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MKC  
9T2261

## MEIS links university and major industries

Through its three major research facilities which support activities in a number of IT departments, MEIS (Microelectronic and Information Sciences Center) brings to the university a level of high technology research never before possible. "We expect the current research projects and grants to stimulate more proposals and funding," states MEIS Executive Committee Chairman H. Ted Davis, who is also Head of the department of Chemical Engineering and Materials Science. "And it's already coming in," he adds. "About \$2 million in research grants has been awarded within the last two or three months."

The three facilities supported by MEIS are the Microelectronics Laboratory, coordinated by Dr. Gary Robinson—a facility for research and instrumentation on microelectronic materials, devices and integrated circuits; VLSI Design Laboratory, coordinated by Dr. Al Tuszynski—a facility for engineering-design research and base for the UNITE Program, which allows industry access to the facility; and the Synchrotron Radiation X-Ray Beamline, coordinated by Dr. John Weaver—a facility

for research in electron spectroscopy and x-ray lithography.

MEIS was established three years ago with funding of \$6 million from Control Data, Honeywell, Sperry Univac and 3M. IT departments which are benefiting from MEIS-supported programs are Chemical Engineering & Materials Science, Chemistry, Computer Science, Electrical Engineering and Physics.

Through MEIS sponsorship four major research projects are currently under way, involving about 45 professors. Those projects are: 1) User Project—a research program on microelectronic materials for ultrasmall electronics technology; 2) 3-D Integrated Circuit Program; 3) PACE—Processor Array Concepts for Engineering; and 4) DASE—Experimental Research on High Performance Computing. MEIS funds also support about 20 graduate students a year and are used to carry out a small research grants program supporting nine professors.

The funding that has been channeled into MEIS is paying off in terms

*MEIS to page 8*



Reviewing plans for the new Microelectronics Laboratory, Executive Committee members: Dr. Kurt Maly, Computer Science, Dr. H. Ted Davis, Chemical Engineering and Materials Science, Dr. Bernd Hoefflinger, Electrical Engineering, and Dr. Martha Russell, MEIS Executive Director.

## Chemical Engineering rated #1 in reputation

A recent study sponsored by four national academic organizations listed the relative academic prestige of the country's top research universities. Two IT departments ranked among the top ten in reputation: Chemical Engineering was selected number one in the nation, and Mechanical Engineering rated number five.

To assess reputation, faculty members in 32 fields of study were asked to rate the quality of their peers at institutions across the country. The study was published by the Conference Board of Associated Research Councils.

## Emeriti Reunion set for May 19-20-21: Welcome back, classes of '33 and '43!

Is it really 40 years, or 50, since you left this grove of academe? If so this year's class reunions will give you a glorious three-day opportunity to wallow in nostalgia, revisit old haunts, and catch up on new developments.

Here is the proposed order of events:

*Thursday, May 19*—Walking tour of the Minneapolis and St. Paul campuses, starting at Morrill Hall.

*Friday, May 20*—IT reception in the new Civil & Mineral Engineering Building including remarks by the Dean and opportunity to meet current faculty, sit in on classes and tour buildings. Noon class reunion lunch at the Great Hall. Afternoon seminar on planned giving, followed by Sunlight Dance in late afternoon.

*Saturday, May 21*—Emeriti luncheon at Town and Country Club. 1933 Class Reunion at Interlachen Country Club. 1943 Class Reunion at Minikahda Club.

Chairman of the 1933 Reunion Committee is William G. Shepherd, and for 1943, William F. Braasch. Events for the entire three-day event are planned by an 18-member Emeriti Planning Committee, co-chaired by Harold (Ted) Miller and Dorothy Overton Green.

# Minnesota High Technology Council replaces ITAC



Comparing notes at a MHTC-sponsored seminar are Dr. Kurt Maly, Computer Science Department; David Crosby of Piper, Jaffray & Hopwood; Dr. Gary Robinson, Coordinator of the Microelectronics Laboratory; and Thomas Ensign of 3M.

Minnesota is a state rich in high technology industries. An influential group of industry representatives have joined forces to keep it that way, through the Minnesota High Technology Council (MHTC)—an alliance of industry, higher education and state government. An outgrowth of the former Institute of Technology Advisory Council (ITAC), MHTC was organized last summer as an independent body. The Council represents a growing number of industries which want to foster the continuing health and growth of the state's high tech firms. To do this, MHTC is focusing on improving technical education at colleges and universities throughout the state, with top priority on gaining state funding for educational programs.

## High quality education draws high tech industries

"High technology companies locate where there are high quality universities," states John Malinka, Executive Director of MHTC. "Studies show that the quality of technical education in Minnesota has been slipping," he notes. Inadequate high school preparation in math and science, outmoded equipment at the university level, overcrowded classes, and faculty salaries that can't compete with industry all contribute to decreasing quality. "When the best students go elsewhere," says

Malinka, "Minnesota industries are the losers."

MHTC is trying to turn things around, and council members are encouraged by the group's success to date. For instance, at the time of this writing Governor Perpich had included the Council's major recommendation in his budget: \$7.2 million in funding to strengthen the University's Institute of Technology. "We've hired Dean-Ewald Associates to speak for us in the legislature and see that MHTC's concerns get addressed," says Malinka.

## Growing membership

Many Council members were also part of the former ITAC. Since one study identified approximately 2,000 technology intensive businesses in the state, there are opportunities for many new members to have input in MHTC, which includes the top executives of both large and small firms throughout the state. The board of directors includes representatives of Economics Laboratory; Data Card Corporation; Electro/General; Electro-Craft; Medtronic; Molecular Genetics; Cray Research; Honeywell; MTS Systems; IBM; Nortronics; E.F. Johnson; National City Bank; Larkin, Hoffman, Daly & Lindgren; Peat, Marwick, Mitchell; Buckbee-Mears; the State of Minnesota; and the University of Minnesota.

## Goals stress education

"In the short term," states Malinka, "we want to build up the faculty and maintain good people at Minnesota campuses, so they don't go elsewhere. As far as industry is concerned, it becomes very expensive to bring in technically trained people from outside the state, and often they don't stay." In the longer range, the Council will address needs of the AVTI and K-12 level as well. The wider goals of the Council are:

- 1) to improve the quality of education at all levels and increase the quantity and preparedness of scientists, engineers and technicians for Minnesota industry;
- 2) to identify the technology and human resource needs of the science and technology industry within the state;
- 3) to improve communication between business, education and government; and
- 4) to promote public awareness of the contributions high technology industries can make to Minnesota's economy.

