

CEE features an outstanding teacher-researcher who doubles as head varsity tennis coach.

## DUANE BRULEY OF CLEMSON

*This feature article was contributed by Professor C. E. Littlejohn, chairman at Clemson University.*

At about the same time that a young graduate student in neighboring Tennessee was becoming increasingly interested in a professional teaching career, Clemson University's chemical engineering department was making plans to offer South Carolina's first PhD program in engineering.

These independent developments of 1960 would soon have a direct bearing on each other and on the future of Duane F. Bruley, then a student at the University of Tennessee pursuing his doctorate in chemical engineering.

The pioneering effort at Clemson was scheduled to begin in the fall of 1962 and additional faculty were needed to help carry the new doctoral program forward. Dr. Bruley joined the department in September of that year and launched what was to become an outstanding career.

Now in his eighth year at Clemson, the 36-

year-old associate professor spends equal parts of his time in a variety of research, teaching, and administrative activities. His main research areas are process dynamics and control and biomedical engineering. He devotes one-half of his research time to each of these areas.

**"Emphasis in chemical engineering should be placed directly on process dynamics, rather than on control stability analysis,"** says Dr. Bruley. Most of his research in process dynamics has been on distributed parameter systems and direct digital control and on-line optimization of chemical plants and processes. Dr. Bruley believes that research endeavors should serve mainly as a means of broadening one's teaching capabilities at both undergraduate and graduate levels.

"In the academic world, research makes an individual more specialized in certain areas so he can contribute to his students at the forefront of subject matter," says Dr. Bruley, whose research at Clemson has been supported by grants from the National Science Foundation and the National Institutes of Health.

He believes strongly in the value of teamwork

among researchers from various disciplines and has worked closely with the Medical University of S. C. for the past six years on several projects in anatomy. Their cooperative studies in oxygen transport in the human brain could be of extreme value in the protection against irreparable damage to brain cells and other organs.

His notable work in this area was recognized by the Southeastern Section of ASEE which presented its first place award for outstanding contribution in research to Dr. Bruley in 1967.

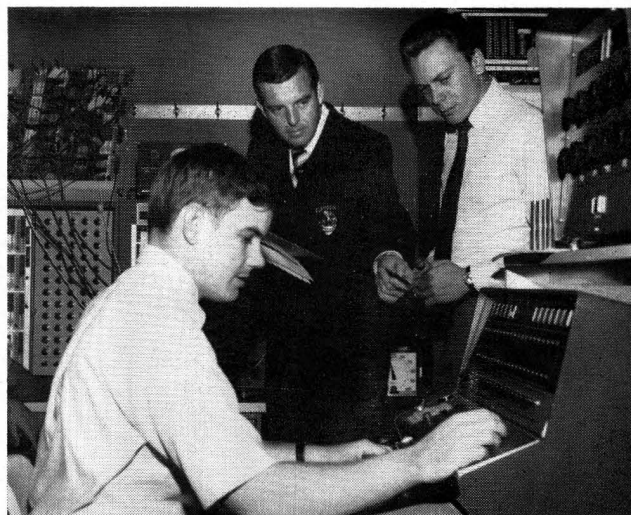
Dr. Bruley is interested in teaching and research at all levels. He teaches graduate and undergraduate classes in chemical engineering including these specialized areas: process dynamics and control, mathematical modeling and simulation, and heat and mass transfer.

**"The student is the most important factor in the academic world. The student is the only reason we are here really,"** Dr. Bruley emphasizes. They are always given first priority at both undergraduate and graduate levels at Clemson. He confides that it can be frustrating at times when endless paper work and committee meetings seem to interfere with the main goal of educating the student.

Dr. Bruley favors an arrangement which places emphasis on graduate and undergraduate training, adding that one benefits the other. "To have a strong undergraduate program," explains Dr. Bruley, "you should have a strong graduate program involving research because this information is used to improve the undergraduate program." He says that an overly-emphasized



**16 wins  
No losses**



graduate program can be detrimental to the undergraduates. "It must be a careful balance."

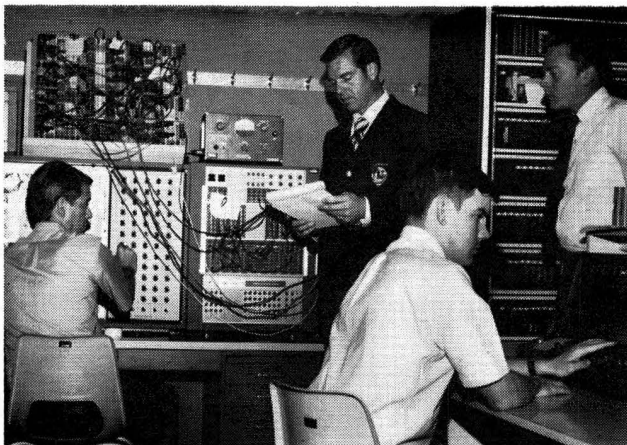
Besides his numerous engineering-related activities, Dr. Bruley has served as head varsity tennis coach since coming to Clemson, a position which he accepted as part of a joint appointment at the university. Last year's overall team record of 16 wins and no losses reflects Dr. Bruley's ability to inspire students to excel on the playing court as well as in the classroom. The 1969 team won the Atlantic Coast Conference championship hands down, compiling a perfect 7-0 record in play against some of the top teams in the east. His squads have won 94 matches and lost 24 since he took over the helm.

