First-Hand: An Electrical Engineering Education at Cornell, 1956 - 1961
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Historians of electrical engineering and education might be interested in what I experienced, more than 50 years ago, as an undergraduate student in a well regarded program at the Electrical Engineering School of Cornell University. I was there in the mid to late 1950’s as well as the early 1960’s. I suspect that these remarks might be of historical value because the nature of electrical engineering education has changed so profoundly in the years since I left Cornell. I can say this with some confidence as I became a professor of electrical engineering at another institution and taught there from 1969 until 2010.

I had about 160 classmates in my freshman electrical engineering class in the fall of 1956 and there were around 2000 first year students overall at the University. Of the 160 EE’s, exactly one was female, Carol D. I know that she felt self conscious — she once confided to me, “I feel as though I have three eyes.” She was gone by the end of our freshman year. I’m not surprised — neither students (I am guilty here) nor faculty made any attempt to make her feel comfortable. She was an attractive young woman who dressed well and was the object of a lot of unfounded ugly remarks, e.g., “She’s working her way through school one professor at a time.” I hardly need mention that the department faculty was all male — this woman had no mentor.

Not only did Carol disappear from the program but so would the majority of her 159 male classmates. We were in a 5 year program and by graduation day there were only about 60 of us left. Why this occurred is mostly the subject of the remainder of this memoir.

In 1956, five year programs in engineering were not uncommon—they have now vanished, to the detriment of the profession. It was believed at the time that a young engineer entering his or her life’s work needed ample exposure to the humanities and the social sciences to become an educated individual, someone not
handicapped by the narrowness of a purely technical education. The logic of this was solid and Cornell’s policy —long since abandoned—is one of the few positive things I can say about my experience there. As a 16 year old entering the university, I didn’t mind having an extra year of college to get a good taste of the liberal arts.

Incidentally, I was not the only 16 year old. In the entire freshman class of 2000 students I think there were 70 of us youngsters—mostly products of the New York City public schools, which would skip you a grade if they thought you could handle it. In general, most of my classmates in EE at Cornell were bright kids and had come from such prestigious high schools as Stuyvesant, Bronx Science and Choate. For many of these youths, getting flushed out of electrical engineering, and in some cases transferring to less demanding universities or entering the military, must have been an embittering experience.

I might also add that the entire cost of a year at Cornell in the 1950’s was $2000, which covered tuition, room, board and books. An additional year of study didn’t seem like an enormous financial burden while today it might mean an expense of $50,000.

Looking at the courses I was required to take at Cornell to get my bachelor’s degree in electrical engineering, I can see that I was receiving an education suitable for circa 1925. This explains in large part the dreadful attrition rate in my class. None of the courses, by themselves, was overwhelmingly difficult. What made life hard, and at times overwhelming, was the sheer amount of work required of us. Not counting phys ed, we took typically 6 courses per semester (this was the era of compulsory ROTC classes at Cornell) and many of them I realize now had no place in a modern electrical engineering curriculum, one that was to be valid for the next 40 years of our professional lives. What we received was an old fashioned, between-the-wars electrical engineering education, embellished with a large dose of mechanical engineering. In our freshman year we EE’s were taking mechanical drawing, (5 hours a week for two terms), machine shop, casting and working of metals. On top of this was a core of important work that is still in engineering programs today: college English, calculus, chemistry, and physics. In 1956 most freshman college students had never seen calculus in high school, which made it hard going in college, rougher still if you had no time for serious study. Chemistry, physics, machine shop, casting of metals all had labs. Typically one had a free afternoon per week in which to think, relax, or, more usually, seek help in math or physics from our instructors, if we could find them.

Our class of 160 freshmen had exactly one faculty adviser in the Electrical Engineering Department, B. K. Northrop. He was an elderly, kind and good man, in poor health, and he died the next year, only to be replaced by another aged professor. The job of suitably advising a needy class this size was too much for any one professor, even a youthful one in good health. I, like most of my classmates, had been a “science whiz kid” back in high school and the sight of 50% on a Cornell physics test was a shock—nothing we had been prepared for—and we didn’t know what to do. Mostly we worked and worried.

If our freshman year was hard the next year was equally hellish. Again we were weighted with mechanical engineering topics—strength of materials, thermodynamics, statics and dynamics. These subjects were also covered in our physics courses but without the additional slide rule work and lab reports. We even had a dose of civil engineering with a required course in surveying—taking up an afternoon a week with our using transits on the arts quadrangle. I have no doubt that some classmate of mine, reading this, will tell me of how as a working EE he needed to know some surveying but such people are rare. Later, as upperclassmen, we had more ME material: fluid mechanics and machine design. The latter, much loathed, we called “machine disease.” What was insidious about these non-electrical courses was that they robbed our curriculum of subjects we should have been studying. In 1956 digital computers were not a brand new technology—they had proved their worth in the war. Yet, there was not one course required of us in computer programming, computer architecture, or logic circuits. No faculty adviser suggested that I take such a subject as an elective. Although post war electrical engineering was the age of electronics, we took 4 semesters of heavy electrical engineering, (motors and generators) and just 3 of electronics. Of the latter, we had twice as much instruction on vacuum tubes than transistors although the transistor radio had been on the market since 1954 and it was obvious which way electronics was headed. I never learned a thing about information theory, radar or television. When I graduated after 5 years I still hadn’t learned the concept of a “bit” of information.

A Cornell EE undergraduate reading the above today would probably be incredulous. I know from recently speaking to one that there is an elaborate tutorial system in place to help people in trouble. “We won’t let you fail,” the old Heathkit motto that we undergraduates knew, is apparently now in place in Cornell engineering. An attrition rate such as the one I experienced would reverberate through the college rankings of US News and World Report. Moreover, if a class loses 90 students each paying 50,000 dollars a year to
the university over a period of several years, the financial consequences, in the millions, are serious. While there may not be a huge number of female students, the 1 per 160 ratio that I knew is gone. Everyone in my class was white, except for two Asians. We were a day’s drive from New York City but in 1956 Cornell apparently made no effort to recruit some black students there. I trust that there are some African-American students in Cornell EE now and the class is no longer as blandly homogenous as the one I knew.

The curriculum has been modernized—it’s no longer a mix of outdated power electricity and mechanical engineering. The EE School has a fine reputation and is very selective about whom it takes. I have to remind myself too that my experience was not unique to Cornell. Three of my high school classmates entered MIT in 1956—two in engineering and one in architecture. In a year, the two engineers were gone to liberal arts colleges. One friend went to Lehigh to take engineering and quickly left.

My bitter memories about Cornell remain but I do not wish to end on an entirely sour note. Thanks to the generous 5 year curriculum I was allowed to take some excellent electives: anthropology, 4 semesters of literature, advanced mathematics. I had some fine teachers for senior level elective courses in the EE department including William Gordon who designed the now famous Arecibo radio telescope in Puerto Rico. And I did learn to work hard.

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