed content of engineering courses. It has proved to be a popular program, as was foreseen by the engineering departments, and has constituted a source of some internal friction.

One of the most popular options in engineering science has been the computer science program. The pattern of emergence of the new department to meet a growth of interest at both the undergraduate and graduate levels in a new field is described in the section titled "The Computer Science Department," beginning on Page 18.

In a quite different direction, there has been discussion over the years within the American Society for Engineering Education and elsewhere concerning the need for new approaches to the humanities and social sciences. NCE has had an interesting record in this area dating back to the early 1920's, essentially due to the educational philosophy of Dr. Allan R. Cullimore, the institution's second head and first president, who stressed what he called "the engineer's duty as a citizen." This long-standing concern relative to the College's curriculum has led to the successive transformations that have by now resulted in NCE's Department of Organizational and Social Sciences. This development is also described more fully in a later section, beginning on Page 16.

The general problem of assessing the technological future and its effect on education is a perplexing one and one not likely to be solved by a single formulation. As a step in matching what seems to be one set of manpower needs to the aspirations and capabilities of one group of students, a Bachelor of Technology program has been introduced -- the College's first degree program specifically for the education of technologists. This, too, is described in a later section. (See Pages 22-26).

The College is now investigating further patterns of diversification and flexibility, within the context of the B.S., in engineering-related fields (possibly a B.S. in general engineering or an interdisciplinary B.S.). The objective of these

studies is to establish as many pathways as possible to match today's growth in different career objectives.

B. Graduate Programs

Interest in graduate work evolved with increasing intensity in the late 40's and into the 50's and 60's. Because graduate work before World War II was not a part of the expectation pattern of the typical engineer, there was little in the way of a tradition of graduate engineering instruction. With the first jump in demand for such education, largely stimulated by the G.I. Bill, NCE began to prepare such programs.

1. The Master's Degree

The first graduate courses were offered in conjunction with an existing master's program at Stevens Institute of Technology, which awarded the degrees. In spite of some early attempts to organize a program of full-time graduate study, graduate students were essentially all part-time evening students until well into the 60's. By 1954, the range of offerings at the College was sufficient to sustain its own degree programs, and the College was authorized to award the master's degree in chemical, civil, electrical and mechanical engineering.

The role of the master's degree in engineering has been cast somewhere in the gray area between an academic disciplinary orientation on the one hand and a professionally-directed program emphasizing practice on the other. While there are ways in which these two directions may be handled simultaneously, there is sufficient divergence to cause some academic concern. There are questions of departmental direction (particularly in smaller departments), of different kinds of students (the student, for example, with the doctorate as a goal versus the practicing engineer who wants a terminal master's degree directly related to his work), and of the need for very different kinds of faculty skills for the two

directions. These have been background questions during the development of the graduate program and will continue to be important in the new fields that will mark NCE's emergence as a technological university.

In the first years, graduate work was largely an extension into new areas that were not covered in the undergraduate curriculum in the same field or in the supporting academic fields, particularly mathematics. As undergraduate curriculum patterns changed, many of the engineering science subject areas "moved down" from the graduate to the undergraduate level.

A persistent problem, which still continues, is that of handling students from a variety of undergraduate schools where the patterns and the rates of such curriculum change vary.

It also gradually became apparent that the model of a student proceeding from a B.S. in an engineering field to an M.S. in the same field was not one that included all potential students. There has been a persistent interest among some in moving to other technically related fields after the B.S. This has come to include students with undergraduate work in the sciences, and more recently in the social sciences, whose interests fall under the technological umbrella. Movement toward these cross-disciplinary patterns seems to be accelerating and probably will continue to do so in the period ahead.

NCE's initial response to this need was the institution of the so-called undesignated M.S., as distinguished from the designated degree (e.g. M.S. in E.E.). The M.S. at first was intended for a student changing from his undergraduate field to another engineering field at the graduate level, or for a science student moving into graduate engineering work.

