astrodynamics; combustion and propulsion; computational fluid dynamics; controls, dynamical systems and estimation; experimental fluid mechanics; global positioning systems; hypersonics; nanosatellites; space systems; and unmanned aerial vehicles.

AE offers an online non-thesis Master of Science degree program in which students have access to the same lectures, class assignments, exams and projects as on-campus students. The MS online degree is an excellent option for students who want to pursue their graduate studies while working.

Many of our faculty are engaged in interdisciplinary research, and on aerospace.illinois.edu you can read about research in all of our faculty's fields.

Student engagement in AE at Illinois is another defining element of our programs. The department is committed to fostering an environment in which students receive the benefits of a smaller department in a worldclass College of Engineering and large research university. Many of our students actively contribute to this environment by participating in our departmental student organizations. AeroGSAC, the Graduate Student Advisory Committee, was specifically created to serve as a voice for all graduate students in AE.

If you are a prospective AE student, we are excited that you might join us at the University of Illinois, where our teaching and research programs, and the personalized nature of our education, offer an outstanding and nurturing intellectual climate for your advanced study. We encourage you to view our website, aerospace.illinois.edu, to learn what our graduate program is like!

RESEARCH FUNDING, COLLABORATIONS, FACILITIES

AE at Illinois is committed to cooperative research within the university and with other universities, state and federal government agencies, and industry. Our faculty and graduate students are active in a variety of interdisciplinary centers. Examples include:

Funding Agencies and Industries

- AeroVironment Inc.
- Air Force Office of Scientific Research
- Air Force Research Laboratory
- Army Research Laboratory
- Army Research Office
- Department of Energy
- Gulfstream Aerospace
- National Aeronautics and Space Administration
- National Science Foundation
- Navy Naval Air Systems Command
- Office of Naval Research
- Rolls-Royce
- Siebel Energy Institute
- The Boeing Company
- United Launch Alliance

Federally Funded Centers

- Advanced Research for the Exploration of Space Center (ARES)
- Center for Exascale Simulation of Plasma-Coupled Combustion (XPACC); *National Nuclear Security Administration*
- Center of Excellence in Modeling of Materials; *Air Force Research Laboratory/Air Force Office of Scientific Research*
- Center of Excellence in Self-healing, Regeneration, and Structural Remodeling; *Air Force Office of Scientific Research*

Campus-Level Institutes

- Beckman Institute for Advanced Science and Technology
- Computational Science and Engineering (CSE)
- Coordinated Science Laboratory (CSL)
- Frederick Seitz Materials Research Laboratory (MRL)
- Information Trust Institute (ITI)
- Micro and Nanotechnology Laboratory (MNTL)
- National Center for Supercomputing Applications (NCSA)

AE faculty and graduate students conduct research in over twenty different laboratories on campus and consistently play a role in the development of major advances in aircraft and space applications.

Laboratory Facilities

- Aerodynamics Research Lab
- Aerospace Robotics and Control Research Lab
- Applied Computational Aerodynamics Lab
- Composites Manufacturing Labs
- Computational Aeroacoustics Lab
- Computational Astrodynamic Research Lab
- Computational Solid Mechanics and Aeroelasticity Lab
- Electric Propulsion Lab
- Energy Deposition Flow Control Lab
- High Energy Laser Lab
- High Strain Rate Mechanics Lab
- Illinisat Lab
- Intelligent Robotics Lab
- Linear and Nonlinear Dynamics and Vibrations Lab
- Nanomechanics and Materials Research Lab
- Nonlinear Systems Lab
- Robotics and Neuro-Mechanical Systems Lab
- Structures and Controls Instructional Lab
- Undergraduate Aerodynamics and Propulsion Instructional Labs
- Undergraduate and Graduate Computer Lab
- Unmanned Aerial Vehicle Research Lab

OUR DEGREE PROGRAMS

The Aerospace Engineering at Illinois top-ranked programs provide students curricula with unparalleled strengths in key fundamental areas, including propulsion, aerodynamics, fluids, materials, flight mechanics and avionics, heat transfer and radiation, structures, cost analysis, reliability, survivability, maintainability, operations research, marketing, and airspace management. The Department has experienced a surge in both undergraduate and graduate student enrollment in recent years. AE's degree programs provide students with plenty of options: BS, MS with thesis, MS non-thesis (on campus and online), MS in Aerospace Systems Engineering, Certificate Program, and PhD.

