Igniting Ideas

School of Engineering and Applied Sciences

University at Buffalo *The State University of New York*

www.eng.buffalo.edu

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Overview

The University at Buffalo School of Engineering and Applied Sciences (SEAS) was founded in 1946 and has since become the largest and most comprehensive public school of engineering in New York State.

UB became part of The State University of New York (SUNY) system in 1962. SEAS today is comprised of six departments:

- *Chemical Engineering*
- *Civil, Structural and Environmental Engineering*
- *Computer Science and Engineering*
- *Electrical Engineering*
- *Industrial Engineering*
- *Mechanical and Aerospace Engineering*

The school occupies five-plus modern buildings on UB's North Campus, located in Amherst, New York.

The mission of the School of Engineering and Applied Sciences is to provide effective and high-quality engineering education at the undergraduate, graduate, and continuing-education levels. Integral to this mission is an infrastructure of expertise and facilities that can support professional engineering education, advanced degree programs and research in important areas of applied science and technology.

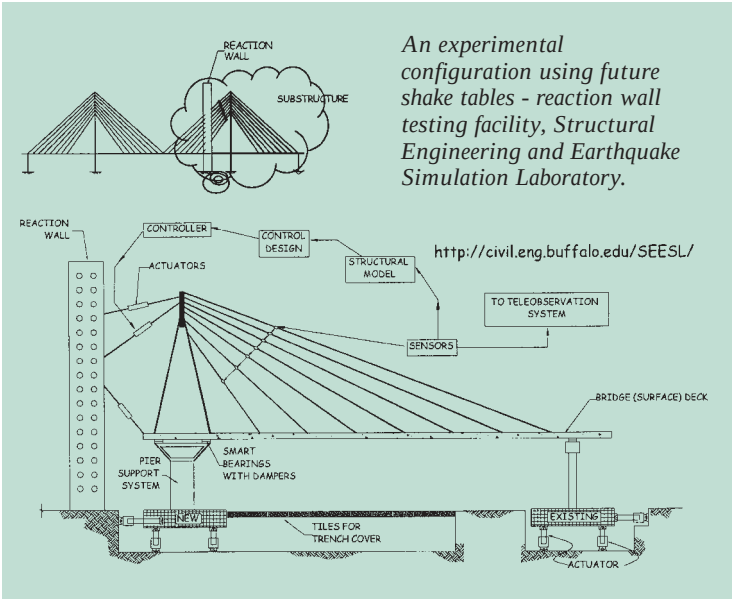
Our specific objectives are:

- *to educate students to think critically and creatively; to identify and solve important technical problems; to practice engineering with technical skill, a full regard for ethical principles, and an understanding of economic and environmental realities*
- *to perform high-quality research that advances applied science or technology while preparing future researchers for industrial, academic and government positions*
- *to contribute to interdisciplinary educational and research efforts to meet complex technological and societal needs*
- *to provide and coordinate educational, technical and information services to industry, government, practicing engineers, K-14 educators, and the public*
- *to become a catalyst for attracting and increasing the private sector to Western New York and New York State*
- *to reach out internationally for cooperation in education and research*

We will continue to forge and maintain significant, mutually committed partnerships among SEAS and industry, government, and other national and international educational institutions.

Research

The SEAS faculty is a research-active group creating cutting-edge engineering and applied science knowledge. Projects are conducted by individual professors or by groups of professors through organized research centers, institutes and laboratories.



An experimental configuration using future shake tables - reaction wall testing facility, Structural Engineering and Earthquake Simulation Laboratory.

As an indication of the School's fast-paced research program, the following major grants were received all or in part by its faculty between March 1 and August 31, 2001.

Creation of UB's Node in NSF's George E. Brown, Jr., Network for Earthquake Engineering Simulation (NEES): $10.5 Million *Grant from NSF,* $6 Million *from SUNY Construction Fund*

The Department of Civil, Structural and Environmental Engineering has been awarded $16.5 million in federal and state funding to develop the world's most versatile earthquake engineering research facility to construct testing capabilities that will revolutionize the understanding of how structures behave during earthquakes.