Later, the undesignated M.S. came to cover students wishing to major in the engineering sciences (applied mathematics, physics, chemistry, and later computer science), which marked the first steps at the graduate level toward that broadening of interests beyond engineering that characterizes the technological university.

Multi-interest fields in which broadening of function into the social and life sciences is involved have seen some program development or the beginnings of planning which can be expected to result in new programs. These include urban systems, environmental science, public administration, and bio-medical engineering.

2. The Doctorate

In 1960, authorization was granted for the awarding of the degree of Doctor of Engineering Science. Although the authorization permitted either a design or research orientation, in practice it has become a research degree. With respect to the master's degree, the doctorate has provided an important pressure toward maintaining an analytically-oriented disciplinary core within the various graduate programs. It has also served as the springboard for the development of a full-time graduate student group who currently number about 15 percent of all graduate degree students.

Even within the constraints of this traditional type of doctoral program, patterns which cross departmental lines are visible. For example, centers of strength and interest on the part of faculty and students in the area of applied mechanics exist in both civil and mechanical engineering. As interest and competence develop in such new areas as urban, environmental and transportation problems, long-standing departmental lines will probably be further strained.

The doctoral program carried with it a commitment to the support of research and to the growth of a research-oriented faculty. To support research, the College, with the assistance of industrial leaders, has formed a Foundation for the Advancement of Graduate Study in Engineering. The size of the doctoral program (which now includes the chemical, civil, electrical and mechanical departments) is relatively small, with fewer than ten degrees a year and about one-half million dollars a year in research support. However, its effect on faculty, particularly younger faculty, in the science and engineering departments has been profound.

With perhaps one or two exceptions, no new faculty without the doctorate have been hired in these departments in recent years.

3. The Professional Degree

Some engineering educators argue that the research-oriented doctorate fails in some ways to meet the needs of the design-oriented engineer. In addition the doctoral residency requirement makes it almost impossible for mature individuals with outside responsibilities to continue formal education beyond the master's degree. A post M.S. program leading to the professional degree (e.g. Chemical Engineer) designed for the experienced practicing engineer was instituted some years ago. It has been authorized in the four departments which offer the doctorate. The program has achieved very limited acceptance and enrollments have been quite small. It is difficult to predict the future of this program at the present time.

4. Future Developments

Many questions pose themselves in attempting to assess the future of the graduate program. A central question relates to the viability of a small doctoral program in a national situation of apparent oversupply of doctorates. Another concerns the development of appropriate patterns of faculty and degree organization with increasing emphasis on interdisciplinary work and in areas with concentration in the social sciences. In order to deal with these and related matters, an in-depth study of the College's graduate programs has been organized. The committee engaged in the study has a mandate to recommend broad changes in the content and organization of the graduate curriculums in-so-far as they are needed to determine a meaningful future role for the graduate program.

Another important question that must be examined is the developing national trend toward the M.S. as the first professional degree in engineering. Although the B.S. may continue as an acceptable entry point into the profession, it is

becoming clear that the M.S. will be a necessary prerequisite for work in the more sophisticated engineering fields.

C. Specific Illustrations

The processes of change and the problems associated with the College's transition are complex and a detailed account of all new developments is beyond the scope of a presentation such as this. In order to illustrate the processes, there follow three examples of the trends and changes which have been described:

"The Evolution of the Social Sciences": The development of an existing department in a field outside of technology;

"The Computer Science Department": The emergence of a new department in a new scientific discipline;

"The Bachelor of Technology Program": The introduction of a degree program that is a distinct departure from the existing engineering curriculums.

1. Evolution of the Social Sciences

In common with all accredited engineering colleges, NCE allocates a substantial percentage of its engineering curriculums to the humanities and social sciences. Approximately one quarter of the undergraduate program is devoted to these areas. Although originally regarded as part of the general education of the engineer, the social sciences are now becoming recognized as fundamental to the profession of engineering itself. The Chairman of the College's Department of Civil and Environmental Engineering recently suggested that the social sciences are as fundamental to the education of his students as are mathematics and the physical sciences. This more central, professional role for the social sciences is the latest development in a long tradition of "Education for Engineering and Citizenship"* at Newark College of Engineering.