## Council organization

MHTC officers are Richard E. Horner, Chairman (President, E.F. Johnson Co.), John A. Rollwagen, 1st Vice Chairman (CEO, Cray Research), and Robert L. Rynearson, 2nd Vice Chairman (Vice President, Honeywell). The Council has committees on Membership, University/Industry Relations, Government Relations, and Public Relations. Membership dues are based on a sliding scale tied to company size, ranging from \$100 to \$15,000 annually. The group also has a membership from companies which support and serve technology companies; these include banks, legal and accounting firms and venture capital companies.

The Council sponsors seminars and publishes a newsletter. More information is available by contacting The Minnesota High Technology Council, 4900 West 78th Street, Bloomington, MN 55435, or calling (612) 893-3009 or 893-3069.



## Jobs in Technology: MHTC Technical Needs Survey

The Minnesota High Technology Council recently published the results of a survey taken to determine the technical personnel needs of all Minnesota industries. The survey was initiated in September 1981 for the purpose of: (1) identifying near-term, three year, needs for technical/professional and paraprofessional/technician personnel in the state; and (2) forecasting the state's needs for the ensuing 10 years.

The technical/professional job categories which anticipate high growth rates in the near-term include computer science (13.3%), electronic/electrical engineering (18.4%), mechanical engineering (12.5%) and manufacturing/industrial engineering (11.6%). Paraprofessional/technician job categories include: mechanical technicians (10.2%), electronic technicians (14.1%), computer programmers (21.1%) and printed circuit designers (27.8%). These rates represent a significant growth in the demand for these disciplines.

A detailed description of survey methods, participants, growth projections and analysis of technical needs is available from the Minnesota High Technology Council, 4900 W. 78th St., Bloomington, MN 55435, (612) 893-3009.

## Akerman Memorial Fund receives gift

A generous gift has been made to the Akerman Memorial Fund of the Department of Aerospace Engineering and Mechanics by the widow of former IT student, John (Bud) McCarthy. Elizabeth Rosacker McCarthy has pledged \$10,000 in memory of her husband.

John McCarthy died last year, will- ing a \$1,000 gift of stock to the AEM Department. When it was discovered that the stock had lost its value, Mrs. McCarthy decided to do more than make good on her husband's gift. . . she increased it ten-fold. On April 5, 1983 Mrs. McCarthy presented the department with a check for \$2,000, as an initial payment on her pledge.

The Akerman Fund is named for former AEM department chairman John D. Akerman. It is used to bring to the campus for a single academic quarter each year a senior design engineer from an aerospace company.

## Meeting the crisis in education: The Minnesota Alliance for Science

Minnesota schools and industries are facing a crisis: we are not educating enough teachers of science and mathematics, not providing adequate elementary and high school education in these areas, and not preparing a corps of young people who can meet the increasing technological needs of Minnesota's industries, or even of daily life.

Now a new program exists to make an effort towards overcoming that crisis. The Bush Foundation has awarded a grant jointly to the Institute of Technology and the College of Education for the development of a plan for upgrading the quality and quantity of science and math education in schools throughout the state, grades K-12 inclusive. Welcome, Minnesota Alliance for Science.

The Alliance is under the dual direction of Edwin F. Stueben, Associate Dean for Undergraduate Studies and Educational Development at the Institute of Technology, and Andrew Ahlgren, Professor of Education and Associate Director of the Center for Educational Development. Overseeing day-to-day management of project activities and working closely with the co-directors in developing specific activities is Executive Director Von Valletta, formerly Minnesota's Deputy Commissioner of Education for seven years. The project grant of \$166,000 is for an 18-month period. It marks what the directors hope is the first phase in implementing changes in educational priorities and activities in the state.

The Minnesota Alliance has four major goals:

### 1) Increase the number of students who enroll in academic math and science courses in grades K-12.

"Since the '70's," notes Stueben, "there has been a proliferation of math-related courses that are more suited to community ed and extension programs than to academic education. Students are not being guided to take the science and math courses they need for college or other post-high school training."

### 2) Make top quality education available by assuring that teachers receive the best possible training and opportunities for continued professional development.

"We are losing science teachers," says Stueben. Studies show that "the average age of the teachers is going up and new people are not coming in. In five years many of today's teachers will start to

retire, and without an influx of new teachers there will be a major crisis."

### 3) Improve instructional resources such as laboratories and equipment and update instructional materials and methods to reflect the latest knowledge.

### 4) Change public policy so that the educational system can provide adequate resources for upgraded technical education.

"People whose lives are not involved with high technology do influence public policy," states Von Valletta. "We would like to see public policy makers stop using language that refers to the cost of education and begin referring to it as a *capital investment*."

The project isn't intended to be a long term study, but rather to generate a plan of action and carry it out. Effective collaboration between public and private colleges and universities, industries, and schools will be required. Notes Valletta, "Many employers have become aware that their employees will be using high technology even if their own business is not related to technology. The state, local school districts, educational institutions and businesses will all benefit through their collaboration."

The project proposal calls for the establishment of four working groups which will include representatives from academic, educational, business, community and governmental sectors. A 15-person steering committee will advise on project operations. The proposed working groups reflect the four major goals of the Alliance.

"Because technology affects everyone today," Stueben says, "a better technical education is not just for the benefit of specialists; all students must be educated in these areas. For instance, virtually everyone will be using a computer in the future. The problem is no longer one of teaching computer literacy, but rather of teaching the analytic skills necessary for understanding how to take advantage of the computer's capabilities."

The challenge for the Alliance is great. The directors don't expect an overnight change in educational policies, but are optimistic that this project can point the way towards improving science and mathematics education in schools and steering more students into the increasing number of careers in fields affected by technology.

## State senate allocates funds

The Higher Education Sub-Committee of the Minnesota Senate voted recently to establish a research institute for minerals and natural resources at the University of Minnesota-Duluth. The plan also includes an appropriation of \$4.1 million for the Institute of Technology.

Earlier in the year Governor Rudy Perpich visited a number of IT departments and promised to request legislative approval for the sale of bonds to finance several major IT programs. Perpich gave top priority to three projects: remodeling and re-equipping the computer science and electrical engineering building, equipping the new civil and mineral engineering building, and planning a new computer science-electrical engineering building.

