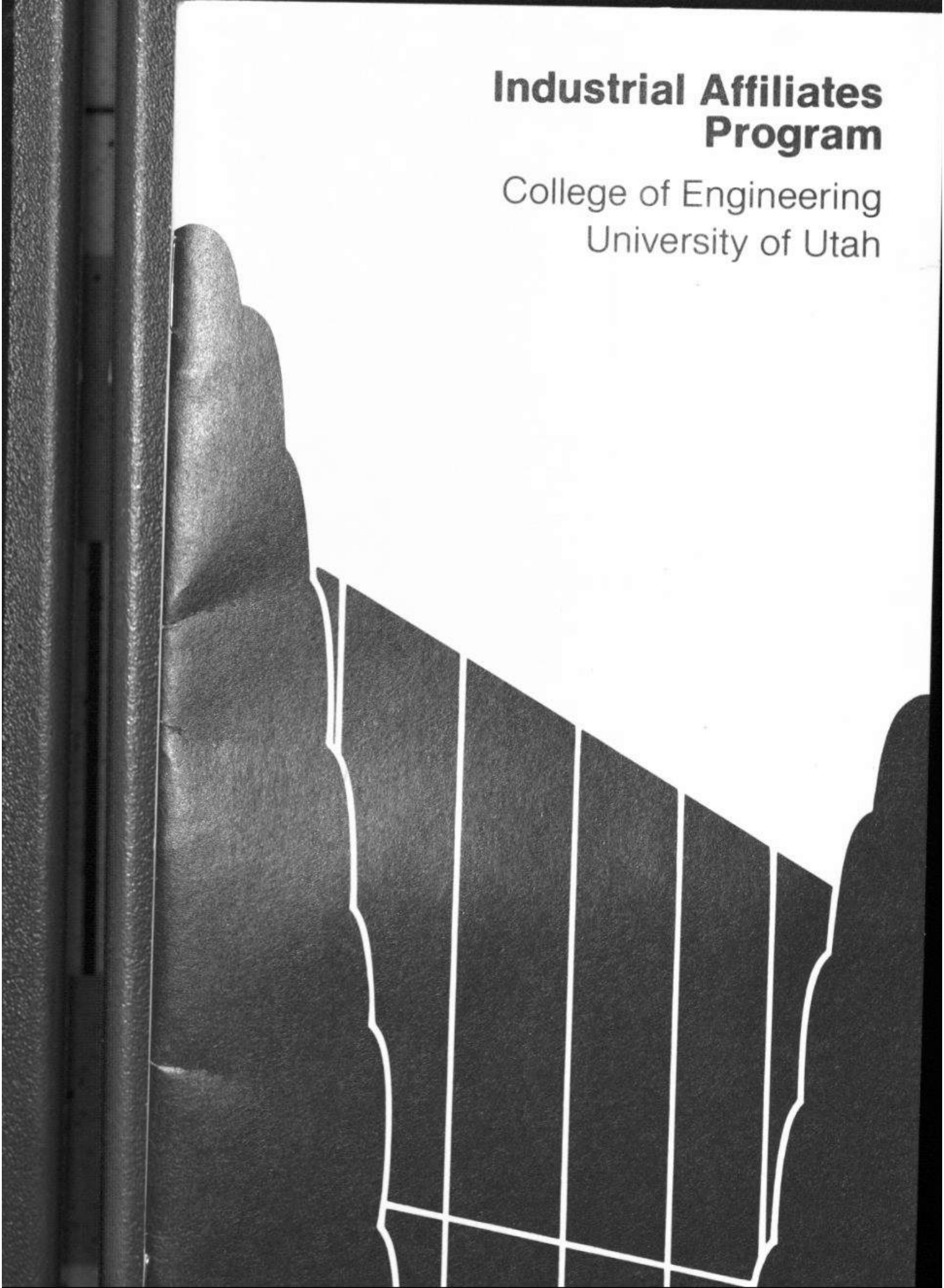
Industrial Affiliates Program

College of Engineering
University of Utah



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Utah Industrial Affiliates Program

The University of Utah College of Engineering has a strong reputation for innovative research and education in a number of novel and interdisciplinary areas as well as in the more classical engineering fields. The college has both a responsibility and an opportunity to interact with industry.