Information Processing for Integrated Observation and Simulation-Based Risk Management of Geophysical Mass Flows: $1.9 Million *Grant from NSF*

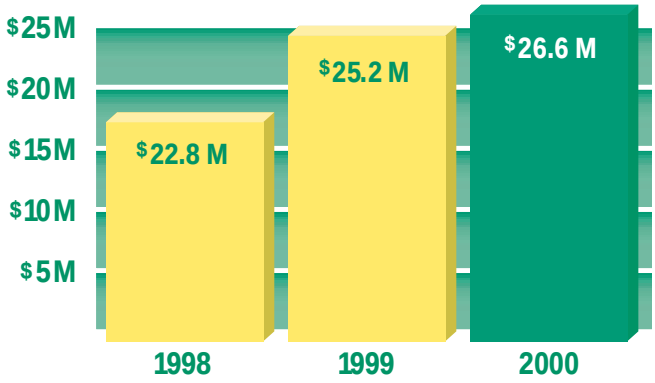
The Department of Mechanical and Aerospace Engineering; the New York State Center for Engineering Design and Industrial Innovation; the Center for Computational Research and colleagues have been awarded a grant to study information processing for integrated observation and simulation-based risk management of geophysical mass flows including volcanic lava, debris and mud flows.

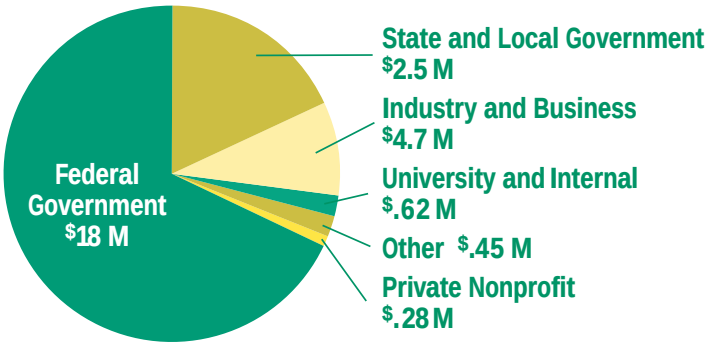
For more information, see
www.eng.buffalo.edu/research

Research focus areas and groups reporting within SEAS as well as groups outside SEAS with significant SEAS faculty participation are listed below.

Theme	Area	Research Centers
IT and Computing	Artificial Intelligence Bioinformatics Geographic Information Sciences High Performance Computing Multimedia and Databases Networking and Telecommunications	Center for Cognitive Science (CCS)* Center for Computational Research (CCR)* Center of Excellence for Document Analysis and Recognition (CEDAR) National Center for Geographic Information Analysis (NCGIA)*
Bioactivities	Bioengineering BioMEMS Biotechnology Cellular and Molecular Engineering	Center for Advanced Molecular Biology and Immunology (CAMBI)* Center for Biomedical Engineering (CBE)
Infrastructure and Environment	Earthquake Engineering Environmental Engineering Intelligent Structures	Center for Integrated Waste Management (CIWM) Environment and Society Institute (ESI)* Great Lakes Program (GLP) Multidisciplinary Center for Earthquake Engineering Research (MCEER)
Visualization, Simulation and Modeling	Computational Mechanics Design and Systems Information Fusion Supply Chain and e-Business	Center for Excellence in Global Enterprise Management (GEM) Center for Multisource Information Fusion (CMIF) New York State Center for Engineering Design and Industrial Innovation (NYSCEDII)
Energy, Flows and Materials Processing	Catalysis and Reaction Engineering Fluid Mechanics Thermodynamics and Energy Systems Turbulence and Combustion	Center for Thermal/Fluids Engineering (CTFE) Energy Systems Institute (ESI)
Photonics, Micro-electronics and Materials	Engineered Materials Micro and Nanotechnology Microelectronics Photonics	Center for Advanced Photonics and Electronic Materials (CAPEM)* Institute for Lasers, Photonics and Biophotonics (ILPB)*

* Centers outside SEAS with significant SEAS faculty participation





Research expenditures for the last three years and an explanation of funding sources for the most recent year are depicted.

Faculty predominantly in Electrical Engineering, Chemical Engineering, Physics and Chemistry were awarded the following two grants:

Biophotonics Materials and Applications, National Science Foundation Integrated Graduate Education, Research and Training (IGERT) Program: $2.7 Million *Grant from NSF*

Education, research and training will emphasize fabrication and application of nanotechnology to develop new and improved optical imaging techniques for real-time imaging of cells and cellular processes; developing the next generation of biosensors and improving sensing applications; using nanotechnology and lasers for targeting and treatment in cancer; applying computer and information technologies in the development of new models and data analysis for understanding cellular mechanisms; developing new photonic devices and systems that are hybrids of traditional polymeric and semiconductor materials with biological materials; and molding the existing curriculum to provide students with maximum exposure to the diversity of photonics and prepare them to operate effectively in this rapidly advancing and changing field.