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*The College's motto.

a. Early Patterns

Much of the early emphasis on human behavior in NCE's curriculums focused on the engineer's role in industry. A half century ago, shortly after the College began offering bachelor's degrees, the new President, Allan R. Cullimore, established a cooperative work-study program that emphasized an understanding of human relations as well as technical matters. Later, industrially-oriented courses in human relations became a part of the curriculum, and in 1941 a Department of Personnel Relations was organized. Its direction was set by an early chairman, Lillian M. Gilbreth,* working closely with Dr. Cullimore.

By the mid-40's the department's mission stated that "in addition to a thorough training in the foundations of the natural sciences and their applications to engineering problems, the engineer must have a knowledge of those phases of the social sciences which directly and indirectly affect his professional work." Industrially-oriented courses in psychology, sociology and history were introduced.

The emphasis on the professional development of the student for his role as an engineer in industry continued until the early 1960's, when the department (then called Professional Development and Industrial Relations) began moving toward a more general discipline-oriented approach to the social sciences. By 1968, a new curriculum introduced a core of basic social science courses, while consolidating the earlier traditional approaches into a single required course in management practices, treated from a behavioral point of view. This modification recognized the changing role of the social sciences and also responded to comments of an ECPD accreditation report.

General education requirements for all undergraduates, established in 1968, include sophomore courses in economics and a social science elective, and senior courses in management practices and contemporary issues.

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*A renowned pioneer in industrial engineering, probably best known as the mother in Cheaper by the Dozen.

b. Changes in Response to a Changing Environment

The "PDIR" department subsequently moved toward a more discipline-oriented approach to the social sciences, as evidenced by its changes of name, in 1964, to Industrial Relations, and, in 1970, to Organizational and Social Sciences. It has broadened its course offerings and for the first time is offering graduate courses and is cooperating in the development of graduate programs.

Having de-emphasized its role in the professional development of engineering students, the department is evolving a new professional relationship with the engineering programs as a discipline fundamental to the practice of the profession. At the same time, the department is on the threshold of developing programs of its own, related to the application of social science in a technological society.

Because of their close relationship to the growing interface between engineering and human problems, the departments of Civil and Environmental Engineering and of Industrial and Management Engineering have recognized the need for close interaction with the Department of Organizational and Social Sciences.

It was for IME that OSS first taught graduate courses in a variety of fields, ranging from "Psychology in Engineering" to "Contemporary Collective Bargaining." More recently, the two departments have cooperated in extending an existing M.S. program in management engineering to include options in Management of Research, Development, and Design; Management of Manpower Policies; and Management of Public and Regulated Agencies.

With CEE, OSS has developed an M.S. program in urban systems, for which it has initiated courses in "Urban Social Structure," "Econometrics," and "Economic Analysis of Urban Areas." This fall, the two departments added a joint staff member in planning.

In cooperation with the Dean of the Graduate Division, the department has initiated discussions with the Rutgers-Newark Graduate School of Business regarding

the establishment of an M.S. program in public administration.

At the undergraduate level, the department is offering several courses for the new Bachelor of Technology program. In addition, it has added a number of electives, including courses in "Municipal Government" and in "Behavioral Science," the first OSS offerings to be designated technical electives by an engineering department.

Working with IME, the department is investigating the possibility of offering a program leading to a Bachelor of Industrial Administration to serve a student population distinctly different from that currently attracted to the College.

