

**REFINING TWO YEAR TECHNOLOGY CURRICULA FOR
GROWTH IN A SENIOR COLLEGE**

DR. ELLIOT ROTHKOPF

COLLEGE OF STATEN ISLAND/CUNY

The College of Staten Island of the City University of New York is a comprehensive college offering degrees from the Associates to the Ph.D. The Engineering Technologies Department offers an A.S. degree in Architectural Studies and A.A.S. degrees in Civil Engineering Technology (CET), and Electrical Engineering Technology (EET). The Computer Science department offers an A.A.S. degree in Computer Technology well as the B. S. and M. S. degrees in Computer Science. The Applied Science department offers an A.A.S. in Pre-engineering as well a B.S. degrees in Engineering Science and Physics. The Engineering Technologies department has embarked on a program of curricular revisions to enhance its growth potential.

In 1996, the Board of Trustees of CUNY mandated that all the credit requirements for all baccalaureate programs be 120 credits and all associate degree programs be 60 credits. Departments could apply for waivers if accredited programs require more than the credits allowed. Since all associate degrees of the Engineering Technologies department had credit requirements of 68-71 credits, a rethinking of our courses and credit load was in order.

The Engineering Technologies department decided that it must focus on a number of criteria to become leaner yet provide students who are able and so desire with greater opportunities for educational advancement. We recognized that with ever increasing technical change, we could not teach everything. We should give the student the best education possible by teaching the basics of the technological field while giving the student the tools for lifelong learning. We would not load the student down with more than the TAC/ABET minimum of 64 credits. Our associate's degree requires many more student contact hours in laboratories than do other associate degrees.

We would do the following:

- develop common core technology courses.
- modify upper level courses to reduce the credit load.
- work with the Computer Science and Applied Science departments to provide greater articulation between our A.A.S. programs and their B. S. programs.
- introduce the internship option in the various curricula.
- provide a technical elective option.

machines and controls was also combined to form ELT 464/465, Electrical Machines, a 3 credit lecture, 1 credit lab, one semester block. This course will now cover the topics but with less detail.

With the curricular revisions described, the Electrical Engineering Technology and the Civil Engineering Technology, A.A.S. programs were reduced to 64 credits, the TAC-ABET minimum requirements. These curricula were approved by June of 1996 and will be fully implemented by Spring of 1998.

Since the Fall 1996 semester, the Engineering Technologies department has been discussing increasing articulation between its two year programs and the four year programs of Engineering Science and Computer Science. This concept of transfer from two year Engineering Technology programs to four year engineering programs was recently discussed in Prism⁴. As was pointed out previously⁵ there is much commonality between engineering that technology curricula in the digital electronics and microprocessor sequences. Furthermore, these courses are not calculus based. Thus, as a first step, the EET, A.A.S. has replaced, as of fall 1997, its 4 credit, 6 hour microprocessor lecture/lab with CSC 462/ENS 462, the 4 credit, 6 hour microprocessor lecture/lab of the Computer Science and Engineering Science B. S. programs. As a second step, beginning in the spring of 1998, the 3 credit/3 hour digital circuits course offered for Electrical Engineering Technology students will be replaced by the 4 credit, 4 hour Computer Science/Engineering Science digital lecture course. We will continue to require technology students to take the 1 credit, 3 hour digital technology lab with our experiments. The digital technology lab focuses on reinforcing the theory whereas the Computer Science/Engineering Science digital lab focuses on digital design. The department felt that requiring second semester technology students to design circuits is unrealistic. However, by the third semester, with microprocessors, design should be easier. Thus, the common lab experience for computer for computer science, engineering science, and engineering technology students in microprocessors is warranted.

The next phase of our curricular revisions should be to eliminate ELT 464/465 as a fixed requirement and replace it with four credits of technical electives. These four credits may be a technical internship and/or any total of four credits of 300 level courses in Computer Science, Engineering Science, or Engineering Technology in consultation with their faculty advisor. Giving students the internship option and the option of taking a technical course in an area where they may use the credit towards their B.S. degree is one obvious advantage. It is also advantageous to the department. We may offer a number of different specialized courses over a number of semesters. Students will be able to enroll in ELT 464/465 when it is offered. They may also enroll in a telecommunications course in another semester. The department can gauge student interest to determine specialized offerings. The department is discussing this change now (Dec. 1997).

