Introduction to the UCI MAE Department
OUTLINE

• Introduction to MAE
• Research and Courses
• MAE Graduate Student Organization
• HSSoE Graduate Affairs Office
• Faculty Profiles

Marc Madou
Graduate Advisor
Chancellor's Professor of Mechanical and Aerospace Engineering; Biomedical Engineering; Chemical and Biomolecular Engineering

Research Interests:
Miniaturization science (MEMS and NEMS) with emphasis on chemical and biological applications, C-MEMS and CD based fluidics.

Roger Rangel
Department Chair and Professor of Mechanical and Aerospace Engineering

Research Interests:
Heat transfer, spray combustion, two-phase flows, fluid instability and atomization.
• **Mechanical Engineering:** One of the most diverse and versatile engineering fields, mechanical engineering combines facets of mathematics, physics, biology and system engineering. Mechanical engineering careers center on creating technologies to meet human needs. This includes solving today's problems and creating future solutions in health care, energy, transportation, world hunger, space exploration, climate change, and more.

• **Aerospace engineering:** The primary field of engineering concerned with the design, development, testing, and production of aircraft, spacecraft, and related systems and equipment it is made up of two major and overlapping branches: aeronautical engineering and astronautical engineering.

• **MAE Mission Statement:** Our mission is to educate students, at all levels, to be the best engineers and leaders in the nation and world by engaging them in a stimulating community dedicated to the discovery of knowledge, creation of new technologies, and service to society.
## Highlights of MAE Department

<table>
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<tr>
<th>Department History</th>
<th>Student Population and Degrees Offered</th>
<th>Research</th>
<th>Faculty and Recognition</th>
<th>Affiliated Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>1298 Undergrads 220 Graduate Students</td>
<td>$11.2 M</td>
<td>31 Full-time faculty</td>
<td>7 World-Class Center and Institute Affiliations</td>
</tr>
<tr>
<td></td>
<td>Degree offered:</td>
<td>Research Expenditures</td>
<td>15 Adjuncts and joint appointees</td>
<td>• Advanced Power and Energy Program (APEP)</td>
</tr>
<tr>
<td></td>
<td>• Master of Science (M.S.)</td>
<td>5 Research Thrusts</td>
<td>Honors: 3 National Academy of Engineering</td>
<td>• UCI Combustion Laboratory</td>
</tr>
<tr>
<td></td>
<td>• Doctor of Philosophy (Ph.D.)</td>
<td>• Dynamics and Controls</td>
<td>2 Fellows AAAS</td>
<td>• Integrated Nanosystems Research Facility (INRF)</td>
</tr>
<tr>
<td>1990</td>
<td>• Master of Engineering (M.Eng.)</td>
<td>• Fluid Dynamics and Propulsion</td>
<td>4 Fellows ASME</td>
<td>• National Fuel Cell Research Center (NFCRC)</td>
</tr>
<tr>
<td></td>
<td>Department expands to include Aerospace Engineering</td>
<td>• Thermal and Transport Sciences</td>
<td>4 Fellows AIAA</td>
<td>• UCI Irvine Materials Research Institute (IMRI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mechanics of Materials and Structures</td>
<td>2 Fellows IEEE</td>
<td>• Center for Complex and Active Materials (CCAM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Systems Engineering and Design</td>
<td>2 Fellow APS</td>
<td>• Beckman Laser Institute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 Mexican Academy of Science Foreign Member</td>
<td></td>
</tr>
</tbody>
</table>
Difference Grad and Undergrad School

• Courses
  • Classes dig deeper, assume you learned undergrad course material
  • More initiative in learning is expected from you
  • Multiple references rather than one textbook
  • Smart, hardworking classmates the norm

• Research and Teaching
  • Participate in creating new knowledge, i.e., research
  • Work individually with faculty research advisor
  • Opportunities to teach, e.g., informal, TA
Goals/Expectations/Advice for Graduate Students

- Make academics your 1st priority
- Take initiative in your educational development, recognize knowledge gaps and fill them in
- Develop broader impact perspective
- Engage with, and benefit from, the intellectual community – classmates, labmates, faculty
- Attend seminars

Mechanical & Aerospace Engineering Graduate Student Association (MAE-GSA)
Mechanics of Materials and Structures - Research

Areas of Interest:
- Nanoscale Mechanics
- Morphing Structures
- Active Materials
- Machine Learning
- Defect Formation/Propagation
- Deformation and Failure
- Advanced Manufacturing
- Composites
Mechanics of Materials and Structures - Faculty

Ramin Bostanabad  
Assistant Professor of Mechanical and Aerospace Engineering  
**Research Interests:** Design under uncertainty, probabilistic machine learning, materials informatics, computational microstructure characterization, topology optimization.