New Generation Materials and Structures for Nanophotonics and Nanoelectronics: $5 Million *Grant from the US Air Force Office of Scientific Research*

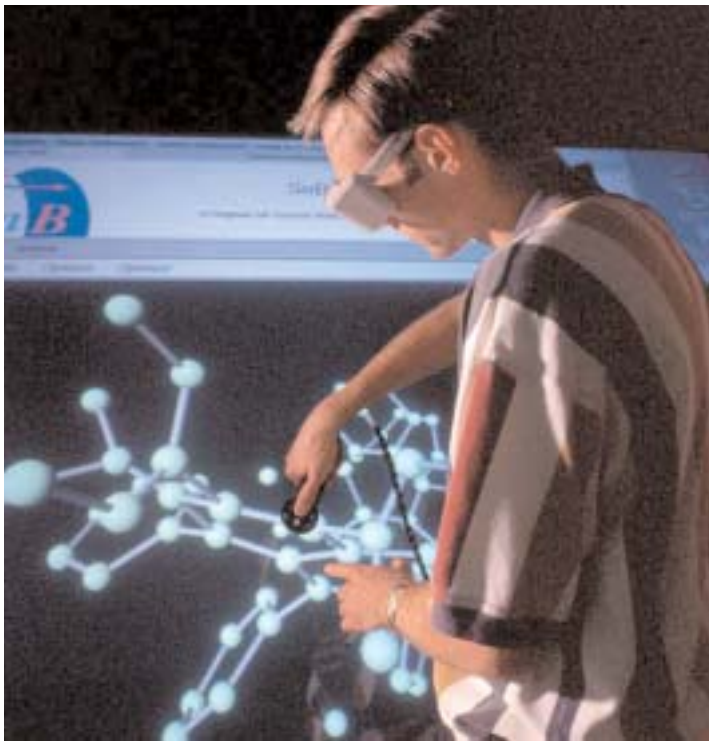
Emphasized are materials and structures that can potentially facilitate generation-after-next information technologies capable of providing dramatically improved speed, encryption and terabit data storage; synergistic interactions among participating institutions to facilitate continuous information exchange, to provide rapid feedback and to monitor progress; and rapid transfer of technology to facilitate integration of the various materials and structures into systems.

Multistore, a Research Infrastructure for Management, Analysis and Visualization of Large-Scale Multi-dimensional Data Sets: $1.0 Million *Grant from NSF*

Multistore, a research infrastructure for supporting integrated research in targeted areas of computer science, including multimedia, visualization, geographical information systems (GIS) and bioinformatics, will be established. The massive storage system will enable the development of computational theories and algorithms for storing, managing, analyzing, querying and visualizing multi-dimensional data sets that are generated from the related fields.

Holistic Battlespace Visualization: $2.8 Million *Grant from National Imagery and Mapping Agency and Sarnoff, Inc.*

The grant is a cooperative effort among the Departments of Industrial Engineering, Mechanical and Aerospace Engineering, Computer Science and Engineering, the Center for Multisource Information Fusion and the Center for Computational Research. The work involves multiple tasks using methods of fusion-based estimation to techniques for visualizing fusion results.



Manipulating molecular structures using "Shake-and-Bake," Center for Computational Research.

Faculty

The SEAS faculty is known for their outstanding teaching, scholarship and research. They are the recipients of many national awards, have earned many special professorial titles, and provide editorial services to leading journals in their fields.

Faculty Numbers

Full-Time Tenure-Track Faculty:	111
Professors	54
Associate Professors	35
Assistant Professors	22
Full-Time Lecturers	9
Full-Time Research Faculty	7

Faculty Honors

US National Medal of Science	1
National Academy of Engineering	1
SUNY distinguished professor titles	5
National Science Foundation (NSF) Presidential Faculty Fellowship Award	2
NSF Career, New Young Investigator and Presidential Young Investigator Awards	20
Office of Naval Research Young Investigator Award	3
SUNY Chancellor's Award for Excellence in Teaching	16
Fellows of Professional Societies	26

Faculty Editorial Positions

Editorships	31
Members of Editorial Boards	25

Eli Ruckenstein, National Medal of Science 1998

For his pioneering theories of the thermodynamics of microemulsions; hydrodynamics of thin films; interfacial phenomena; nucleation; scaling of transport phenomena; and for imaginative technological and experimental achievements in the areas of catalysis, polymer composites, metal-support interactions, and protein separation.