## Readers remember

A previous issue of ITEMS asked alumni: "What do you remember about IT Week, or the former E Week, or the original Engineers' Day that started the spring time tradition?" We received some interesting recollections, and pass them on forthwith:

*...about 1919, '20 or '21 the Civil Engineers part in the parade consisted of taking a steam locomotive the length of the parade, laying track ahead of it and taking it up behind.*

Chauncy L. Greene, EE 24

*As is known throughout the world, St. Patrick was an engineer. So it was fitting and proper that a parade of engineers be held on his birthday... The parade and the date was not favored by some faculty units over in the academic section. Absence from class and disruption of the daily routine were not to be tolerated. But the favorable sentiment was strong. So a compromise was made about 1920 or 1921... There was established an "Engineers Day," set later in the spring season for more favorable weather. The significance of St. Patrick and his inspiration to engineers deteriorated as did the Irish influence... In those days not much was asked of the engineering student. It was not required that he be able to write a theme. Radio was just stirring on the campus. A lecturer told us that radio would not reach much of a commercial importance in entertainment...*

Robert T. McCullough, EE 23

## New underground building for CME

A new underground structure has appeared on the Minneapolis campus, adding its state of the art appearance and host of technologically advanced features to the diverse campus architecture. As is only fitting, the building is the new home for the Department of Civil & Mineral Engineering (CME). Still in its initial "shakedown" stage, the building has been open only since January. Not only does it serve as a live model for the application of theories of optics, passive and active solar heating, air circulation and water diversion, but, says Charles Fairhurst, CME Department Head, "It brings together the entire department in one location, with the advantages of improving communications, boosting morale and building a feeling of cohesiveness."

Though 95 percent below ground, the building is far from invisible. Its main structural lab rises 50 feet above ground. Located just north of IT's seven buildings, it has a large spiraling plaza leading to the main entrance and to pedestrian walkways connecting neighboring buildings, as well as to a bus transit corridor.

Inside are classrooms, laboratories and offices, but "as yet the labs are lacking equipment, the classrooms still need to be furnished," reports Fair-

hurst. Funding from state and private sources has been requested and it is hoped that by the date of its official dedication in October, the CME Building will be better equipped.

Among the technological problems which the designers, BRW Architects, addressed were finding new ways to bring natural light into the underground areas through the smallest possible apertures, and providing cost efficient solar heating. An active solar optics system was developed that transmits light more than 100 feet below ground; and a remote view optical system, much like a periscope, allows those down under to view a ground level outdoor scene. Heating for the building depends upon both passive and active systems. A passive solar system collects sunlight on a monitor, from which it is reflected by mirrors to target zones. A water-filled Trombe wall on the southwest facade combines passive and active solar systems, collecting heated water in pipes within the wall by day, recirculating the heated water at night.

The building was cited by the U.S. Department of Energy for an award for energy efficiency. It was designed by BRW Architects of Minneapolis. Principal architect was David Bennett.



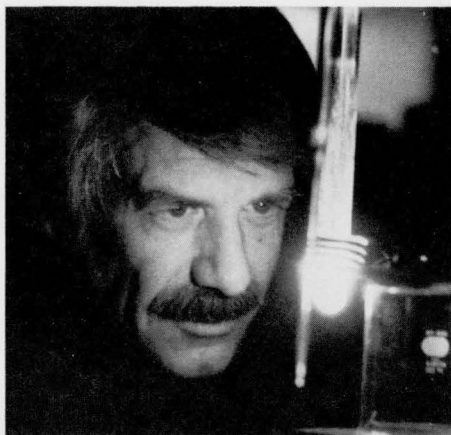
A new building for Civil and Mineral Engineering. 95 percent below ground, but far from invisible.



## Meteorite probably dropped from Mars

A "young" meteorite, found three years ago in the Antarctic, is believed by University scientists to be a chip off the old block of Mars. Earlier analysis of this meteorite at the Johnson Space Center in Houston revealed that it is much younger than the types that most commonly break from asteroids and fall to earth, and that it contains traces of the same kind of gases that make up the Martian atmosphere.

Collaborating on the analysis of the suspected "martian" are physicist Robert Pepin and his associate Richard Becker, a post-doctoral Fellow. Using extreme heat, up to 2,700°F., Becker freed the gases from minute particles of the meteorite. Mass spectrometer measurement then indicated evidence of a significant percentage of heavy nitrogen. Heavy nitrogen had also been



*Dr. Robert Pepin: "It looks as if we're on the right track."*

identified by the Viking Spacecraft mission to Mars in 1976. "Scientists know of no other place in the solar system where such heavy nitrogen enrichment occurs," says Pepin. Even though the enrichment of heavy nitrogen in the

meteorite sample was initially found to be 15%, as opposed to the 60% which had been found in the Martian atmosphere by IT physicist Alfred Nier, Pepin thinks this meteorite contains at least some of the Mars atmosphere. One conjecture is that exposure to earth's atmosphere may have diluted the concentration of heavy nitrogen in the meteorite, possibly during the time it was being processed at the Johnson Space Center.

Further analysis of the meteorite is underway. By varying the heat used for releasing the gases from the sample, Pepin has suggested that it may be possible to get rid of the suspected earth-nitrogen contamination. He now reports that preliminary results of a follow-up experiment reveal a heavy nitrogen enrichment of 20%. "It looks as if we're on the right track," concludes Pepin.

## Corporate Associate fellowships encourage graduate research and teaching

Every year a small group of talented graduate students receive an educational boost in the form of fellowships sponsored by the Corporate Associate fellowship program. Designated specifically for graduate study in the Institute of Technology and the School of Management, these fellowships offer students a unique opportunity to combine advanced research work with teaching experience. Not only are the students rewarded financially and academically, but the university benefits from the teaching they do and the encouragement and stimulation they provide for other students. "To encourage the interaction of teaching and research," explains Leon Green, chairman of the committee making fellowship selections for IT, "the fellowships provide students with support in the form of quarter time teaching associate positions, plus payment of tuition and fees, and summer research salaries." The awards are for one year, renewable for a second year upon recommendation.

Fellows are selected annually from a list of nominees submitted by individual departments. The amount of fellowship money available varies from year to year. "Two years ago we awarded 6 fellowships, this year there are 4 new fellows, and next year there will probably be 5," reports Green.

IT Corporate Associate Fellows for 1982-83, including both new appointments and second year recipients, are:

William Earl, Mathematics; Bruce K. Edgar and Jeffrey A. Pedelty, Astronomy; Mark D. Foster and Dona Lee McCullum, Chemical Engineering and Materials Science; Nancy Grossman, Physics; Richard L. Laffin, Architecture; Joanne Larson, Civil and Mineral Engineering; Eric H. Mohring, Geology and Geophysics; Jill L. Zimmerman, Computer Science.

The Corporate Associate fellowship program has existed since 1969, when it was started by a group of businesses and industries whose intentions were "to attract high quality graduate students to the University of Minnesota, and to improve the quality of the instructional programs by involving these capable students as teaching associates or in some other similar capacity."

