Programs of Study

The Department offers courses of study leading to three graduate degrees in Aerospace Engineering: the M.S., the M.Eng., and the Ph.D.

Master of Science

The M.S. is a thesis-based master's degree having a significant research component. It may be a terminal degree for students who intend to pursue research-related careers, or it may be a stepping-stone to a Ph.D.

Master of Engineering

The M.Eng. is a non-thesis professional master's degree. It is usually a terminal degree for students who intend to pursue careers that do not emphasize R&D.

Doctor of Philosophy

The Ph.D. is a thesis-based doctor's degree. It is strongly research-oriented and is a terminal degree for students who intend to pursue careers in R&D, research management, or university teaching.

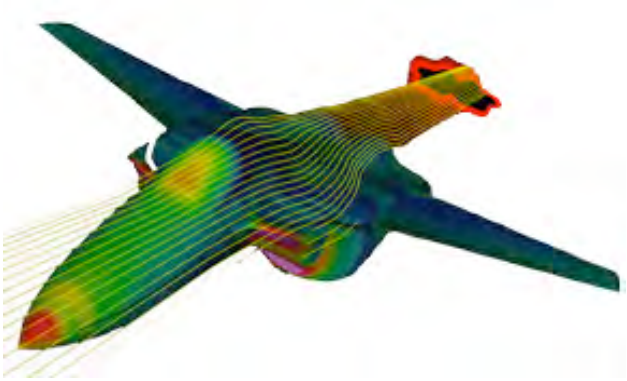
Sample Course Offerings

Theory of Flight
Flight Testing and Simulation
Aerodynamics of V/STOL Aircraft
Dynamics and Control of Aerospace Vehicles
Rotorcraft Dynamics
Foundations of Fluid Mechanics
Aerodynamically Induced Noise
Stability of Laminar Flow
Finite Element Method in Fluids / Heat Transfer
Computational Methods in Fluid Dynamics
Parallel Processing
Theory and Design of Turbomachinery
Analysis and Computation of Turbomachinery Flows
Space Propulsion and Power
Aerothermochemistry of Propulsion Systems
Space Science
Astrodynamics
Orbit and Attitude Control of Spacecraft
Classical and Modern Controls
Advanced Composite Structures
Structural Dynamics
Aeroelasticity
Adaptive Structures

Research Areas and Centers

The Department provides coursework and research projects in the following areas of emphasis. Areas within these specializations include flow instabilities and turbulence, advanced airfoil design, rotorcraft dynamics, spacecraft dynamics and control, advanced composite structures, smart structures, and electric propulsion.

Analytical / Computational Fluid Dynamics
Experimental Fluid Dynamics
Aeroacoustics
Flight Science and Vehicle Dynamics
Dynamics and Control
Rotorcraft Engineering
Structural Dynamics
Structures and Materials
Space Propulsion
Turbomachinery and Heat Transfer



The following is a list of the several programs and centers of research that involve the Department.

Rotorcraft Center of Excellence
Institute for Computational Science
Center for Acoustics and Vibration
Propulsion Engineering Research Center

Facilities

Numerous wind tunnels: Low-turbulence subsonic wind-tunnel (3.25 x 5 foot test section); low-turbulence boundary layer tunnel (16 x 16 inch test section); low-speed axisymmetric tunnel (3 foot diameter test section); supersonic wind tunnel (6 x 6 inch test section); supersonic free shear layer facility (2 x 5 inch test section).

Water channels/Water Tunnel: Laminar flow water channel (1.5 x 2.5 foot test section); access to the Garfield Thomas Water Tunnel of the Applied Research Lab.

Aeroacoustic facilities: Small anechoic jet noise facility; an anechoic chamber; reverberant room.

Structures research laboratory: Scanning laser vibrometer; modal testing facilities; hydraulic testing machine; smart materials lab; an acoustic emission system; reflection polariscope.

Composites materials laboratory: Autoclave (3 foot diameter x 7 foot length); a computer-controlled filament winding machine; a pultrusion machine; a braiding machine for composite materials manufacturing.

Space propulsion facilities: High vacuum tank facility for low-density flow; unsteady propellant combustion facility; variable power microwave generator and propulsion facility; spectrometer; CW Nd laser.

Several large turbomachinery facilities: Axial flow turbine; multi-stage compressor facility; single-stage compressor (3-foot diameter); automotive torque converter facility; linear turbine cascade facility.