Penghui Cao  
Assistant Professor of Mechanical and Aerospace Engineering; Materials Science and Engineering  
**Research Interests:** Fundamental understanding of the mechanisms by which materials plasticity deform and fail, particularly in extreme environments.

Edwin Peraza Hernandez  
Assistant Professor of Mechanical and Aerospace Engineering  
**Research Interests:** Morphing structures, deployable structures, origami, tensegrity, active materials, structural optimization.

Tim Ruppert  
Associate Professor in Materials Science and Engineering  
Associate Professor (Joint Appt.) in Mechanical and Aerospace Engineering  
**Research Interests:** Optimal design, fabrication and experimental characterization of micro-architected materials.

Lorenzo Valdevit  
Professor in Materials Science and Engineering  
Professor (Joint Appt.) in Mechanical and Aerospace Engineering  
Director: Institute for Design and Manufacturing Innovation (IDMI)  
**Research Interests:** Mechanics of multifunctional materials, building energy efficiency.

Mark Walter  
Professor of Teaching in Mechanical and Aerospace Engineering  
**Research Interests:** Mechanics of multifunctional materials, building energy efficiency.
Mechanics of Materials and Structures – Courses Highlight

ENGRMAE 256. Nanomechanics. 4 Units.

Nanoscale materials and the experimental and computational techniques used to measure their properties. Mechanical behavior is the main focus, but other material properties such as diffusion and electron transport are discussed.

Restriction: Graduate students only.

• MAE 254  Mechanics of Solids and Structures (Continuum Mechanics)
• MAE 258  Mechanical Behavior of Solids - Continuum Theories (Materials Modeling)
• MAE 259  Mechanical Behavior of Solids - Atomistic Theories
• MAE 207  Advanced Finite Elements
• MAE 248  Mechanics of Smart Structures
• MAE 255  Composite Materials and Structures
• MAE 256  Nanomechanics
• MAE 282  Engineering Design Under Uncertainty
• MAE 295  Failure and Fracture
Dynamics and Control - Research

Areas of Interest
- Control Theory and Algorithms
- Autonomous and Distributed systems
- Navigation and Flight systems
- Machine Learning
Dynamics and Controls - Faculty

David Copp
Assistant Professor of Teaching of Mechanical and Aerospace Engineering
Research Interests: Optimal control and estimation, hybrid dynamical systems, energy storage, pedagogy.

Tryphon Georgiou
Distinguished Professor of Mechanical and Aerospace Engineering
Research Interests: Dynamical systems and control, mathematical physics, applied mathematics.

Faryar Jabbari
Professor of Mechanical and Aerospace Engineering
Research Interests: Control theory, particularly in robust and nonlinear control systems. Saturation control and control applications for combustion and fuel cell research. Controller design for systems with limited actuator capacity, with emphasis on active and hybrid control systems for earthquake engineering.

Zak Kassas
Associate Professor of Mechanical and Aerospace Engineering
Research Interests: Cyber-physical systems (CPS), autonomous vehicles (aerial, ground, underwater), satellite-based navigation, intelligent transportation systems (ITS), cognitive and software-defined radio (SDR), sensor fusion.

Solmaz Kia
Associate Professor of Mechanical and Aerospace Engineering
Research Interests: Systems and control; decentralized/distributed algorithm design for multi-agent systems; cooperative navigation; sensor fusion; fault detection.

Athanasios Sideris
Professor of Mechanical and Aerospace Engineering
Research Interests: Machine learning, Neural network control, Robust control

Haithem Taha
Associate Professor of Mechanical and Aerospace Engineering
Research Interests: Geometric nonlinear control theory; unsteady aerodynamics and aeroelasticity; optimization, calculus of variations and optimal control; flight dynamics and autopilot design; airplane performance and configuration aerodynamics.