In 1979, fellowship funding was taken over by the Partners Program, which supports a number of programs in the Institute of Technology and the School of Management. Collectively funded by more than 30 businesses, corporations, financial institutions and professional firms, the program has channeled over \$1 million into support for more than 240 graduate students.

Serving on this year's IT fellowship selection committee, which has a rotating membership, are: Chairman, Leon Green, Mathematics; Morris Blair, Physics; Thomas Lundgren, Aerospace Engineering & Mechanics; Harold Mooney, Geology; and Larry Schmidt, Chemical Engineering.

## Charles Britzius—50 years of enthusiasm for Theta Tau

"Enthusiastic" is the word that comes to mind in describing the man who, for 50 years, has been an active member and moving force in Theta Tau, a national professional engineering fraternity. Charles Britzius (CE 33),



**Charles Britzius**

joined Theta Tau as a Civil Engineering undergraduate at the University of Minnesota and has been an avid supporter ever since. He first served on the fraternity's executive council in 1954; was national president for a number of years, treasurer for about 15, and is now the organization's historian and archivist.

Theta Tau, though primarily for engineers, is open also to other scientists

## CALENDAR...

## May

- 2-6 **IT Week—Daily Activities**  
See separate article for details
- 4 **Mechanical Engineering Seminar**  
3:15 pm ME 108, Overflow in ME 212  
*What Does MIT Offer in Manufacturing and Productivity?*  
Prof. Nam Suh, Dept. of Mechanical Engineering  
Massachusetts Institute of Technology
- 4 **Society of Physics Students (SPS) Lecture**  
12:15 pm 170 Physics  
*The Origins of Fundamental Concepts in Physics*  
Dr. Edwin Marquit
- 5 **Control Science & Dynamical Systems Center**  
Robotics Seminar—Live interaction on UNITE-TV System  
2:15 pm ME 102  
*Model Based Imaging Systems*  
T. Binford, Computer Science Dept.  
Stanford University
- 5 **Chemical Engineering & Materials Science**  
1:15 pm 240 Amundson Hall  
*Biotechnology Seminar*
- 6 **Aerospace Engineering & Mechanics Colloquium**  
2:15 pm Akerman 225  
*The Latest Decade of Experimental Research in Turbulent Flow*  
Prof. Stanley Corrsin, Dept. of Chemical Engineering  
Johns Hopkins University
- 11 **Mechanical Engineering Seminar**  
3:15 pm ME 108, Overflow in ME 212  
*Mapping Scientific Knowledge*  
Dr. Derek Price, Chairman of Dept. of History, Science & Medicine  
Yale University
- 12 **Chemical Engineering & Materials Science**  
1:15 pm 240 Amundson Hall  
*Biotechnology Seminar*  
Dr. Douglas Inloes, Monsanto Chemical Corp.  
St. Louis, MO
- 12 **Computer Science & Dynamical Systems Center**  
Robotics Seminars—Live interaction on UNITE-TV System  
2:15 pm ME 102  
*Control of Fusion Welding Processes: Beyond Robots*  
D.E. Hardt, Mechanical Engineering  
MIT
- 12-14 **Chemistry Department Symposium Honoring Professor Bryce Crawford, Jr.**  
12:15 pm *Vibrational Spectroscopy and Chemical Structure*  
Proceedings will be published in special issue of the Journal of Physical Chemistry honoring Professor Crawford.
- 13 **Aerospace Engineering & Mechanics Colloquium**  
13 Akerman 225  
2:15 pm *Solution of the Incompressible Navier-Stokes Equations by the Finite Element Method*  
Prof. Mitchell Luskin, Dept. of Mathematics  
University of Minnesota
- 17 **Technology & Society Assessment Program sponsored by Tau Beta Pi**  
17 *Biotechnology*  
At Coffman Union. Pre-registration required. Obtain forms in IT offices or 105 Lind Hall
- 18 **Society of Physics Students (SPS) Lecture**  
18 170 Physics  
12:15 pm *Early History of the Solar System*  
Dr. Robert Pepin
- 18 **Mechanical Engineering Seminar**  
3:15 pm ME 108, Overflow in ME 212  
*Environmental Effects on the Mechanical Properties of Metals*  
Prof. Richard A. Oriani, Director Corrosion Research Center & Dept. of Chem. Engineering & Materials Science  
University of Minnesota
- 19-21 **Emeriti Reunion—Classes of '33 and '43**  
See separate article for details
- 19 **Control Science & Dynamical Systems Center**  
19 Robotics Seminar  
2:15 pm ME 102  
*Kinematic Concerns in Robotics*  
A. Erdman, Dept. of Mechanical Engineering  
University of Minnesota
- 25 **Mechanical Engineering Seminar**  
3:15 pm ME 108, Overflow in ME 212  
*Application of Multi-Dimensional Numerical Models to Combustor Design*  
Dr. Hukan C. Mongia, Garrett Turbine Engine Co.  
Phoenix, Arizona
- 26 **Control Science & Dynamical Systems Center**  
26 Robotics Seminar  
2:15 pm ME 102  
*Supervisory Control of a Multi-Legged Robot*  
D. Orin, Department of Electrical Engineering  
Ohio State University

## June

- 1 **Mechanical Engineering Seminar**  
3:15 pm ME 108, Overflow in ME 212  
*Public Health and Public Policy Concerns for Indoor Air Quality*  
Dr. John Spengler, Environmental Health Sciences Dept.  
Harvard School of Public Health
- 1 **Society of Physics Students (SPS) Lecture**  
12:15 pm 170 Physics  
*Quarks: The Fundamental Constituents of Matter?*  
Dr. Ken Heller  
University of Minnesota
- 2 **Control Science & Dynamical Systems Center**  
2 Robotics Seminar  
2:15 pm ME 102  
*New Concepts in Vision Technology*  
A. Rheinhold, Co-Founder and Product Manager, Vision Systems  
Automatix, Inc., Mass.
- 9 **Control Science & Dynamical Systems Center**  
9 Robotics Seminar  
2:15 pm Shepherd Labs 113  
*Planning in Abstract Robot Spaces*  
M. Perkowski, EE Tech. University of Warsaw and  
University of Minnesota
- 16 **Control Science & Dynamical Systems Center**  
16 Robotics Seminar  
2:d15 pm Shepherd Labs 113  
*Deterministic Adaptive Regulators*  
J. Hetthessy  
Technical University of Budapest
- 26-July 1 *1983 Conference on Dynamics of Molecular Collisions*  
To be held at Gull Lake, MN  
Principal organizer: Prof. W.R. Gentry, Chemistry Dept.