The College of Engineering established a modest Technical Liaison Program three years ago. It is now expanding that effort into a full Industrial Affiliates Program to provide the University/industry interaction and collaboration necessary to optimally educate current and future generations of engineers. We ask for help from the industrial and private sector, which will benefit directly from the services of the students we produce.

Affiliates are business organizations whose activities involve applied science and engineering. Members receive benefits obtainable only from association with an institution having an advanced, state-of-the-art engineering program located in one of the most rapidly developing economic regions of the country. Representatives from member companies develop close ties with faculty and students in the college and are informed of research programs conducted in this academic environment.

Utah's Industrial Affiliates Program is unique in several ways. First, it is available to small as well as large businesses (Table 1). Second, participants may choose to affiliate directly with the academic department of greatest interest to them. Third, affiliates may join one or more special University/Industry Interaction Centers described below.

Table 1
University of Utah
Industrial Affiliates Program
Membership Contributions

Business Type	Gross Annual Income	Annual Affiliates Membership*
Start-up	under $1,000,000	$ 2,500
Small	under $5,000,000	$ 5,000
Other	over $5,000,000	$10,000

*Donated equipment is valued at one-half the fair market value.

Benefits and Services

Members of the Industrial Affiliates Program are urged to appoint one key individual to serve as a technical liaison with the College of Engineering. Through this person the firm has access to a variety of benefits available only to members of the program:

1. The opportunity to meet with faculty and students each year at an annual industrial affiliates meeting.

2. The opportunity to be informed on publishable research in the College of Engineering, including receiving the annual Research Report and faculty publication list.

3. A subscription to the *Industrial Affiliates Newsletter*, which provides information about the program, the college, research and educational activities, and other topics.

4. The opportunity to receive College of Engineering publications and technical publications by the faculty.

5. The opportunity to talk in advance with the University Patent and Product Development Office regarding licensing and commercial development of University technologies.

6. The opportunity to interact and affiliate directly with the department or program of greatest direct interest.

7. Access to the University's library services and information retrieval systems.

8. Complimentary membership in the University of Utah President's Club, including free University parking and an invitation to the annual President's Club dinner.

9. Announcements of seminars, short courses, and late afternoon or evening course programs.

10. Opportunities to recommend special courses and programs via the Division of Continuing Education and the College of Engineering.

The major benefit is in access to present and future graduates, their professors, and the technologies those students and faculty will generate.

The benefit to the college and the departments is in the industrial interactions and perspectives generated by the liaisons. The funds generated are used flexibly as described below.

Joining the Program

The Industrial Affiliates Program offers members unique opportunities for interaction and cooperation with the College of Engineering in furthering common goals in engineering education and research.

Each affiliate contributes up to $10,000 annually for unrestricted support of the college's teaching, research and service activities (Table 1). This support is an investment in the education and training of engineers and in academic research programs essential to the continued growth and competitiveness of private industry. By participating in the program, an important channel of communication is established between the company and the University.

The program is coordinated through the dean's office, which serves as a focal point for communication, exchange of technical information, contact with the faculty and other benefits available to members. Membership is for one year.

The University is known nationally for its encouragement of small business enterprises, as evidenced by the activities of the Utah Innovation Center and the successful spinoff companies launched in recent years, and is keenly aware of the problems such businesses face. The University's Industrial Affiliates Program is one of the few open to small businesses (Table 1).

Interaction with a quality University is particularly important for small, young, high technology businesses who don't have the technical resources which a modern school of engineering can provide. The Industrial Affiliates Program is a commitment to small as well as large businesses. Take advantage of it!

Distribution of Funds

The funds and resources provided by affiliate members are used to support the education and research activities of the College of Engineering. The bulk of the funds (65%) go directly to the designated department. The remainder is used by the college via the dean's office to support collegewide activities, launch new programs, etc.

The areas in which departmental and college funds are applied include:

Program Innovations

To meet the increased demand for engineering graduates and the challenge of new technologies and engineering fields, the college must regularly develop new programs and courses.