Generation to Generation

Development

SEAS is two-thirds through a seven-year University-wide comprehensive campaign entitled "The Campaign for UB: Generation to Generation." Our School's goal is $18M. We are appreciative of our many alumni, friends, faculty / staff, corporations and foundations, and all who have given generously. To date, 80 percent of the goal has been realized. We are confident of meeting and exceeding the goal.

Economic Outreach

Strategic Partnership for Industrial Resurgence (SPIR) – an economic development program whose mission is to assist, revitalize and redirect New York State industry and whose goal is to make business more competitive.

SEAS faculty, staff and graduate students work to foster partnerships between the University and the business community, and promote access to the University's resources for the purpose of enhancing and promoting economic growth.

SPIR Data (2000-01 Academic Year):

Participating Companies	159
Projects	268
Projected Jobs Created	318
Projected Jobs Retained	1312
Increased Sales	$30M
Federal $ Leveraged	$39M

Students

The SEAS student body is both talented and diverse. Many earn honors and receive scholarship recognition. The following tables present degrees offered by level, enrollment figures and graduation numbers for the most recent year.

Engineering Discipline	Bachelor of Science	Master of Engineering	Master of Science	Ph.D.
Aerospace	◆†	◆	◆	◆
Chemical	◆†	◆	◆	◆
Civil	◆†	◆	◆	◆
Computer	◆			◆°
Computer Science	◆*		◆	◆°
Electrical	◆†	◆	◆	◆
Environmental	◆		◆	
Industrial	◆†	◆	◆	◆
Mechanical	◆†	◆	◆	◆

†ABET *accredited*
*Bachelor of Arts *also available*
°PhD *is in* Computer Science and Engineering
Graduate Certificate Program *in* High-Performance Computing *also available*

Graduate engineering courses may also be taken through EngiNet™, our graduate distance learning program. (www.eng.buffalo.edu/EngiNet)

Enrollment (Fall 2001)

Total	3455
Undergraduate Students	2549
Graduate Students	906

Degrees Granted (2000-01 Academic Year)

Bachelor of Arts	33
Bachelor of Science	417
Master of Engineering	42
Master of Science	223
Doctor of Philosophy	52

Alumni

Alumni go on to responsible positions in industry, government and academia, number over 19,000, and are located in all 50 states and over 50 countries worldwide.

Student Empowerment and Workforce Preparation Programs

Alliance for Minority Participation (AMP) A SUNY-based NSF-sponsored program to improve the academic performance, retention and graduate rates of historically underrepresented minority students in the areas of engineering, mathematics, technology, and the natural sciences.

Buffalo-Area Engineering Awareness for Minorities (BEAM) A consortium of companies, colleges and school systems to encourage pre-college minorities to consider engineering careers.

Center for Technical Communication (CTC) CTC teaches students written and oral communications. Formats include credit courses and integrated short, specialized modules in standard laboratory and design courses and work experience programs. A group of experienced engineers and technical communication professionals advise CTC and mentor students. CTC also provides custom short courses for industry.

International Student Program An opportunity for engineering students to study abroad at over 100 universities in more than 25 countries.

SEAS Student Excellence Initiative A program to help all students achieve their academic potential and build supportive relationships with their peers and the faculty. A variety of programs are offered, including structured academic "small groups" for key courses, individual tutoring, and faculty-student mentorships. Student needs are diagnosed and integrated into course designs.

STEP and CSTEP Pre-college and collegiate Science and Technology Enrichment Programs (STEP) that provide instruction, training, and counseling services to students who are historically underrepresented in science, technology, health, and health-related professions.

Work Experience Programs SEAS students may work in industry through a collection of programs that includes the Engineering Career Institute (ECI, a summer employment program), the Engineering Co-operative (Co-op) Education Program and Internships. (www.eng-intern.buffalo.edu)

For more information, please contact us at:

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