A further curricular modification that we are investigating is a move to eliminate Technical Mathematics II which introduces the technical student to Calculus. This would be replaced by the first semester of Calculus for engineers and science majors pursuing the B. S. degree. This obviously would aid articulation to the B. S. degree. However, students might have to take an additional 3 credits of Pre-calculus. This issue is also being actively discussed between our

The first two steps were taken during the 1995-96 academic year. One course, CSC 114, Technical Programming, was already part of the CET and EET A.A.S. programs. It was not changed. Three new common-core courses were developed. They were ENT 100, ENT 101, and ENT 110. ENT was a new acronym for Engineering Technology introduced for common core courses. These courses can be taken by students enrolled in MTH 020, Elementary Algebra, for entering students requiring remedial mathematics.

ENT 100, Basic Technical Skills, is a 2 credit, 4 hour course beginning with technical orientation, continuing through learning skills such as use of the calculator, library access, introduction to the computer, technical problem solving, right triangle trigonometry, conversion of units, introduction to motion and forces, and introduction to electricity through series circuits and parallel circuits. The need for this type of a course as part of the freshman experience has been examined previously.¹⁻³

ENT 101, Introduction to Measurements and Instrumentation, is also a 2 credit, 4 hour course. The course uses a lecture/lab format. The importance of measurements for the scientific and engineering community is emphasized. Accuracy and precision is discussed. Physical measurements and electrical measurements are performed using appropriate instrumentation. Sometimes the same measurements are performed using different instruments so that the students get an appreciation for the limitations of the equipment. Students are taught how to write proper lab reports with graphical results when appropriate.

ENT 110, Engineering Graphics, is a 2 credit, 5 hour course in Computer Aided Design, CAD. Students are taught the basics of graphics from the three view projections to electrical symbols and simple schematics using CAD. This course is also required for Engineering Science students.

These courses replace more curricular specific courses such as Introduction to Civil Technology, Introduction to Circuits, Electronic Drafting, and Architectural Drawing.

Since all entering students will be introduced to electrical concepts up to series and parallel circuits, we begin ELT 224, Electrical Circuit Analysis, with the series-parallel circuit. This helped us consolidate two 3 credit circuit lecture courses into a single 4 credit, 4 hour, lecture course. Similarly, we have consolidated the two, 1 credit, two hour circuit analysis lab into a single, 1 credit, three hour laboratory.

To further lower the EET program credit requirements, which was 71 before 1996, we combined our separate communications and industrial electronics lecture and lab courses of 6 credits lecture and 2 credits lab into a single lecture course, Electronics II, of 4 credits and a single lab course of 1 credit. In this lecture-lab 5 credit block, will focus on electronic systems. The electronic components discussed in Electronics I will be combined to form useful communications and industrial controls systems. The basics of both types of systems can be taught in a single unified course, albeit with less examples than before.

Electrical Machines I and II, an 8 credit, 2 semester lecture/lab sequence covering electrical

department, the math department and our sister departments.

As we discuss and implement curricula modifications, we have revitalized our Industrial Advisory Board to focus them on helping us in student recruitment and internship opportunities. We have made a joint meeting between our Industrial Advisory Board and Assistant Principals and college advisors from feeder high schools. We will have people from industry speak at the high schools. We will have high school classes visit industrial sites to learn what technical employees do. We have begun this activity in the 1997-98 academic year. We expect that by streamlining our curricula and recruiting more students, with greater interest in the technology field, we will produce better educated graduates for either the job market or for continuing in high education or both.

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ELLIOT M. ROTHKOPF

Elliot M. Rothkopf is a professor and chairperson of the Engineering Technologies Department at the College of Staten Island/CUNY. Dr. Rothkopf received his B. S. and M. S. degrees in electrical engineering from the City College of New York and Polytechnic University, respectively, and his Ph.D. from the Hebrew University of Jerusalem. Dr. Rothkopf has taught electrical engineering for over twenty-five years. His research interests involve electrical instrumentation. He is a senior member of the Institute of Electrical and Electronic Engineers (IEEE) and a member of the American Society for Engineering Education (ASEE), Eta Kappa Nu, and the New York State Engineering Technology Association (NYSETA).