## SCHOOL OF MATHEMATICS & INSTITUTE FOR MATHEMATICS AND ITS APPLICATIONS

The following distinguished mathematicians will be visiting the School of Mathematics and the Institute for Mathematics and its Applications for periods of either one or three months during Spring Quarter 1983. Their visits are supported by the Ordway Endowment of the School of Mathematics.

J. Alperin	Chicago	mid March-mid June 1983
M. Artin	MIT	month of May 1983
H. Brezis	Paris VI	May 15-June 15, 1983
B. Lawson	Stony Brook	May 15-June 15, 1983
S. MacLane	Chicago	April 1-June 30, 1983
(Visiting Ordway Professor, IMA)		
I. Madsen	Aarhus	month of May 1983
J. G. Sinai (IMA)	Moscow	one month during April-May, 1983

### Institute for Mathematics and its Applications

#### April 1-August 31, 1983

*Foundations of Continuum Thermodynamics and Phase Transition*

James Serrin, Coordinator.

#### Future Programs

##### 1983-84

*Mathematical Models for the Economics of Decentralized Resource Allocation.*

Leonid Hurwicz, Coordinator.

##### 1984-85

*Continuum Physics and Partial Differential Equations.*

Coordinators: Jerry Ericksen and David Kinderlehrer with the assistance of Haim Brezis and Constantine Dafermos.

##### 1985-86

*Stochastic Differential Equations and Applications.*

Daniel Stroock, Coordinator.

## Were you there for IT Week?

IT Week is an annual spring splurge of activities cooked up by Plumb Bob, IT's senior honorary leadership society, for the delectation and delight of students, faculty, alumni and industry representatives. This year, as in the past, activities ranged from the silly (an amoebae race) to the serious (a space shuttle seminar). A major event was the outdoor Technology Fair, at which students could check out the products and operations of approximately 30 industries and potential employers. "It was not a career fair," states Michael Marti, Plumb Bob president, "but rather an opportunity for engineering students to learn what the participating companies actually do."

Highlighting the week were such assorted events as a hot air balloon launch sponsored by KS95, a space shuttle seminar featuring Dr. Anthony England, a former member of the ground crew for Apollo 13 and 16, and a banquet at which Gerry Spiess was the guest speaker.

Activities started May 2 and terminated May 6, IT Day, with races, games and an evening party.

## SHORT COURSE ANNOUNCEMENTS

### June

13-16 *Fluid Mechanics Measurements*  
Contact: Kathleen A. Sikora, Program Coordinator, FMM  
376-3302

20-24 *Heat Transfer in Gas Turbine Systems*  
Contact: John Vollum, 222 Nolte Center  
373-3157



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- Dean ..... Roger W. Staehle
- Associate Dean ..... V. Rama Murthy
- Associate Dean ..... Edwin F. Stueben
- Associate Dean ..... Richard C. Jordan
- Director of Special Programs ..... Clarence A. Berg
- Assistant Director of Development ..... Elaine B. Battles
- Issue Editor ..... Claire S. Aronson
- Photographer ..... Teresa Fett
- President, IT Alumni Society ..... Joseph R. Schumi

The University of Minnesota adheres to the principle that all persons shall have equal access to its facilities, activities, and employment without regard to race, creed, color, sex, national origin, or handicap.

## 1982 Science & Technology Day proceedings available.

The Institute of Technology Alumni Society has published proceedings from its 1982 Science & Technology Day held last November 12. Entitled "Science and Law: the Misunderstood Alliance," the publication includes the following transcripts:

- Judge Lee Loevinger: "Science, Technology & Law in Modern Society"
- Cecil C. Schmidt: "Who Owns the Rights of Sponsored University Research?"
- Arden J. Bradshaw: "Product Liability Dilemmas for Scientists and Engineers"
- Clark MacGregor: "Can High Technology Live with the Lawmakers?"

The publication is available at \$5 per copy from the Minnesota Alumni Association, 100 Morrill Hall, 100 Church St. SE, Minneapolis, MN 55455, (612) 373-2466. Please make checks payable to Institute of Technology Alumni Society.



## Economics Laboratory backs fermentation studies

Economics Laboratory, a major chemical company in the Twin Cities, has awarded a grant of \$375,000 to the University's Biotechnology Center. Received through the Department of Chemical Engineering and Materials Science, the grant is earmarked for a 5-year program to support an assistant professor in a fermentation or related engineering program. Chemical Engineering and Materials Science has had a bioengineering program for over twenty-five years, Drs. Tsuchiya and Fredrickson being the principal professors involved. Professor Tsuchiya has now resigned and will become Professor Emeritus. The Department plans to add the Economics Lab assistant professor and to replace Professor Tsuchiya with an assistant, thus enlarging the bioengineering program and laying a foundation for the engineering aspects of the University's biotechnology effort.

### Importance of biotechnology

Biotechnology is on the verge of changing our world. It is providing solutions to problems ranging from pollution control to cheese production. "It is leading the way to the development of a whole new set of industrial applications," says Professor Victor Bloomfield, Director of the Biotechnology Center and Head of the Biochemistry Department.

What makes biotechnology so exciting is the diversity of disciplines involved and the range of research and applications opportunities it invites. Basic to all is biochemistry, including molecular and microbiology—perhaps the fastest growing branch of science today. Biochemical research, in turn, impacts on many other disciplines—chemical engineering, plant and animal genetics, animal reproduction, immunology, and pharmacy, to name a few related areas.

One particular area, fermentation biology, has been singled out by the Biotechnology Center as a prime focus for research. Says Bloomfield, "Fermentation biology brings together experts from throughout the university. For example, microbiologists are studying such questions as how enzymes can degrade cellulose, chemical engineers are discovering how microorganisms co-exist in mixed cultures, and food scientists are developing better dairy starter cultures to improve cheese quality. The applications for industrial

growth in biochemistry and microbiology, based on the work of fermentation scientists, are tremendous." The Economics Laboratory grant is awarded in recognition of the huge developmental potential in this field.



**Dr. Victor Bloomfield, Biotechnology Center Director:** "Biotechnology is on the verge of changing our industrial world."

### New Center for fermentation technology proposed

"What has been lacking in the Biotechnology program to date," states Bloomfield, "is academic emphasis on production microbiology—taking that next step from the lab bench to the production plant." To correct this situation, Bloomfield says, "We are proposing a new center for fermentation biology and technology within the Biotechnology Center, involving specially equipped space and some new faculty."