Equipment and its Maintenance

The education of outstanding engineers for industry requires modern equipment which can be provided by direct donation. Such equipment also requires maintenance and updating.

Faculty Development and Retention

Attracting and maintaining the outstanding faculty to perform innovative research and excellent teaching requires such incentives as summer salary, travel funds and staff support.

Scholarships and Fellowships

A quality engineering program requires outstanding teaching and lab assistants as well as outstanding faculty. Teaching assistant stipends must be competitive if the University is to attract top quality students. Outstanding teaching and laboratory assistants take some of the routine teaching burdens off of the faculty, permitting them to be more productive and innovative, and to devote more time to their students.

Exploratory Research Support

The competitive edge enjoyed by many successful business and industrial enterprises has come from their use of technological innovations—innovations that have directly resulted from the state-of-the-art research carried on in university graduate programs. Research is also extremely important to undergraduate education, adding new dimensions to the established curriculum.

The availability of such research support permits exploration into novel, innovative areas for which it may be difficult to secure conventional government grants or contracts.

Affiliated Departments

The University of Utah College of Engineering is the outstanding engineering school in the Intermountain West, one of the most rapidly growing areas of the country. The school includes seven departments and ten degree-granting programs (Table 2).

The *Department of Bioengineering*, which grants only graduate degrees, is rated among the best such programs in the nation. It has an enviable reputation for hands-on bioengineering instruction of direct interest and benefit to the medical device and related industries. The *Institute for Biomedical Engineering*, headed by W. J. Kolff, is internationally known for its work in artificial internal organs research, which culminated in 1982 with the total implantation of an artificial heart in a human.

The institute and the Bioengineering Department have been responsible for a number of spinoff companies which have begun having a significant impact on the economic growth of the Salt Lake Valley. The outstanding bioengineering research manpower available in Salt Lake City has led to the area being dubbed "The Bionic Valley" by *Science Digest* Magazine.

The *Computer Science Department* has an international reputation for its pioneering work in computer graphics and computer-aided geometric design. Other areas of expertise include VLSI, multiprocessor architectures, information retrieval and robotics. The Computer Science Department is now ranked among the top 20 in the nation.

The *Materials Science and Engineering Department* is internationally known for its work in the area of polymers, including polymer structure-property relations, ceramic materials and semiconductor materials, including 3-5 compounds.

The *Civil Engineering Department* is active in the areas of water treatment, soil mechanics, transportation and urban planning as well as in solid mechanics—particularly metal-matrix composites. There is a growing emphasis on composites, structural mechanics and computer-aided design and analysis.

The *Mechanical and Industrial Engineering Department* is well known for its work in the area of synthetic fuels, thermal science and applied mechanics. It is internationally known for the work of one of its key faculty members, Dr. Stephen Jacobsen, and his co-workers for the development of one of the most advanced artificial arms available today. Dr. Jacobsen's *Center for Biomedical Design* is an outstanding example of the application of innovative design concepts and related mechanical and bioengineering principles to the solution of very complex medical problems. This activity has resulted in significant industrial interaction. The department is very active in computer-aided design, robotics and automated manufacturing.

The *Chemical Engineering Department* has an enviable reputation for its outstanding undergraduate and graduate teaching and research programs, with particular emphasis on hands-on laboratory instruction. Graduates of this program are prized acquisitions in industry. The Chemical Engineering Department is known for its work on combustion and synthetic fuels, including coal and oil shale.

The *Electrical Engineering Department* is active in digital signal processing, digital electronics, optics, electromagnetics, microwave tubes and microwave applications. The department has an excellent reputation for producing well-trained electrical engineers.

The *Microelectronics Laboratory* is one of the outstanding hands-on University facilities for education and research in microelectronic fabrication and processing.