Average ACT composite score for incoming undergraduate students: 32.2

Average GRE percentile for incoming MS and PhD students: 92

AE Enrollment	13-14	14-15	15-16	16-17	17-18
BS	410	478	513	502	518
MS-total	66	86	96	120	99
MS-thesis	30	34	58	32	55
MS-non thesis (on campus)	27	39	15	55	37
MS-Aerospace Systems	9	5	9	12	7
MS-online	0	8	14	21	29
Non-degree certificate	2	1	2	1	1
PhD	58	51	60	70	69

AE AT ILLINOIS FACULTY RESEARCH AREAS

Aeroacoustics	Aeroelasticity	Aerospace Materials	Aerospace Structures	Aerospace Systems Design and Simulation
Daniel Bodony Jonathan Freund	Maciej Balajewicz Lawrence Bergman Daniel Bodony Philippe Geubelle Harry Hilton Kai James	Ioannis Chasiotis Huck Beng Chew Philippe Geubelle Harry Hilton John Lambros Scott White	Maciej Balajewicz Lawrence Bergman Harry Hilton Kai James Scott White	Phillip Ansell Steve D'Urso Grace Gao Harry Hilton Koki Ho Kai James Zachary Putnam Michael Selig Huy Tran
Applied Aerodynamics	**Astrodynamics**	**Combustion and Propulsion**	**Computational Fluid Dynamics**	**Controls, Dynamical Systems and Estimation**
Phillip Ansell Maciej Balajewicz Daniel Bodony Gregory Elliott Koki Ho Michael Selig Brian Woodard	Bruce Conway Alexander Ghosh Koki Ho John Prussing Zachary Putnam	Daniel Bodony Rodney Burton Gregory Elliott Jonathan Freund Philippe Geubelle Deborah Levin Marco Panesi Joshua Rovey	Maciej Balajewicz Daniel Bodony Jonathan Freund	Maciej Balajewicz Timothy Bretl Cedric Langbort N. Sri Namachchivaya Petros Voulgaris
Experimental Fluid Mechanics	**Flow Control**	**Global Positioning Systems**	**Hypersonics**	**Nanosatellites**
Phillip Ansell Craig Dutton Gregory Elliott	Phillip Ansell Daniel Bodony Craig Dutton Gregory Elliott Jonathan Freund	Timothy Bretl Grace Gao	Deborah Levin Marco Panesi Zachary Putnam	Rodney Burton Alexander Ghosh Koki Ho Zachary Putnam Joshua Rovey
Space Systems	**Unmanned Aerial Vehicles**			
Timothy Bretl Rodney Burton Grace Gao Alexander Ghosh Koki Ho Deborah Levin Zachary Putnam Joshua Rovey	Phillip Ansell Timothy Bretl Gregory Elliott Grace Gao Michael Selig			

AEROSPACE AT ILLINOIS

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Aerospace Engineering at Illinois
2017-18 Facts & Faculty


Phillip J. Ansell

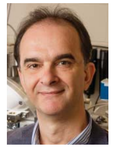

Maciej Balajewicz


Lawrence A. Bergman


Daniel J. Bodony


Timothy W. Bretl


Rodney L. Burton


Ioannis Chasiotis


Huck Beng Chew


Bruce A. Conway


Steven J. D'Urso


J. Craig Dutton


Gregory S. Elliott


Jonathan B. Freund


Grace X. Gao


Philippe H. Geubelle


Alexander Ghosh


Harry H. Hilton


Koki Ho


Kai James


John Lambros


Cedric Langbort


Deborah Levin


N. Sri Namachchivaya


Marco Panesi


John E. Prussing


Zachary R. Putnam


Joshua L. Rovey


Michael S. Selig


Huy T. Tran


Petros G. Voulgaris


Scott R. White


Brian S. Woodard

ADVANCING AEROSPACE RESEARCH AND DEVELOPMENT

Aerospace Engineering at Illinois is an international leader in aerospace science and engineering. With nationally ranked undergraduate and graduate programs, state-of-the-art research facilities, and internationally renowned faculty, the department is committed to excellence and leadership in teaching, research, and service.

