Electrical engineering offers many fields of opportunity for the young electrical engineering graduate. For example he may have the opportunity to work for one of the large electrical manufacturing companies, such as the General Electric Company from one of whose short wave broadcasting stations I am now speaking. In such an organization there are opportunities in research and development and in the manufacture and marketing of nearly every type of electrical equipment—from the largest electric generator to the smallest radio tube. He may choose to work for a public utility and to concern himself with the generator or the transmission and distribution of electrical energy. Or he may choose to work for any of those industries which utilize electrical energy extensively for driving motors, for industrial heating and for lighting. In the field of transportation he may be interested in railways, busses, cranes or elevators. If his interests are in electrical communication systems he has the fields of wire telegraphy and telephony or of radio telegraphy and telephony and their allied fields, including radio broadcasting, public address systems, talking pictures, etc.

To describe all of the various fields of opportunity open to the electrical engineering graduate would require far more time than I have at my disposal. However, from the few examples I have cited it will be apparent to the listener that the field is almost unlimited.

To equip and train young men to enter this broad field is the function of an electrical engineering curriculum. It must
provide its graduate with a thorough grounding in the fundamentals of the profession and in addition must provide as broad a training as possible. It must acquaint the student with the basic problems of the various applications so that upon completion of his course he will have obtained sufficient judgement to choose intelligently the branch he wishes to pursue. It must also acquaint the student with the fundamentals of allied branches, such as mechanical and civil engineering - since his work may involve the use of those fundamentals and cooperation with men trained in these professions. He must know the fundamentals of metallurgy since he will use metals extensively. He must understand the principles of economics and business administration since the economic motive is behind most engineering work and since his ultimate objective will be to occupy an administrative position. He must receive thorough training in English for he will be required to prepare and present reports which are correctly written, to write specifications correctly - to speak and think correctly on his feet when stating a case to a hard headed board of directors or when acting as expert witness in legal cases, etc.

It is not at all unusual for our electrical engineering graduates to obtain and fill successfully positions in the mechanical and civil engineering fields. This is an indication of the broadness of their training.

We do not feel that it is the function of an undergraduate curriculum to attempt to train specialists in any branch of electrical engineering. Such specialization should come only after a man has obtained a broad basic training. A certain degree of specialized training may be obtained by graduate
study, but in the final analysis a man becomes a specialist only after long years of training and experience in industry.

It is with these ideas in view that the curriculum in electrical engineering at Rensselaer is planned.

In general the curricula at Rensselaer are laid out on a rather unique basis. The school year is divided into two semesters, each approximately eighteen weeks in duration. Each semester is in turn divided into two seven week advance periods, a three week review period and a one week examination period. During any seven weeks advance period a student usually carries three subjects, in which he recites every day. Two of the subjects are theory subjects, requiring home preparation - the third subject is usually a laboratory or design subject requiring no outside preparation. At the end of the first seven weeks period of a semester the student takes up another group of three subjects. At the end of the second seven weeks period the student reviews the subjects studied during the preceding fourteen weeks. This review period is divided into two seven day periods and the student devotes one day to review of each week of advance work. At the end of the review the student devotes approximately one week to examinations in the subjects studied during the semester.

With such a system the student is able to concentrate his attention on a comparatively small number of subjects during any period. During the advance period he studies a subject in comparatively small assignments. During the review he recovers the subject in larger assignments and has the opportunity
to coordinate and crystallize the whole subject more clearly in his mind. In restudying the subject for a third time in preparation for the examination he obtains a complete picture of the whole subject, with all parts occupying their proper perspective.

Before taking up the study of any of the purely electrical engineering subjects the student has been thoroughly grounded in such fundamental subjects as chemistry, mathematics and physics, and has also completed the basic drawing courses.

During the second semester of the sophomore year and all of the junior year the electrical engineering student studies the fundamental electrical engineering subjects such as direct and alternating current theory, direct and alternating current machinery and electronics.