Table 2 • University of Utah • Departments and Degree Programs • College of Engineering

Dept./Program	Accredited	Degrees Offered	FTE Faculty	Enrollment* Grad.	Undergrad.	B.S.	Degrees 1982-1983 M.S./M.E.	Ph.D.	1982-1983 Research Funding
Bioengineering	—	M.E., M.S., Ph.D.	4.28	42	—	—	6	4	$ 612,828
Chemical Engineering	ABET	B.S., M.E., M.S., M. Phil, Ph.D.	8.77	45	196	34	12	4	$ 236,685
Civil Engineering	ABET	B.S., M.E., M.S., Ph.D.	14.50	39	382	44	6	1	$ 207,752
Computer Science	—	B.S., M.E., M.S., M. Phil, Ph.D.	15.10	72	836	42	11	6	$2,482,772
Electrical Engineering	ABET	B.S., M.E., M.S., M. Phil, Ph.D.	15.19	98	959	84	16	1	$1,123,672
Materials Science & Engineering	ABET	B.S., M.E., M.S., Ph.D.	8.92	53	51	8	4	5	$ 801,239
Mechanical & Industrial Engineering:			20.51	107	696				$ 734,726
Engr. Admin.	—	M.E.A.					13		
Ind. Engr.	ABET	B.S., M.R., M.S.				8	3		
Mechanical	ABET	B.S., M.E., M.S., M. Phil, Ph.D.				79	10	1	
Nuclear	—	M.E., M.S., Ph.D.					2	1	
Other			2.10	—	2	3**	—	—	$ 492,357
Total			89.37	456	3,122	302	83	23	$6,692,031

*Enrollment as of Autumn Quarter 1983.
**Bachelor of University Studies (B.U.S.)

The *Biomaterials Profiling Center* is a research unit which is internationally known for its studies on the mass spectroscopic and gas chromatographic analyses of coal, oil and polymers.

The College of Engineering provides outstanding engineers at the bachelors, masters and Ph.D. levels. The sponsored research budget of the college was nearly $7 million in fiscal 1983, complementing its appropriated state budget of $4.5 million.

Special University/Industry Interaction Centers

In addition to the Industrial Affiliates Program, the college has organized a number of interdisciplinary-interdepartmental "centers" which provide more specialized programs with substantial industrial commitment and greater opportunities for direct technical interaction. These programs, summarized in Table 3, build on the existing strengths and collaborations within the college and throughout the campus.

All members of University/Industry Interaction Centers are automatically members of the Industrial Affiliate Program. If the company is an Industrial Affiliate and then wishes to join a center, the industrial affiliate contribution applies to center membership.

A separate detailed brochure is available on the specialized University/Industry Interaction Centers.

Benefits and Services

1. Detailed lists of faculty publications and reports published or in press in the center's area of expertise are available biannually. These lists are much more detailed than those supplied to industrial affiliates. After perusal of this list, members may request single copies of the available publications and reports at no charge. In cases of proprietary industrially sponsored research, there may be limitations on distribution.

2. Each year members receive a list of faculty who are willing to travel for the purpose of lecturing on current research. No honoraria, other than reimbursement for travel expenses, are associated with such lectures.

3. Scientists from an affiliate laboratory are encouraged to visit the college for periods of a few days to a week for informal individual discussions with faculty members concerning their research in areas of interest to center members. Proper advance notice is necessary for such visits, including precise schedules and itineraries. An opportunity to meet informally with graduate students is included also. Such visits should not be confused with the recruitment trips handled and scheduled through the University Placement Office, nor should they be used for consultation on specific company problems. Contacts made as a result of membership may lead to individually negotiated consulting arrangements between faculty members and industrial firms.

4. Industrial sabbatical leaves are becoming more common. Depending upon laboratory space and research commitments in particular programs, it is often possible to arrange an industrial sabbatical in the College of Engineer-

Table 3 • University of Utah • Special University - Industry Interaction Centers

Center	Description	Max. No. Participants	Annual* Membership
Optical Sensors and Machine Vision	Fiber and integrated optics; light scattering, optical materials, image processing, pattern recognition, Raman, fluorescence, IR; biochemical sensing; machine-robot vision and sight	15	$35,000
Microelectronics / Microfabrication	New materials, design, processing, fabrication, quality control—including electro optics; training	10	$50,000
Composite Materials and Solid Mechanics	Modeling, analyses, fabrication, testing of composite materials and structures; training	10	$35,000
Computer-aided Design / Manufacturing and Industrial Robotics	CAD method development; robot design and sensing, automated manufacturing and materials handling; training.	15	$75,000
Specific (at firm's request)	Group of faculty in a specific, multidisciplinary area	1	$20,000**

*Donated equipment is valued at one-half the fair market price.
**See description in text.

ing for periods ranging from three months to a year. In addition to the opportunity to pursue research projects of mutual interest, audit courses and attend seminars, visiting industrial scholars may also be invited to participate in lectures and seminars.