As its course offerings have expanded, OSS has added staff with academic background and experience in such new fields as urban economics, public administration, and behavioral science.

c. Progress, Promise, and Problems

Although the Department of Organizational and Social Sciences has made great progress since its inception, and although it shows considerable promise for the future, it is not without its problems. The department is of relatively long tradition at NCE, but has in its successive manifestations until recently provided a limited service function to the engineering departments. Some engineering faculty -- and some students -- doubted the effectiveness of the department in its earlier mission of sensitizing students to the engineer's role in industry. Some of this negative attitude among faculty has carried over to the present, even though the department's courses and faculty have changed radically. Not all the engineering faculty yet understand the new role the department can play. Few engineering departments have acknowledged the central importance of the social sciences in engineering. Although OSS has cooperated successfully with two

science students) instant turn-around is provided for solution of classroom computer problems.

c. The Department at Present

Thus far, even in the present restricted job market, the computer science department has not felt a decrease in the demand for its course offerings at either the B.S. or M.S. level. In fact, a surprisingly large percentage of incoming freshmen (The Class of 1975) have indicated an interest in majoring in computer science.

At the undergraduate level, the department offers courses in programming, logic, numerical analysis, operating systems, computer organization and simulation. Students in computer science earn a B.S. in Engineering Science, which means that they have a strong minor in an engineering field. For most of the students the minor is either in industrial or electrical engineering. This arrangement is fairly satisfactory, but there are the usual curriculum difficulties about what is taught where, and whether the industrial minors should not know at least something about (electrical) computer structure. The broad diversity of academic disciplines which falls within the field of computer science, in other words, leads to problems of field definition.

The graduate curriculum, on the other hand, is complicated in at least two further ways. One is the split which is experienced in most engineering school graduate divisions between the academically-oriented and the professionally-oriented student, both of whom must often be taught in the same class. The second and even more divisive dimension of student grouping arises from the fact that a large number of the graduate students have obtained their bachelor's degrees in engineering fields and wish to broaden themselves with a degree in computer science. Teaching such students in the same course with graduates of a full B.S. computer science program is very difficult.

engineering departments in the development of new courses and programs, it is still a junior partner; the degrees are awarded by the engineering departments.

To develop new programs less related to engineering and to attract a different student population, OSS must overcome the College's long-standing image of offering only engineering degrees. Externally, this image affects the attitude of the other Newark colleges and the State Department of Higher Education. In order to function effectively in the Newark college complex and in the State system of higher education, NCE must communicate its competence in the areas of social science.

2. The Computer Science Department

This description of the development of a new academic department is meant to sketch the kinds of pressures and demands, both within the college and from outside, which cause a whole new field of study based on a fresh technological development to emerge. The digital computer, in this case, was the prime mover.

A brief history of the department is included, along with an overview of the development of the departmental undergraduate and graduate programs. Some of the current problems being faced by the department are noted, and a final comment outlines its plans and expectations.

a. Initial Interest in Computers

In 1961 NCE, with the help of a National Science Foundation grant, acquired an IBM 1620 (Model 1) computer. In preparation for the computer and during the first few years it was on campus, non-credit courses in programming were given to faculty members and students on a volunteer basis.

Some of the students, sophomores at the time, wrote a "load-and-go" Fortran compiler which was enthusiastically received by IBM 1620 users across the country. Several of these early students have since gone on to graduate work in computer science.

For some time after the 1620 appeared at NCE it was considered essentially a tool for use in the various engineering courses. No formal courses were offered in the field of computer science per se, but several engineering departments began to offer applications-oriented programming courses. Within the traditional engineering courses not a great deal of computer work was included. Many other colleges and universities at that time experienced a similar lag in the introduction of computer applications, as witness the numerous conferences sponsored by NSF, IEEE, The Ford Foundation and others to encourage the use of computers in engineering education.

In response to a growing recognition of the importance of the computer in the engineering fields, a required computer programming course for all sophomores was approved in 1965. Before its introduction a year later, faculty from the various engineering departments prepared themselves to teach the course. The course was taught for the first years by teachers assigned from the engineering departments with resulting problems of supervision and coordination.