OUR UNDERGRADUATE PROGRAM

The undergraduate program of AE at Illinois consistently ranks among the top aerospace engineering programs internationally, with distinguished faculty, excellent undergraduate research opportunities, advanced facilities, active student societies, a collegial and collaborative environment, and exceptionally bright students from around the world. Our primary goal is to educate our students to become future leaders in engineering, science, technology, and beyond.

AE faculty members are internationally renowned because of their diverse research areas and excellence in teaching. Many of the faculty enthusiastically engage undergraduate students by inviting them to join in world-class research. These programs expose the students to aerospace arenas including robotics, unmanned aerial vehicle (UAV) development and control, space systems, wind tunnel experiments, micro- and nanotechnology, aerospace modeling and simulations, GPS systems, composite manufacturing, and smart materials.

AE boasts more department-affiliated student organizations and extra-curricular projects than any other department in Engineering at Illinois, with groups such as the American Institute of Aeronautics and Astronautics (AIAA) student branch, AIAA Design/Build/Fly, Student Space Systems, Illini Aerospace Outreach, Illini Space Society, Illinois Robotics in Space, Satellite Development Organization, Women in Aerospace, Student Aircraft Builders and the Undergraduate Advisory Board. These organizations provide students hands-on opportunities in team-oriented, extracurricular activities of which AE is very supportive. AE has designated the Undergraduate Research Laboratories as space for students to enhance their experiences in both these projects as well as coursework. Available for student use are 3D printers, laser cutters, drill presses, saws and other equipment.

The AE curriculum emphasizes a strong theoretical foundation in the three key areas of aerospace engineering: aerospace materials and structures; aerodynamics; and propulsion, dynamics and controls. It also promotes hands-on learning through:

- AE 100 Intro to Aerospace Engineering, freshmen introduction to aircraft and rocket design and flight
- AE 298 Introduction to Aerospace Research
- AE 460 Aerodynamics & Propulsion Lab, theory and application of experimental techniques with emphasis on fluid dynamic, aerodynamic, thermal, combustion and propulsion phenomena
- AE 461 Structures & Vibrations, theory and application of experimental techniques with emphasis on structural mechanics, vibrations, dynamics, and control systems
- AE 483 UAV Navigation and Control, design, analysis, and application of decision algorithms to modern aerospace systems: global positioning systems, air traffic control systems, unmanned aerial vehicles, imaging and communications satellites, and planetary ground vehicles
- AE 498 UAV Independent Study.

The excellent preparation AE undergraduates experience has translated into nationwide recognition. Over the past decade, AE has placed in one or more of the top three spots of the AIAA Undergraduate Space Design Competition. AE students also have performed well in the National Aeronautics and Space Administration (NASA) Big Idea Challenge, the NASA Robotic Mining Competition, the NASA Micro-g Neutral Buoyancy Experiment Design Challenge, the Students for the Exploration and Development of Space (SEDS) satellite constellation design competition, and the Midwest High-Power Rocketry competition.

The AE program offers an exceptional education that prepares students to be leaders in technology, business, and service to society. Furthermore, the AE curriculum develops the critical thinking skills necessary to solve even the toughest of engineering problems, both now and in the future.

OUR GRADUATE PROGRAM

AE at Illinois offers world-class graduate-level engineering education and research opportunities in aerospace engineering. The department has earned a reputation as one of the best programs in the world. AE graduates go on to top scholar and research positions in academia, industry, and government labs. The department views its students as future leaders in industry, academia and society.

The research opportunities in AE at Illinois are unparalleled. Our faculty and students are engaged in numerous disciplines, and our website categorizes their research into several areas: aeroacoustics; aeroelasticity; aerospace materials; aerospace structures; aerospace systems design and simulation; applied aerodynamics;

TENURED, TENURE-TRACK, RESEARCH AND EMERITUS FACULTY - Areas of interest

Phillip J. Ansell: Assistant Professor / PhD, University of Illinois at Urbana-Champaign, 2013. Applied aerodynamics; unsteady flows; wake and shear flows; experimental aerodynamics; flow control; aircraft design and performance; high-lift aerodynamics; low-speed and transonic aerodynamics.

Maciej Balajewicz: Assistant Professor / PhD, Duke University, 2012. Model order reduction; nonlinear systems; fluid-structure interactions; turbulence; machine learning; system identification; computational fluid dynamics.