5. It is possible to arrange for an industrial staff member to visit the campus for a few weeks for training in the use of certain specialized techniques, such as X-ray Photoelectron Spectroscopy, Mass Spectrometry, Fourier Transform Infrared Spectroscopy, Appearance Potential Spectroscopy, X-ray Diffraction, etc.

6. At least once each year the center organizes a one-day research symposium. This technical meeting is open only to center members and to University of Utah College of Engineering students, faculty and staff. It is an opportunity for extensive interaction with faculty and students.

Membership contributions range from $20,000- $75,000 annually depending on the program; up to one-half of the contribution may be via equipment donations (Table 3). A minimum commitment of two years is considered reasonable to establish a meaningful relationship. Table 4 shows the relationship between the programs and the academic departments of the college.

The centers have a very limited membership, as outlined in Table 3, ranging from 10 to 20 firms. This enables the faculty and the industrial representatives to interact effectively without undue encroachment on the professional time of either.

In addition to the centers noted in Tables 3 and 4, we can assemble a group of faculty in a specific multidisciplinary area to meet the needs of a particular firm. This group will meet with representatives of the firm in problem presentation, discussion and brainstorming sessions—either at the University of Utah or at the industrial site. Such a consortium of faculty consultants is particularly attractive to a firm considering a thrust into a new interdisciplinary area. For a basic annual fee of $20,000, the college will organize up to three such sessions per year. The faculty participating are compensated directly by the firm at normal consulting rates. This program is exciting to the college because it provides the opportunity to assemble a group of faculty in a specific area which otherwise might not develop. We expect that many of these groups may continue to interact and work together, possibly developing into a new thrust area or program for the college.

University of Utah

The University of Utah is one of the major research universities in the United States. It ranks 22nd in the country in federal research grant and contract awards. The College of Engineering received $7 million in sponsored research during fiscal 1983, making it one of the major research engineering colleges nationally and the major resource for engineering research in the Intermountain West.

Table 4 • University of Utah • Interdisciplinary Academic and Research Programs

Special Programs	Departments						
	Bioengr.	Chemical Engr.	Civil Engr.	Computer Science	Electrical Engr.	Materials Sci. & Engr.	Mechanical Ind. Engr.
Microelectronics and Microfabrication	■	■		■	■	■	■
Composite Materials and Solid Mechanics			■			■	■
Computer-aided Design, Manufacturing, and Industrial Robotics	■	■	■	■	■		■
Optical Sensors and Machine Vision	■	■	■	■	■	■	■
Specific	■	■	■	■	■	■	■

Located on the northeastern edge of Salt Lake City, the 1,500-acre campus reaches to the foothills of the Wasatch Mountains. Academic and research activity is centered in 221 buildings, including one of the region's foremost research library systems.

The research and teaching activities of the College of Engineering will be greatly aided and augmented by a new research building (available January 1984) and by a new classroom and teaching laboratory building (available July 1986). Such support is evidence of the state of Utah's commitment to the college and its mission.

Conclusions and Further Information

The Industrial Affiliates Program provides an opportunity for substantial industry-college interaction and development. A key benefit to industry is the development of research programs which will provide the innovation and creativity for future industrial developments. The program has a funding structure which allows the participation of small businesses with limited financial resources. It also permits the industry member to directly affiliate with the department of interest for a more detailed and specific interaction. In addition, there is the opportunity for more direct and in-depth involvement in specialized programs of an interdisciplinary nature.

We welcome your participation and involvement. For further information contact:

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