At about the same time that the sophomore programming course was evolving, several graduate courses were introduced in the areas of computer languages and numerical analysis. These were offered within the mathematics department. It was clear quite early that the work in the computer languages area was far from the mainstream of the interest of the mathematics faculty. Student interest, however, continued to develop and by 1967 graduate work in logic and automata was introduced.

As the research interests of faculty and students developed during the mid-1960's, computer use expanded. Before the College had moved beyond the IBM 1620, provision was made for buying time on larger computers and a time-sharing tie-in was installed to a large commercial computer. The added use of computers and the increase in the sophistication of the problems being dealt with led to growth of a staff of people who were capable of rendering technical assistance to those

working on the problems. Among them were people with the ability to teach some of the graduate work described above.

b. Establishment of a Computer Science Department

The combination of undergraduate and graduate teaching needs and the growing academic research interests led to a decision in 1968 to establish a Computer Science Department. The staff available at the time was numerically far short of what would have been needed to meet the departmental responsibilities as they then existed, not to speak of projected growth. Establishment of a department, however, was felt to be indispensible to attracting the needed staff. By the fall of 1968 a departmental chairman had been appointed and the staff consisted of two full professors and two instructors.

Under the leadership of the newly appointed chairman, faculty development has continued, student interest has grown dramatically and course offerings have increased. At the time of this writing (Fall 1971) the introductory programming course (now a freshman course) is totally supervised by computer science departmental staff. In addition there is a computer science option within the engineering science undergraduate program and a computer science major within the engineering science M.S. program. The current catalogs list nine undergraduate and eleven graduate courses offered by the department. All the courses are heavily subscribed. The staff has grown to two full professors, two associate professors and three assistant professors. In addition, graduate assistants are used for instruction in the freshman course.

Computer capability has grown consistently, although always somewhat behind demand. The major equipment is now an RCA System 3 computer with time-sharing capability via teletypes at various campus locations. The computer center operates on a two shift basis and on Saturdays. Access for qualified users is arranged at other times. With the use of load-and-go Fortran (again written by our computer

d. Future Developments

Across the country the evolution of computer science departments, almost none of which bear that name any longer, is in the various directions of "information science" or "systems science" or "management information systems."

These developments are in the air at NCE as well and the programs of many of our students, both graduate and undergraduate, are following these trends. There is a strong interest in systems analysis, operations research, mathematical programming, automatic control, administrative uses of computers and so on. NCE's students for the most part lean toward the practical use of computer science in applications. They are not primarily interested in continuing on to the doctorate.

It seems clear that a change of direction, perhaps a broadening of the curriculum into the area of systems science (although that term is never easy to define) should be NCE's next step. Such a step would require a close and willing cooperation among the various engineering departments. Already, however, problems of jurisdiction between departments have begun to develop and are currently being aggravated by declining enrollments in some of the departments.

Certainly, the "computer science problem" will not go away and will have to be solved in a positive manner in the very near future.

3. The Bachelor of Technology Degree

Having moved toward the science end of the technological spectrum in the 1960's, the College is now moving toward the technical side of the spectrum with the development of the Bachelor of Technology degree. The degree is a significant departure from recent patterns, and yet it adheres to the earlier tradition of the College, which originated as a school for technicians.

In the last decade, baccalaureate programs in technology have been initiated at many institutions across the United States. In June 1970, 4,105 persons

received a bachelor's degree in industrial or engineering technology. In New Jersey on that date, no students were enrolled in programs leading to such a degree, although several institutions had programs in the planning stage. NCE's program, which began this past September (1971), was the first in a public institution to be approved in the state. (Fairleigh Dickinson, a private university, initiated a similar program in September of 1970.)

a. The Role of the Technologist

The engineering technician, who has traditionally worked in a supporting role to the engineer, has not until recently had a formal education beyond the Associate degree. During the last decade, however, a strong national trend toward further education became evident. The increasing complexity of technological problems required a substantially higher level of education for engineers in industry, and engineering curriculums thus have become more thoroughly based in mathematics and science. Since the more routine work of the engineer has always been delegated to the technician, the latter now finds himself in need of further education to cope with his new assignments. This trend toward a more advanced education at both levels has led to the establishment of bachelor's programs in technology and to a new occupational identity, the technologist.