The electrical engineering subjects studied in the senior year are largely application courses such as the electrical equipment of power plants and substations, transmission and distribution of electrical energy, electric transportation, illumination, communication and electrochemistry. These application courses are necessarily brief. Their primary purpose is to show the student the practical applications of the fundamental electrical engineering subjects he has studied, and to acquaint him with the basic problems encountered and the terminology used in the various fields of application. Upon graduation he has obtained a broad view of the whole field of electrical engineering. He is prepared to choose intelligently the field which he wishes to pursue and can enter that field with a fundamental understanding of its problems.
To explain the mechanics of the method of teaching an electrical engineering subject I will describe a typical course, such as direct current theory. Upon registration in the course the student is provided with a set of printed sheets, called topic and problem sheets. These sheets contain references to topics in the selected text and a typical group of problems covering the subject. For any given daily recitation the student is assigned preparation of a prescribed number of these topics and problems. Lectures are used to supplement the text. Their function is to cover material which may not be satisfactorily covered in the text or which may not be mentioned in the text and to more thoroughly explain material which experience has shown is difficult for students to comprehend. Experimental demonstrations are freely used. The lectures, one hour in length, are always given by the professor who has charge of the course. In the direct current theory course a one-hour lecture is given every other day. In many of the more difficult courses one-hour lectures are given every day.

For recitations the class is divided into sections numbering from 15 to 20 students. Each section is given an oral interrogation on one day followed by a blackboard recitation on the next day. Because of the small sections the oral interrogations conducted by the professor in charge of the course are quite informal. The professor is thus able to ascertain those points which are not clear in the students' minds and can discuss them more fully. The blackboard recitations are held by the instructors who assist in the course. Each student is given a card asking specific questions
on an assigned topic or stating a typical problem. The student then goes to the blackboard and writes a brief discussion of the topic or solves the assigned problem. He then recites orally to the instructor, explaining his topic or problem. The instructor asks pertinent questions in order to determine whether the student thoroughly understands the assignment.

The recitations during the review period are held in a similar manner to the advance recitations.

The examinations are always written and are made sufficiently comprehensive to determine whether the student has a satisfactory knowledge of the entire subject.

In the seven weeks period following the theory course the student takes a laboratory course covering the same subject. For laboratory work the class is divided into small groups. The number of students comprising a group is determined by the nature of the laboratory experiments to be performed. For example, in an electrical measurements laboratory, when two persons can conduct the experiments, the students work in pairs — in machinery laboratories, where more men are required to conduct the experiments, the groups consist of four or five students. Instructors assigned to the laboratory each supervise the work of approximately twenty students. Periodically throughout the laboratory course class room interrogations are conducted in which the students are interrogated by instructors as to their understanding of experiments completed. At the termination of the course each student is given an examination in which he is required to perform some part of one or more of the experiments.

The performance of the laboratory experiments serves to still further crystallize and reinforce the student's knowledge of his subject.
The courses are closely coordinated with each other and professors continually refer in their lectures and recitation sections to material previously covered in other courses. Thus the courses are effectively tied together to present to the student an integrated picture of the whole field of electrical engineering.

In the application courses lectures by professors in charge of courses are supplemented by lectures presented by industrial leaders who are experts in the particular field of the course. Such lectures are an additional stimulus to the student, since they emphasize the practical connection between the course and industry. Problems assigned in the application courses are of a practical design nature. They are made quite comprehensive and their solution may involve several days of work.

Concurrently with his study of electrical engineering subjects the student also studies basic subjects in mechanical and civil engineering. He takes a seven weeks course in general metallurgy. He also studies English throughout his four years and has training in public speaking and in the preparation and presentation of reports. He studies the fundamentals of economics and business administration. During the summer period between freshman and sophomore years the student receives training in machine shop practice in the Institute shops.

During the summer period between the junior and senior years the student has the choice of taking more advanced work in machine shop practice or of obtaining practical experience by doing approved work in the electrical industry.

During the latter part of the senior year the student
is required to prepare a thesis — either of a research or a
design nature. Preliminary to graduation he must present and
defend his thesis before a committee of the faculty.

Having completed such a course of training, the
young graduate is well equipped to enter his profession. He has
a thorough knowledge of its fundamentals and has a sufficiently
broad perspective to choose the branch he wishes to pursue. In
addition, because of his broad training, his viewpoint toward those
branches in which he does not engage will be broader, more
intelligent and more sympathetic.