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ENGRMAE 275. Nonlinear Feedback Systems. 4 Units.

Advanced tools for feedback control system analysis and synthesis. Norms, operators, Lp spaces, contraction mapping theorem, Lyapunov techniques along with their extensions. Circle criterion positivity and passivity. Applications to nonlinear control methods, such as sliding mode or adaptive techniques.

Prerequisite: ENGRMAE 270B

Restriction: Graduate students only.
Fluid Dynamics and Propulsion - Research

Areas of Interest

• Aeroacoustics
• Aeroelasticity
• Biomedical Flows
• Combustion Theory
• Computational Fluid Dynamics

• Electrosprays
• Jet & Rocket Propulsion
• Multiphase Flow
• Turbomachinery
• Turbulence
Fluid Dynamics and Propulsion - Faculty

Said Elghobashi
Distinguished Professor Emeritus of Mechanical and Aerospace Engineering
Research Interests:
Direct numerical simulation of turbulent chemically reacting and dispersed two-phase flows.

Manuel-Gamero
Associate Professor of Mechanical and Aerospace Engineering
Research Interests:
Electric propulsion, colloidal thrusters, electrospays.

Perry Johnson
Assistant Professor of Mechanical and Aerospace Engineering
Research Interests:
Turbulent flows, particle-laden and multiphase flows, turbulent boundary layers, large-eddy simulations, scientific computing.

John LaRue
Professor Emeritus of Mechanical and Aerospace Engineering
Research Interests:
Fluid mechanics, heat transfer, turbulence.

Feng Liu
Professor of Mechanical and Aerospace Engineering
Research Interests:
Computational fluid dynamics, turbomachinery, propulsion.

Bihter Padak
Assistant Professor of Mechanical and Aerospace Engineering
Research Interests:
Combustion, reaction kinetics, and emissions control technologies.

Dimitri Papamoschou
Professor of Mechanical and Aerospace Engineering
Research Interests:
Aeroacoustics, compressible turbulence.
Fluid Dynamics and Propulsion - Faculty

Roger Rangel
Department Chair and Professor of Mechanical and Aerospace Engineering

Research Interests:
Heat transfer, spray combustion, two-phase flows, fluid instability and atomization.

William Sirignano
Distinguished Professor of Mechanical and Aerospace Engineering

Research Interests:
Combustion theory, multiphase flows, turbulent reacting flows, computational methods. Rocket and jet propulsion, gas turbine and internal combustion engines.

Haithem Taha
Associate Professor of Mechanical and Aerospace Engineering

Research Interests:
Geometric nonlinear control theory; unsteady aerodynamics and aeroelasticity; optimal control; flight dynamics and autopilot design.

Jacqueline Thomas
Assistant Professor of Mechanical and Aerospace Engineering

Research Interests:
Design of aircraft systems and operations, aviation environmental impacts, aeroacoustics.

Three-stream asymmetric nozzle used for reducing jet engine noise. Dimitri Papamoschou
Fluidic Dynamics and Propulsion - Courses Highlight

- MAE 230A Inviscid Incompressible Fluid Mechanics I
- MAE 230B Viscous Incompressible Fluid Dynamics II
- MAE 230C Compressible Fluid Dynamics
- MAE 230D Theoretical Foundations of Fluid Mechanics
- MAE 231 Fundamentals of Turbulence
- MAE 233 Turbulent Free Shear Flows
- MAE 236 Nonequilibrium Gas Dynamics
- MAE 237 Computational Fluid Dynamics
- MAE 239 Dynamics of Unsteady Flows

ENGRMAE 231 Fundamentals of Turbulence. 4 Units.


Prerequisite: ENGRMAE 230A and ENGRMAE 230B

Restriction: Graduate students only.
Systems and Design - Research

Areas of Interest

- Design and control of MEMS
- Machine information systems integration
- Computer Aided Design
- Robotics including microrobotics
- Biomechanics

- Carbon- and Magnetic MEMS
- CD-Based Fluidics
- Rehabilitation, prosthetics and exoskeletons
- Kinematics of spatial motion
- Design of Mechanical Systems
Natasha T. Buswell
Assistant Professor of Teaching in Mechanical and Aerospace Engineering

Research Interests:
Graduate engineering education, faculty development, engineering teaching, engineering education research methods.