"Tennis is a very challenging and rewarding experience along with professional life in chemical engineering," says Dr. Bruley. "It's really a hobby." Athletics have long been an important part of his life and Dr. Bruley believes they are an indispensable phase of the total university environment. "To operate optimally mentally," he says, "a person should maintain good physical condition."

Dr. Bruley played tennis and football at Eau Claire State University during his undergraduate days, and was head varsity tennis coach at the University of Tennessee for one year prior to coming to Clemson.

At Clemson, the tennis coaching staff is composed entirely of chemical engineering professors. Besides Dr. Bruley, Dr. Bill Beckwith, associate professor, is assistant coach, and Dr. Joe Mullins, associate professor, assists periodically.

Among his other Clemson duties, Dr. Bruley



is in charge of the department's process control computer laboratory. This facility includes a GE-312 digital process control computer and peripheral equipment which was a competitive gift awarded by Dow Chemical Co., Midland, Mich., on the basis of a proposal submitted by the department. The laboratory also contains a TR-48/DES-30 analog/digital logic package which was granted by the National Science Foundation.

During his seven years at Clemson, Dr. Bruley has had 18 articles published or accepted for publication and filled 35 speaking engagements, including an invitation to the University of Goteburg, Sweden, in June, 1968.

Dr. Bruley is a member of the AIChE, Tau Beta Pi, Sigma Xi, the Simulation Council, and is a registered professional engineer in South Carolina. A native of Chippewa Falls, Wis., Dr. Bruley is an honor graduate of the University of Wisconsin, receiving a BS degree in chemical engineering in 1956. While there, he held a Universal Oil Products scholarship.

He then attended the Oak Ridge School of Reactor Technology, Oak Ridge, Tenn., as a special fellow in a one-year graduate nuclear engineering program. Dr. Bruley later attended Stanford University on an Atomic Energy Commission fellowship and was graduated in 1959 with an MS in mechanical engineering.

At the University of Tennessee, Dr. Bruley held Shell and Texaco foundation scholarships while pursuing his PhD in chemical engineering and serving as a graduate teaching assistant.

Dr. Bruley's wife is the former Suzanne Bigler. They have three sons: Scott, 6, Randy, 5, and Mark, 2.

## ChE book reviews

*Design Studies in the Manufacture of Ethylene by Pyrolysis of Naphtha*, D. B. Tolmie (Ed.), The University of Sydney, New South Wales, (Australia), Department of Chemical Engineering, (1967), \$10.

This is a bound report of some 285 typed and mimeographed legal-size pages. It covers the efforts of 26 senior chemical engineering students in the class of 1967 at The University of Sydney. As the title suggests, the class project dealt with the design and economic evaluation of an ethylene plant. The plant capacity is 120,000 long tons per year of polymer-grade (99.9% pure) ethylene; because of the naphtha feedstock this entails a considerable production of ethylene co-products such as propylene, butylenes, and gasoline.

The report is divided into 12 chapters, each covering the work of two students. Introductory material is provided by Professors T. G. Hunter and D. B. Tolmie and includes some treatment of project scheduling and control. Chapters by the students cover the following titles in sequence:

- Economics and Technology
- Storage and Transportation
- Naphtha and Ethane Pyrolysis Furnaces
- Scrubbing and Compressing Pyrolysis Gases
- Heat and Power Economy, Utilities and Effluent Disposal
- Acid Gas Removal
- Drying of Cracked Gases
- Refrigeration System
- Acetylene Conversion
- Distillation
- Plant and Services Layout
- Optimizing Process Conditions

Each chapter includes a brief treatment of technology, a summary of detailed calculations, and a list of references. In total, the report contains a considerable amount of collected material on the general subject of ethylene technology.

The contents of the report reflect industrial practice to some extent, since the material was reviewed and criticized by practitioners. It extends beyond conventional process design and includes such details as locations of fire hydrants and first aid stations. It suffers from the time constraints of students who are not able to consider many of the alternate solutions to the problems at hand. However, the amount of work done by the students and by the editor is indeed impressive, and one wonders whether there was

(Continued on page 93)