Other experimental facilities include: Several laser Doppler anemometers including a subminiature semiconductor model; a partical image velocimeter system; an ATC/510G flight simulator.

Computational facilities: 3 processor IBM 9000 vector computer (PSUVM), IBM RS/6000 workstations, X-terminals, Silicon Graphics workstations, IBM-compatible personal computers.

Admissions / Financial Aid

The entering M.Eng./M.S. student must hold a bachelor's degree in physical science, mathematics, or engineering. Students having a 3.00 junior-senior GPA and appropriate course backgrounds will be considered for admission to the M.Eng./M.S. program. The Graduate Record Examination (GRE) test must be taken prior to being considered for acceptance to the graduate program, and international students must score 550 or higher on the Test of English as a Foreign Language (TOEFL) and 250 or higher on the Test of Spoken English (TSE) before assuming teaching responsibilities. Qualified students may be admitted at the beginning of each semester.

The full-time tuition rate at the University Park campus is currently $6,008 per semester for Pennsylvanians and $11,107 per semester for non-Pennsylvanians. Room and board charges for an on-campus graduate apartment with utilities start at $515 per month. The University requires medical insurance for all graduate assistants, traineeship/fellowship recipients, and all international students enrolled at Penn State and their dependents. Financial support is available through graduate assistantships, fellowships and traineeships, graduate school tuition assistance (for summer semester) and employment and loan programs are available through the Office of Student Aid. Half-time teaching and research assistantships are available within the department on a competitive basis, each carrying a stipend plus paid tuition; research assistantships usually include additional summer support. In 2004-2005, the stipend amount is $13,185 (M.S.) or $14,175 (Ph.D.) for two semesters. Out-of-state tuition adds $22,214 to these assistantship values.

Graduate Life

Adjacent to the town of State College, University Park is located in central Pennsylvania. State College is a multicultural community that appeals to both singles and those with families, with excellent schools, health care and low crime rate. The University offers a wide range of cultural activities, such as art exhibits, concerts, and traveling Broadway shows. University Park is also home to professional conferences, lectures and seminars. Located in the scenic Appalachian Mountains, Penn State students can also enjoy outdoor activities such as hiking, biking, camping, canoeing and skiing.

Faculty

Anthony K. Amos, Ph.D. (Princeton)
Structural mechanics, dynamics and control
Kenneth S. Brentner, Ph.D. (Cambridge)
Rotorcraft acoustics, computational aeroacoustics
Cengiz Camci, Ph.D. (Von Karman Institute)
Aero-thermodynamics of turbomachinery
Farhan S. Gandhi, Ph.D. (Maryland)
Structures, helicopter dynamics, aeroelasticity
Joseph F. Horn, Ph.D. (Georgia Tech)
Rotorcraft dynamics, control, handling qualities
George A. Lesieutre, Ph.D. (U.C.L.A.)
Structural dynamics, active structures, composites
Deborah A. Levin, Ph.D. (CalTech)
Modeling and simulation of reacting flows
Lyle N. Long, D.Sc. (George Washington)
Computational science, CFD, unpiloted vehicles
Mark D. Maughmer, Ph.D. (Illinois)
Aerodynamics, flight mechanics, airfoil design
Barnes W. McCormick, Ph.D. (Penn State)
Aeronautics, low-speed aero, V/STOL, propellers
Dennis K. McLaughlin, Ph.D. (M.I.T)
Experimental fluid mechanics, aerodynamic noise
Robert G. Melton, Ph.D. (Virginia)
Astrodynamics, spacecraft and mission design
Michael M. Micci, Ph.D. (Princeton)
Rocket propulsion, electric propulsion
Philip J. Morris, Ph.D. (Southampton)
Analytical fluid mechanics, aerodynamic noise
Edward C. Smith, Ph.D. (Maryland)
Rotorcraft dynamics, composite structures
Hubert C. Smith, Ph.D. (Virginia)
Aircraft design, performance, and operations
David B. Spencer, Ph.D. (Colorado)
Spacecraft trajectory design, dynamics and control

Visit the Penn State Department of Aerospace Engineering web site!

www.aero.psu.edu/graduate.html

or contact

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Director of Graduate Studies
(814) 865-6431

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Graduate Study in the

Department of Aerospace Engineering