The technologist represents a distinctly new level of specialization, interposed between the earlier technician, who still serves a useful function, and the more sophisticated kind of engineer being graduated today. The technologist works closely with the engineer and the technician in the solution of technological problems. It has been said that the 4-year technologist resembles the engineer of two generations ago in his practical approach to the solution of everyday problems. This is an oversimplification of today's situation, because the technologist has many newer techniques at his disposal, but it does help to clarify the role that the technologist fills in industry.

b. Development of the Proposal

For many years the College's Division of Technology has offered part-time evening programs of three years' duration leading to certificates in various fields of engineering technology. This program stops short of an Associate degree, but students do occasionally transfer to a county college or a technical institute to complete the formal degree.

In 1969 the President of the College appointed a committee of the faculty and administration to review the role of the division. The possibility of offering an Associate degree was explored but was discarded because the state's developing county college system could more appropriately fill this need. The committee then studied the feasibility of instituting a bachelor of technology program to provide persons holding an Associate degree in engineering technology with an opportunity for further education.

A Technology Committee, including faculty members from each of the five engineering departments, with the director of the Division of Technology as Chairman, began to investigate such programs at other schools and to consider the possibility of developing a baccalaureate program at NCE. Concluding that a Bachelor of Technology was both feasible and desirable, the committee recommended its adoption to the Committee on Curriculum in the spring of 1970. The Committee on Curriculum endorsed the proposal, and the necessary teaching positions were incorporated into the College's 1971-72 asking budget.

Three options appeared to be initially appropriate -- in the electrical, industrial, and mechanical areas. The faculties of the three engineering departments concerned were thus asked to review the proposed program.

A majority of the faculties of the three departments supported the new program, with some misgivings, because of a certain unfamiliarity with the technologist concept and because it appeared to some at least to imply a lowering of

the College's standards. Over the summer of 1970 a detailed proposal was prepared by the Dean of Engineering and the staff of the Division of Technology. Based on the original faculty committee proposal, it also included sections on need for the program, and administration of it. To resolve problems of articulation, the administrative staff also visited several county colleges where the program was met with enthusiasm.

Discussions in the fall of 1970 brought out several faculty concerns. Some felt that the program would merely produce "second class" engineers who might be confused with the College's regular graduates. Others were concerned about being asked to teach these "second class" courses to the possible detriment of their professional standing. Some suggested that the new program might compete for students who would otherwise elect to take the regular program.

In terms of administration, there was concern about the relationship of the new program to the existing academic departments. It had been proposed that a faculty committee chaired by a new assistant dean be placed in charge of the curriculum. The faculty wanted assurance that existing departments would have responsibility for preparing courses and selecting teaching staffs, working with the assistant dean and the faculty committee. They also wanted assurance that no one would be forced to teach in the new program.

Eventually, after considerable discussion, the proposed new program received the formal approval of the Faculty as a whole. Faculty approval made it possible to proceed with submission of the proposal to the College's Board of Trustees and finally to the State Board of Higher Education for action. The State Board approved the proposal and authorized the degree without question.

c. The Approved Program

As finally approved, the Bachelor of Technology program consists of the last two years of a four year course of study. The first two years are provided by

county colleges and technical institutes in their existing and developing associate degree programs in engineering technology. The program is initially being offered in the evening on a part-time basis; a full-time day program is presently being considered. An administrator with the rank of Assistant Dean supervises the program.

With the exception of a few humanities and social science electives, all courses in the technology program differ from those offered to engineering undergraduates. The technology courses often cover material similar to that found in engineering courses, but the approach is less mathematical and more applications-oriented. The purpose of the courses is to demonstrate application of engineering principles to the solution of practical industrial problems.

The program also includes several courses in industrial management, since it is expected that many graduates will hold supervisory positions.