The fermentation biology project has a proposed budget of \$2.5 million, with \$2 million designated for remodeling the space and purchasing equipment. The new center would be located in the Biochemistry building on the St. Paul campus. It would be a centralized research facility, available to investigators from other university departments as well as to scientists from related industries. "This will not be a production center," states Bloomfield. "It is an academic program—one that's going to be very important for the economy."

### Importance to the State

"The University has a definite interest in trying to be useful to the state of Minnesota," notes Bloomfield. "We

want to make sure we're educating people and developing a talent base here in biotechnical areas, such as at MIT and Stanford. Fermentation biology is an area where we can do this." "Biotechnology is really an all-university concern," states Bloomfield. "As yet the center is not a physical entity, but it does have an organizational identity. It seems to be something that will be important for the state."

### Alliance from page 3

"Given the resources we have in Minnesota," declares Valletta, "the brain power, the history of enlightened public policy, and the general environment that supports education, there is a good probability that we will meet our goals. Our success depends upon a willingness of people to realize the need for change and upon the collaborative efforts of schools, government and industries in bringing about change."

### MEIS from page 1

of growth for the university and improved technologies for industry. As mentioned, a number of proposals for future research have been generated through work on the four major projects. In addition, 6 new professors have been hired, 14 new courses have been added in computer science and electrical engineering, and a major seminar series has been launched, featuring internationally known specialists in the fields of microelectronics and information sciences.

MEIS is directed by an executive committee consisting of Dr. Davis, this year's chairman; Dr. Bernd Hoefflinger, head of Electrical Engineering; Dr. Kurt Maly, head of Computer Science; and Dr. Martha Russell, Executive Director of MEIS. A MEIS management board, including industry and University representatives also meets periodically.

"I see MEIS as serving as a center for enhancing the development of microelectronics-related science and technology," says Davis, who notes that the future looks very good for this university-industry cooperation because there is strong support from the governor for the center's programs, as well as backing from some of the state's major industries.

Plans are now underway for renovating and improving the Microelectronics Laboratory in order to provide specialized equipment, new space and additional classrooms. This will be the first improvement in that lab since it was set up in 1970. New office space at 227 Lind Hall is also being prepared.



## Productivity Center gains momentum

What is the Productivity Center all about? "Industrial efficiency" might be the most concise answer. Formally set up in the fall of '82, the Productivity Center grew out of research activities of the department of Mechanical Engineering. "Our department has been working on computer aided design since 1977," notes Dr. S. Ramalingam, Productivity Center Director, "and robotics work has been going on since '79-'80." A Mechanical Engineering Advisory Committee and IT faculty had been discussing this project with Dean Staehle for a year before it was officially organized in 1982.

A cooperative venture between the University of Minnesota and industry, the Productivity Center was created, according to Ramalingam, "to initiate, participate in, and contribute to the generation of new knowledge in design and manufacturing sciences, to develop software and hardware systems for computer aided design and manufacture, and the integration of these systems to accelerate the practical realization of technology-based solutions for productivity growth and product quality improvement."

The Productivity Center was established with direct financial support in excess of \$440,000 from a number of industries, including major contributions from 3M for instructional programs in computer aided design and computer aided manufacturing (CAD/CAM). Principal programs now underway include work in robotics and manipulators; intelligent manufacturing machines and systems; factory automation based on CAD/CAM; process science of manufacture; design of a virtual manufacturing system; and development of new production/manufacturing techniques.

Several programs are underway in the Institute of Technology to boost cooperative research with industry. The Productivity Center and the Microelectronic Information Sciences Center (MEIS) represent two of these programs. The Productivity Center, says Ramalingam, expects to work closely with small and medium-sized companies. "Although the University values scholarship," says Ramalingam, "we cannot detach ourselves from industry." He foresees a continuing growth of cooperation with industry as university scientists tackle the increasingly complex technical needs in industry.

Present work in computer assisted

manufacturing has two main goals:

1) to integrate the work of the designer and the manufacturer, using computer generated information to enable a designer to recognize manufacturing limitations, thus facilitating designs which lie within the capabilities of the manufacturing process, and 2) to automate manufacture under computer control.

Along with the benefits of greater industrial efficiency will come some major social consequences. "In Japan," points out Ramalingam, "society is now beginning to experience the impact of robotics on the labor force. We must anticipate and plan for the effects that changing technologies will have on our society. The traditional distinction between management and labor will have to be reconsidered." He stresses the need for developing new avenues of communication and cooperation if future social problems are to be eased. "Industrial growth, technical developments, and the conquering of old frontiers in this country have led to a whole new set of conditions in labor and in industry," says Ramalingam; "leaders from all sectors will have to cooperate in planning for life in a changing society."

### *Britzius from page 5*

whose work is closely connected with engineering. "Along with my involvement with the alumni association, I've been interested in speaking, giving direction and advice, and participating in the fraternity's activities," says Britzius.

This is the 50th anniversary of Britzius's graduation from the U, but one wouldn't know it from looking at him. Sports interests have always been important to him; it's not hard to believe he was the Big Ten tennis singles champion as a college senior, or that he still enjoys the game.

The energy that backed him up in sports has also stood by him in his professional life. Britzius is the founder, past president and current chairman of the board of Twin City Testing Labs, a company which provides a variety of environmental testing services, including soil testing, chemical, metallurgical and waste testing throughout the upper midwest. His association with his company started when Britzius worked for the company's forerunner, Hall Labs, for a few years after graduation. After gaining some experience, plus a master's degree in civil engineering, he returned to Hall with an offer to buy out his former employer. He has turned the small lab, originally a soil testing service for building construction, into an expanding business, comprising 17

branches in sites from Lake Michigan to Wyoming. "We use many university students as technicians and interns," notes Britzius. "It's good for us and good for them."

Britzius is committed to a philosophy of social responsibility. He has served as mayor of Deephaven, IT Alumni Association president, board member on a Boy Scout council, and participated in numerous other civic, church and professional activities. At present he is chairman of SETAC (Scientific, Engineering, Technological Assessment Committee), an organization representing 40 companies which work with the media, legislators or others seeking information about energy, pollution and environmental concerns. The aim is to provide scientific information, primarily to the media, though, says Britzius, "at times we take the initiative in questioning statements appearing in the news media." Britzius also belongs to a state society of professional engineers who engage in lobbying to influence policies concerning energy, pollution and other issues. He describes their position on one important environmental issue, energy, as "favoring immediate conservation measures, the use of coal or nuclear fuel until the start of the next century, and the development of alternative energy sources as they become economical."