Lawrence A. Bergman: Research Professor, Professor Emeritus / PhD, Case Western Reserve University, 1980. Vibration-based energy harvesting; smart structures; nonlinear system identification; stochastic dynamics; linear and nonlinear structural dynamics and control.

Daniel J. Bodony: Blue Waters Associate Professor / PhD, Stanford University, 2005. Current research: Large-scale parallel computing; fluid mechanics of compressible fluids; flow stability and control; fluid-thermal-structure interaction (aeroelasticity, aerothermoelasticity); aeroacoustics (sounds generated by turbulent flows).

Timothy W. Bretl: Associate Professor / PhD, Stanford University, 2005. Brain-machine interfaces; optimal control; robotic manipulation; motion planning; theoretical and algorithmic foundations of robotics and automation.

Rodney L. Burton: Professor Emeritus / PhD, Princeton University, 1966. Electric and advanced chemical rocket propulsion; nano-satellites; space exploration; hypersonic flows; hypervelocity accelerators.

Ioannis Chasiotis: Professor / PhD, California Institute of Technology, 2002. Scanning probe microscopy in mechanics of materials; mechanical reliability; fracture and fatigue of MEMS and thin film materials; interfacial mechanics of carbon nanofibers and nanotubes in polymer matrices; time and rate dependent mechanics of nanofibers and thin films; deformation and damage mechanics of inhomogeneous/anisotropic materials.

Huck Beng Chew: Assistant Professor / PhD, National University of Singapore, 2007. Fracture and failure processes of small-scale material structures through bridging the nano and micromechanics of materials using multi-scale modeling and simulations.

Bruce A. Conway: Professor Emeritus / PhD, Stanford University, 1981. Current research: Optimal control; celestial mechanics; numerical optimization.

Steven J. D'Urso: Coordinator/Lecturer of Systems Engineering / MS, University of Illinois at Urbana-Champaign, 1989. Complex systems definition; aerospace systems design; aerospace systems engineering.

J. Craig Dutton: Professor / PhD, University of Illinois at Urbana-Champaign, 1979. Gas dynamics and fluid mechanics, in particular, experimental, numerical, and analytical studies of high-speed separated and mixing flows; shear layers; jets; base flows; shock wave/boundary layer interactions; nozzle flows; ejector flows; diffuser flows; valve flows; flow through and deformation of extracellular matrices; laser diagnostic methods.

Gregory S. Elliott: Professor / PhD, The Ohio State University, 1993. Current research: Experimental fluid mechanics with an emphasis on laser-based diagnostic techniques; thermal and fluid sciences (experimental techniques with an emphasis on laser based diagnostic techniques and experimental supersonic and subsonic fluid mechanics); combustion; propulsion; plasmas; aerodynamics; turbulence; thermal spray coating technologies; internet-based instruction; engineering design; computational fluid dynamics.

Jonathan B. Freund: Donald Biggar Willett Professor of Engineering / PhD, Standford University, 1998. Molecular dynamics simulation of nanometer scale flows and heat transfer in solids; large-scale parallel computing; numerical methods; biomedical fluid dynamics; aerodynamic sound; fluid mechanics.

Grace Xingxin Gao: Assistant Professor / PhD, Stanford University, 2008. GPS/GNSS-based positioning; navigating and timing with applications to unmanned aerial vehicles; power systems; robotics.

Philippe H. Geubelle: Abel Bliss Professor of Engineering / PhD, California Institute of Technology, 1993. Computational design of novel materials; fracture mechanics; theoretical and computational solid mechanics; thin films' and MEMS' damage and failure modeling; biomimetic materials; multiscale modeling of advance materials; computational aeroelasticity.

Alexander Ghosh: Adjunct Research Assistant Professor / PhD, University of Illinois at Urbana-Champaign, 2013. Astrodynamics; nanosatellites; space systems.

Harry H. Hilton: Professor Emeritus / PhD, University of Illinois at Urbana-Champaign, 1951. Probabilistic structural integrity of dentures; aerodynamic noise / aeroacoustic; thermal structural control; active and passive structural control; minimum structural weight analysis under random loads with probabilistic failure properties; electro-magneto-rheological material characterization, analysis and simulations; viscoelastic materials; nonlinear dynamics; computerized flight vehicle synthesis; numerical analysis in solid mechanics.

