

making a map. It sounds simpler than it really is; photogrammetry requires the use of trigonometry, calculus, and an unlimited amount of higher mathematics and science. Complex though it may be, photogrammetry has enabled us to easily make measurements of a lot of things that we weren't able to do before. For example, we now make maps of wild animals, the sails of ships, flexing airplane wings, and even objects like human eyeballs. On campus, we've been working for the animal husbandry department, making measurements of young horses to project the animals' adult sizes, weights, and other data. Because the horses won't stand still long enough for us to make ordinary measurements with a measuring tape, we take pictures of them with calibrated, metrical Zeiss cameras. Then we make the measurements on the photographs in our photogrammetry laboratories.

#### **Why are there so few surveying programs?**

The program is an expensive one to maintain, and some of the smaller states haven't wanted to invest enough money to train the minimal 10 or 12 people needed to keep a program going. Instead, those states have been sending interested students to CSU, Fresno, where we have gathered a widely acclaimed surveying and photogrammetry faculty, who are privileged to teach in four modern laboratories, housing 18 photogrammetric stereoplotters — more than any other school in the country. One important factor contributing to the success of CSU, Fresno's surveying engineering program is the unyielding commitment the university's administration has made to support the program on many levels. The pride they have in this rare program and enthusiasm for its continued success is obvious.

#### **Among engineering specialities, is demand highest for surveyors?**

Surveying engineers easily get jobs. The scarcity of accredited surveying programs virtually guarantees jobs to CSU, Fresno students after graduation. Last year, the graduates were getting anywhere from three to six job offers, with an average starting salary of \$27,000 per year.

#### **Are students ready to start at a large company when they graduate?**

We are preparing students to become professionals. This, in part, means that they are capable of effectively working in large or small companies. In order to achieve this goal, we educate students in methods of applying their knowledge and skills to any situation. The education of a surveyor is a growth process which begins with his or her first course — but never ends. I can't emphasize enough that, with rapid advancements in science and technology, the education of a surveyor is a never-ending process.

#### **Does that never-ending process apply to you as well?**

Absolutely! I attend many seminars in which I am simply a student, and I read two or three books, as well as monthly journals, in addition to the text I am using for each class. To stay current in practical field techniques, I work as a surveyor during summers. This gives me a broad body of knowledge from which to draw for my class lectures. In some classes, the students and I become partners in education; that is, we are learning together. An example of this partnership is my geodesy class, in which we use applied mathematics to study the size and shape of the earth and the gravity field that surrounds it. I welcome and am mentally stimulated by the challenging questions students ask. These questions and concerns focus my attention on matters that aren't fully understood, and this prods me to find out more about the subject. Sometimes we obtain very creative results from "dumb questions."

One of the most satisfying aspects of engineering is that it is a very creative profession. There is always some new development that must be blended into an old curriculum, and sometimes there are so many new developments that it's necessary for us to create new courses. For example, last year I developed two new courses, and in the last two years taught four courses that were new to me. Needless to say, the education of this surveying engineer is definitely a never-ending process!

#### **What are your strengths in teaching?**

Perhaps my greatest strengths are flexibility, stamina, and creativity. Since joining the CSU, Fresno faculty, I have taught 29 different course or laboratory subjects, in three departments. I enjoy the challenge of learning. I'm willing to put in considerable time understanding and restructuring complex subjects so I can present them to students in an easily grasped form.

Students get very frustrated with me because I'm slow to grade examinations and return them. I'm very concerned that engineering students develop good problem solving habits, so rather than going through the examinations and just marking the final answers right or wrong, I look at every number in their calculations and point out why they are wrong and how they can improve their procedures. I seem to have a good rapport with students; they come to my office for advice on everything from homework to love! Many of the program's graduates keep in touch with me and stop in to visit when they are in Fresno.

#### **What do you like to do in your spare time?**

There hasn't been much spare time lately! With my wife, Rosemarie, I enjoy the quiet and serenity of country living. She is a musician who frequently provides music for events like weddings and church services. I sing with her and sometimes play the guitar. Occasionally I scare our dogs by singing folk songs in Hawaiian. My wife and I take dancing lessons and belong to a dance club that meets once a month. I enjoy leisurely reading books about economics and political philosophy.