A good scientific education, thinks Britzius, includes much more than engineering. To encourage an interest in science, and in service, he likes to speak to junior and senior high school groups. He stresses the ways in which a career in science and engineering can benefit society as well as make good use of students' abilities. Stating "a person should train himself to contribute to society," Britzius presents the students with an outstanding role model for how to combine engineering with social responsibility.

## Computer Science sponsors research review symposium

On March 9, 1983 the Computer Science Department held the first annual Research Review Symposium sponsored by the Computer Science Corporate Affiliates Program.

The purpose of the symposium was to establish closer relations with the high technology industry and to encourage collaborative research efforts between the department and industry.

About 60 industry representatives from 23 companies and 3 members of the Minnesota State Legislature attended.

## Volunteer supports IT for its "unique importance"

Why is a lawyer like Henry Frisch spending his spare time raising funds for the Institute of Technology? Why is he dreaming up ways for IT alumni volunteers to make themselves useful to their alma mater? And why is this lawyer serving as a mathematics department representative on the IT Alumni Society's Board of Directors?



**Henry Frisch:** "I see how important the technical base is to Minnesota's economy."

Frisch, a lawyer with the firm of Faegre & Benson, was an IT undergraduate in mathematics, class of '69. Though he switched to law, he says that in his day-to-day legal work he is constantly being reminded of "how important the technical base is to Minnesota's economy. I wanted to become involved in supporting IT," says Frisch, because "it's really the only institution in the State providing a source of technical people with graduate training."

Frisch's involvement is manifested through his decision to give generously himself and to do fund raising for IT and by serving on the Board of Directors of the IT Alumni Society, as a representative of his undergraduate department, mathematics.

During the year the Alumni Society has surveyed a sample of IT graduates to determine their interest in doing volunteer work for IT. Approximately 200 people have responded positively. "Respondents were given an opportunity to make some impressionistic choices about the type of volunteer work that interests them," notes Frisch. Possible areas of involvement include "faculty liaison," "industry liaison," and "student

guidance." The Board, in trying to translate the responses into meaningful possibilities for action, is "playing the role of a catalyst in giving volunteers some initial stimulation and direction," after which, Frisch hopes, the volunteer program should take off on its own. "We want people to feel that what they're doing is enjoyable as well as useful," says Frisch.

Potential volunteers are being contacted now with some specific suggestions for serving the Institute of Technology.

## Dean backs IT-Alumni involvement



In remarks made at the January 25 meeting of the IT Alumni Board, Dean Roger Staehle highlighted a number of ways in which the Alumni Association and the Institute of Technology can work more closely for the benefit of both organizations. Some areas in which volunteers could help leverage resources are: legislative contact, company relationships, departmental advisory groups, recruitment of top scholars, and procurement of resources.

## IN THE INSTITUTE...

### People

Professor **Emil Pfender, Mechanical Engineering**, has been invited by the Committee on Scholarly Communication of the People's Republic of China (CSCPRC) to lecture in China in June 1983 as a Distinguished Scholar. He will lecture at Tsinghua and two other universities on plasma technology.

Mr. **Wang Yohgjia**, a Ph.D. candidate in **Civil Engineering** from the Northeastern Institute of Technology in Shenyang, has been awarded a Graduate School fellowship for completion of his dissertation research in "Viscoelasticity in Rock Mechanics."

Professor **John L. Imhoff**, who received his M.S.M.E. from the University of Minnesota in 1947, has been honored with the creation of an endowed chair at the University of Arkansas. The John L. Imhoff Distinguished Chair in Industrial Engineering.

Faculty, staff and students of the Department of **Aerospace Engineering & Mechanics** wish to express their deep appreciation to Mr. **Roger F. Erickson**, who has recently retired after 42 years in his position as Senior Research Shops Foreman. His "exceptionally high standards of performance and friendly, cooperative manner will be greatly missed."

**H. Gordon Brown, CE '35**, died November 19, 1982 in Asheville, N.C. Mr. Brown was a retired engineering consultant with Dow Corning Corp. He was a member of two honorary societies, Tau Beta Pi in Engineering and Phi Lambda Upsilon in Chemistry.

**Physics professor Stephen Gasiorowicz** was a Visiting Professor at the University of Tokyo during Fall quarter 1982, during which time he was invited to speak at the Workshop on Quantum Chromo-Dynamics at Yukawa Institute of Kyoto.

**Yau-Chien Tang** presented an invited talk entitled "Effects of Antisymmetrization in Nucleon Scattering" at the International Symposium on Clustering Phenomena in Nuclei in Tubingen, Germany in September.

**Hiroshi Suura** has spent a winter quarter leave at the Institute of Theoretical Physics at the University of California, Santa Barbara.



**George T. Piercy, CE 1938**, former senior vice president of Exxon Corp. was elected to a second year as president of the University of Minnesota Foundation.

**John Spletstoesser, Minnesota Geological Survey**, presented a paper and co-chaired a special session at the annual meeting of the Geological Society of America in New Orleans in October. Other Geological Survey staff members who presented papers recently were **Val Chandler**, speaking at the Society of Exploration Geophysicists international meeting and **Richard Lively**, at the annual Midwest Ground-Water Conference.

**Arthur G. Erdman** was appointed Editor for Computer Aided Design Mechanisms and Machine Theory Journal.

**R.J. Goldstein, Mechanical Engineering** Department Head, was elected Vice-President of Assembly for International Heat Transfer Conferences; U.S. Delegate to Assembly; appointed member of National Science Foundation Advisory Council on Engineering and elected Chairman of its subcommittee on Mechanical Engineering and Applied Mechanics; chosen Prince Lecturer, Arizona State University 1983; appointed member NASULGC Committee on the Quality of Engineering Education.

**Charles H. Sathrum**, 1968 Bachelor of Physics, has joined INET Corporation of Sunnyvale, CA as Vice President. He is responsible for business development in the areas of computer applications, systems and engineering and plant operations support activities.

## Awards

The **Chemistry** Department announces that three of their staff have been selected as Alfred P. Sloan Research Fellows: Professors **Paul Barbara**, **John Evans** and **Wayne Gladfelter**. The fellowship grants, for \$25,000, are awarded for the two year period beginning September 1983.

Two faculty members in the Department of **Astronomy** have been awarded Alfred P. Sloan Foundation Fellowships for 1983: **John Dickey** and **Robert Kennicutt**, bringing to five the number of current faculty who have received Sloan Fellowships at that stage in their careers. The Astronomy Department records that 60% of their faculty are current or former Fellows.