Koki Ho: Assistant Professor / PhD, Massachusetts Institute of Technology, 2015. Systems engineering; multi-disciplinary design optimization; astrodynamics; space mission design and planning; distributed satellite systems; Cubesats/small satellites; space systems.

Kai James: Assistant Professor / PhD, University of Toronto, 2012. Multidisciplinary design optimization; topology optimization; aeroelasticity; computational solid mechanics; nonlinear mechanics; additive manufacturing.

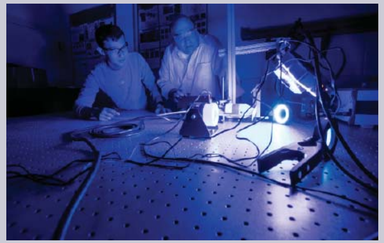
John Lambros: Professor / PhD, California Institute of Technology, 1994. Failure and fatigue of additively manufactured materials; failure mechanisms of Li+ composite electrodes; 3D X-ray tomography and digital volume correlation; static and dynamic fracture mechanics; thermomechanical fatigue; nonlinear stress wave mitigation; dynamic failure of MEMS devices and microelectronics; image correlation techniques applied to biological systems; wave propagation and fracture in multiphase systems.

Cedric Langbort: Associate Professor / PhD, Cornell University, 2005. Control, optimization, and design of distributed systems; aerospace information technology; transportation cyber-physical systems; control theory; convex optimization methods for control; distributed and networked systems; applications to air-traffic control, multi-agent systems, large-scale infrastructures and cyber-security.

Deborah Levin: Professor / PhD, California Institute of Technology, 1979. Combustion and propulsion; hypersonics; space systems; chemically reacting flows; high performance computing; kinetic particle methods.

N. Sri Namachchivaya: Professor / PhD, University of Waterloo, 1984. Multi-scale modeling; homogenization; filtering and estimation; stability and bifurcation theory; nonlinear and random dynamical systems.

Marco Panesi: Assistant Professor / PhD, von Kármán Institute for Fluid Dynamics and Universita degli Studi di Pisa, 2009. Uncertainty quantification; weakly ionized plasmas; non-equilibrium chemistry and radiation; hypersonic flows.



John E. Prussing: Professor Emeritus / Sc.D., Massachusetts Institute of Technology, 1967. Optimal control theory applications; orbital mechanics; optimal spacecraft trajectories.

Zachary R. Putnam: Assistant Professor / PhD, Georgia Institute of Technology, 2015. Planetary entry, descent, and landing systems; space guidance, navigation, and control; hypersonic and space systems design; mission design; atmospheric and space flight mechanics.

Joshua L. Rovey: Associate Professor / PhD, University of Michigan, 2006. Space propulsion; electric propulsion; space exploration; nanosatellites; weakly-ionized plasmas; plasma-material interactions; high-density pulsed plasma; microscale combustion; ionic liquid chemistry; aerodynamic flow control.

Michael S. Selig: Professor Emeritus / PhD, The Pennsylvania State University, 1992. Applied aerodynamics; aircraft design, performance, stability and control; flight simulation and modeling; wind energy systems; airfoil design and analysis; computational and experimental aerodynamics.

Huy T. Tran: Research Assistant Professor / PhD, Georgia Institute of Technology, 2015. Systems engineering and system-of-systems; systems design; resilient systems; network science; machine learning.

Petros G. Voulgaris: Professor / PhD, Massachusetts Institute of Technology, 1991. Advanced control methods to engineering systems; time varying and adaptive systems; Control and estimation theory to communication systems; robust and multi-objective control and estimation; distributed and multi-agent control; multi-objective control; time varying, nonlinear, adaptive systems; aerospace applications; decentralized and distributed systems.

Scott R. White: Donald Biggar Willett Professor of Engineering / PhD, The Pennsylvania State University, 1990. Composite materials; processing of polymers and composites; bio-inspired materials; multifunctional materials; novel processing techniques; process modeling; health monitoring, self-healing composites; energy storage materials; mechanical behavior of polymers and composites.

Brian S. Woodard: Research Professor / PhD, University of Illinois at Urbana-Champaign, 2012. Aerodynamics with an emphasis on experimental aircraft icing; high-energy lasers; engineering education specifically applying project-based learning and spatial visualization skills.