Where research helps science take flight!

Iowa State’s Department of Aerospace Engineering allows scientists and students to combine their knowledge and skills to create key contributions to engineering that help shape our world – now and into the future. Welcome aboard a program that will take your aspirations far beyond the horizon to a higher level of accomplishment.

Aerospace Structures and Materials

» Fracture mechanics and flaw detection.
» Machine learning for materials design.
» High-pressure materials science and mechanics.
» Atomistic and multiscale mechanics of materials.

Non-Destructive Evaluation (NDE)

» Linear and nonlinear ultrasonic measurement for material characterization.
» X-ray computed tomography.
» Vibrothermography.

Fluid Dynamics

» Acoustics and noise reduction.
» Turbulent flow modeling/simulation and laminar-to-turbulent transition.
» Environmental flows: buildings, wind turbines and tornadoes.
» Low Reynolds number multiphase flows.
» Supercooled droplet and ice crystal icing.
» Low order modeling.

Flight Dynamics, Control and Space Systems

» Spacecraft guidance, dynamics and control.
» Space trajectory optimization.
» Control of ocean wave energy converters.
» Space system design, development, and operation.

Complex Systems and Optimization

» Formal methods: techniques from symbolic model checking and runtime verification for autonomous and safety-critical systems.
» Multidisciplinary design optimization.
» Analysis, design, and optimization of next-generation vehicles.
<table>
<thead>
<tr>
<th>Faculty Researchers &amp; Primary Research Areas</th>
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</table>
| **Ossama Abdelkhalik**  
Ph.D. Texas A&M Univ.  
Associate Fellow, AIAA  
*Space trajectory optimization, spacecraft control, control of ocean wave energy converters* |
| **Benjamin Ahn**  
Ph.D. Purdue Univ.  
*Engineering education: workforce development, mentoring, teaching and learning mechanisms* |
| **Ashraf Bastawros**  
Ph.D. Brown Univ.  
Fellow, ASME  
*Experimental solid mechanics, micromechanics, fracture and icing* |
| **Leonard Bond**  
Ph.D. The City Univ., London  
Fellow, AAAS; Fellow, Institute of Physics, U.K.  
*Ultrasound and non-destructive evaluation* |
| **Dale Chimenti**  
Ph.D. Cornell Univ.  
Fellow, ASNT  
*Non-destructive evaluation and ultrasonics* |
| **Vinay Dayal**  
Ph.D. Texas A&M Univ.  
*Composite materials and wind turbines* |
| **Paul Durbin**  
Ph.D. Univ. of Cambridge  
Fellow, APS  
*Modeling and computer simulation of turbulent flow and flow undergoing transition* |
| **Ping He**  
Ph.D. Chinese Academy of Sciences  
*Multidisciplinary design optimization, computational fluid dynamics, machine learning, aircraft design* |
| **Stephen Holland**  
Ph.D. Cornell Univ.  
Fellow, ASNT  
*Non-destructive evaluation and thermography* |
| **Hui Hu**  
Ph.D. Univ. of Tokyo  
Fellow, ASME; Associate Fellow, AIAA  
*Experimental fluid dynamics and aircraft icing* |
| **Valery Levitas**  
Ph.D. Institute of Superhard Materials, Kiev; Fellow, ASME  
*Multiscale theoretical and experimental mechanics, physics* |
| **Dae-Young Lee**  
Ph.D. Univ. of Michigan  
*Space system design, development, and operation* |
| **Alric Rothmayer**  
Ph.D. Univ. of Cincinnati  
Associate Fellow, AIAA  
*Perturbation methods, boundary layer theory, aircraft icing* |
| **Kristin-Yvonne Rozier**  
Ph.D. Rice Univ.  
Associate Fellow, AIAA  
*Formal methods: formal specification, model checking, runtime verification, satisfiability* |
| **Partha Sarkar**  
Ph.D. Johns Hopkins Univ.  
Fellow, ASCE; Fellow, SEI  
*Wind engineering and aeroelasticity* |
| **Anupam Sharma**  
Ph.D. The Pennsylvania State Univ.  
Associate Fellow, AIAA  
*Computational fluid dynamics and acoustics* |
| **Azadeh Sheidaei**  
Ph.D. Michigan State Univ.  
*Advanced materials and biological systems* |
| **Azadeh Sheidaei**  
Ph.D. Michigan State Univ.  
*Advanced materials and biological systems* |
| **Thomas Ward**  
Ph.D. Univ. of California, Santa Barbara  
*Fluid dynamics, low Reynolds number multiphase flows* |
| **Bong Wie**  
Ph.D. Stanford Univ.  
Associate Fellow, AIAA  
*Guidance, control, astrodynamics* |
| **Liming Xiong**  
Ph.D. Univ. of Florida  
*Atomistic and multiscale materials modeling* |
Unique Department Laboratories

Aerodynamic/Atmospheric Boundary Layer (AABL) Wind and Gust Tunnel
Wind Energy and Wind Engineering: Uniform and ABL wind simulation with gust

Tornado Simulator
Wind Engineering: Translating tornado-like vortex/impinging jet

Icing Tunnel
Supercooled droplet icing and ice crystal environment

Rotational Diamond Anvil Cell
High-pressure material transformation and deformation

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