**Rex T. Skodje**, a graduate student in the **Chemical Physics** specialty area, is one of three recipients of an ACS

Division of Physical Chemistry Graduate School Prize. The award of \$2,500 from the Procter and Gamble Co., recognizes outstanding work which is published in the Journal of Physical Chemistry and has a graduate student as the first and principal author.

Two **Civil Engineering** students have been awarded one year RCM Memorial scholarships by the engineering/architectural firm of Rieke Carrol Muller Associates, Inc. Congratulations to **Jon Henderson** of Eveleth, and **Rita Schild** of Minneapolis.

Professor **Gary Parker, Civil and Mineral Engineering**, received the J.C. Stevens Award in recognition of his eminence in the areas of Fluvial Mechanics and River Engineering. Dr. Parker's work has contributed to the continued development of the St. Anthony Falls Hydraulic Laboratory.

**Architecture** graduate student **Mary Fagerson** has been awarded a prize by the West Central Regional Council of the Association of Collegiate Schools of Architecture for her submission: "Energy Efficient Housing in a Minnesota Climate: A Statistical Analysis of 98 Houses from a Designer's Viewpoint."

**E. Bruce Lee**, Department of **Electrical Engineering**, has been elected a Fellow of the Institute of Electrical and Electronics Engineers. Professor Lee has achieved this distinction for "contributions to the foundations of optimal control theory and to engineering education."

**Bernd Hoefflinger**, Head of **Electrical Engineering**, is the recipient of one of the four annual awards of the British Institute of Electrical Engineers, presented for the best publications in their journals. Hoefflinger and his colleagues, D. Herbst, B.J. Hosticka, U. Kleine, W. Nientiedt and R. Schweer received the award for their letter entitled: "Integrated CMOS SC filter with 170 KHz cut off frequency." For other MOS filter designs, Hoefflinger and co-authors had previously won the Darlington Award of 1980 of the IEEE Circuits and Systems Society.

Professor **Olli Lehto**, visiting professor at the **School of Mathematics** this year, was one of 4 persons to receive the 1982 Order of the White Rose of Finland, first class commander, awarded by the government of Finland to honor distinguished service to that country.

Professor **George Freier** was one of 6 persons this year to receive the Distinguished Service Citation from the

American Institute of **Physics** Teachers.

**John H. Weaver**, Professor of **Chemical Engineering and Materials Science**, received the 1982 G.J. Lapeyre Award for his contributions to the field of synchrotron radiation research.

**Max Donath** was honored as the 1983 Young **Mechanical Engineer** of the Year for Minnesota by the Minnesota Chapter of the American Society of Mechanical Engineers.

**Ephraim M. Sparrow** was presented the ASME Heat Transfer Division Distinguished Service Award at their annual meeting in November 1982. The award recognized Dr. Sparrow's outstanding service as Senior Editor of the Journal of Heat Transfer from 1972 through 1980.

Outstanding Mechanism Design Project sponsored by Truth, Inc., Owatonna, was awarded to **Thomas Marrinan**, **Suhonto Ngatimin** and **Peter Swenson**—Fall 1982, and **Douglas Petron**, **Daniel Meierhofer** and **Paul Steinmueller**—Winter 1983.



*Bryce Crawford, Jr.*

**Professor of Chemistry, Bryce Crawford, Jr.** has been designated a Regents' Professor, the University's highest faculty rank. The award carries with it an annual stipend of \$5,000 from the University of Minnesota Foundation. Crawford's research has centered primarily on molecular spectroscopy and molecular structure. He has also received the 1977 Pittsburgh Spectroscopy Award, the 1978 Ellis Lippincott Medal, and the 1982 Priestley Medal of the American Chemical Society.

The National Action Council for Minorities in Engineering (NACME) has designated \$4,200 in scholarships to six IT students for the 1982-83 academic year. The recipients are: **Michael Bosques**, **Scott Brandt**, **Sidney Garrison**,

**Anita Gonzales, Christopher Piper and Vera Trueblood.**

**Raymond Sterling** of the American Society of Civil Engineers was named Minnesota's Young Engineer of the Year. He is an assistant professor of **Civil Engineering** and director of the Underground Space Center. He was nominated for his work in underground space and earth shelter design.

## Civil Engineers honor Prof. Fant

Last October Professor Jesse Fant, Associate Head of CME, was nominated by the Minnesota branch of American Society of Civil Engineers to receive the Annual ASCE People Server Award. Less than two months later, Fant died of cancer. His accomplishments, however, live on, and this May his widow Dorothy will receive the award in Jesse Fant's name.

Fant received a B.S. in Civil Engineering from Purdue University in 1942 and an M.S. from the University of Minnesota in 1950. He spent his entire teaching career at the University of Minnesota, where he had been Associate Head of CME, director of undergraduate studies, chairman of the undergraduate scholarship committee, freshman advisor, and member of the

CME building committee.

Fant had been active in local and national professional organizations of land surveyors and civil engineers. In 1970 he received a surveyor of the year award of the Minnesota Land Surveyors Association, in '72 he received the first Earle Fennell Award for outstanding contributions to continuing education, and in '75 he won a presidential citation of ACSM as chairman of their education committee.

## Now is the time . . .

An investment in IT can mean financial benefit for you as well as support for this important educational institution. While you reap tax deductions or your heirs benefit financially, your gift can be providing for faculty development, student assistance, research support, or backing for a variety of other necessary programs. With June 30th and the end of the fiscal year just around the corner, you may be interested in considering some of these ways to give:

*Direct gifts* of cash, real property or valuable possessions, may be designated for a specific purpose or for unrestricted use. Cash gifts are tax deductible, up to 50% of your adjusted gross income. Appreciated property, such as real estate and securities, may

be given as a gift, thus eliminating capital gains tax on long term holdings. Gifts in kind, such as valuable objects, books, and equipment qualify you for a charitable gift deduction and assure you that your gifts will be protected and treated with care.

*Planned giving* can be arranged with expert advice from the planned giving staff at the University of Minnesota Foundation. Planned giving may be made through bequests, gifts by will, or life income gifts, which benefit you now while helping the university.

Other giving options include *life insurance* and *life estate contracts*. To discuss giving to the Institute of Technology, contact Elaine Battles, Assistant Director of Development, (612) 376-2448.

## Annual giving update

The University's annual giving drive ends June 30. With the State and the University facing major financial cuts, it is vitally important to have a successful annual drive. This year, the IT goal is for 3,000 donors to contribute a total of \$148,000. As of March 31, reports the University of Minnesota Foundation, 1,476 donors had given \$102,080. If your name is not yet among the list of contributors, please consider doing what you can to help meet this year's goal.



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