Donald Dabdub
Professor of Mechanical and Aerospace Engineering

Research Interests: Mathematical modeling of urban and global air pollution, dynamics of atmospheric aerosols, secondary organic aerosols, impact of energy generation on air quality, chemical reactions at gas-liquid interfaces.

Lawrence Kulinsky
Adjunct Professor of Mechanical and Aerospace Engineering

Research Interests: Micro- and nano-manufacturing, hybrid manufacturing, microfluidics, electrokinetic phenomena, BioMEMs, personalized diagnostics, and drug delivery.

Marc Madou
Chancellor's Professor of Mechanical and Aerospace Engineering

Research Interests: Miniaturization science (MEMS and NEMS) with emphasis on chemical and biological applications, C-MEMS and CD based fluidics.

J. Michael McCarthy
Director of the Performance Engineering Program and Professor of Mechanical and Aerospace Engineering

Research Interests: Design of mechanical systems, computer aided design, kinematic theory of spatial motion.

David Reinkensmeyer
Professor of Mechanical and Aerospace Engineering; Anatomy and Neurobiology; Biomedical Engineering; Physical Medicine and Rehabilitation

Research Interests: Robotics, mechatronics, biomedical engineering, rehabilitation, biomechanics, neural control of movement.

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Research Interests: Robotics, mechatronics, biomedical engineering, rehabilitation, biomechanics, neural control of movement.
Jacqueline Thomas
Assistant Professor of Mechanical and Aerospace Engineering
Research Interests: Design of aircraft systems and operations, aviation environmental impacts, aeroacoustics.

Camilo Velez
Assistant Professor of Mechanical and Aerospace Engineering

Alexandra Voloshina
Assistant Professor of Mechanical and Aerospace Engineering
Research Interests: Rehabilitation robotics, prosthetics, exoskeletons, locomotion biomechanics.

David Reinkensmeyer demonstrates one of his robotic devices created to help patients recover hand and arm function after neurologic damage caused by stroke or spinal cord injury.
Systems and Design- Courses Highlight

ENGRMAE 252. Fundamentals of Microfabrication. 4 Units.

Introduces Engineering and Science students to the science of miniaturization. Different options to make very small machines (micro and nano size) are reviewed, materials choices are discussed, scaling laws are analyzed, and many practical applications are listed.

Restriction: Graduate students only.
Thermal and Transport Sciences - Research

Areas of Interest
- Combustion and Emissions
- Fuel Cell Technologies
- Advanced Energy Systems
- Renewable Energy
- Heat Transfer
- Atomization and Sprays
- Reaction Kinetics
- Nanomaterials
Thermal and Transport Sciences - Faculty

Jacob Brouwer
Professor of Mechanical and Aerospace Engineering; Civil and Environmental Engineering

Research Interests:
- Fuel cells, energy systems dynamics, electrochemical systems design and analysis, chemical kinetics, reacting flows.

Derek Dunn-Rankin
Professor Emeritus of Mechanical and Aerospace Engineering; Civil and Environmental Engineering; Environmental Health Sciences

Research Interests:
- Combustion, optical particle sizing, particle aerodynamics, laser diagnostics and spectroscopy.

Jaeho Lee
Assistant Professor of Mechanical and Aerospace Engineering

Research Interests:
- Heat transfer, electronics cooling, energy harvesting, photonics, microdevices, and nanomaterials.

Vince McDonell
Adjunct Professor of Mechanical and Aerospace Engineering

Research Interests:
- Combustion, alternative fuels, gas turbines, sprays, diagnostics, combined heat and power, emissions, autoignition/flashback

Bihter Padak
Assistant Professor of Mechanical and Aerospace Engineering

Research Interests:
- Combustion, reaction kinetics, and emissions control technologies.
Thermal and Transport Sciences - Faculty

G. Scott Samuelsen
Director of Advanced Power and Energy Program, Research Professor and Professor Emeritus of Mechanical and Aerospace Engineering; Civil and Environmental Engineering

Research Interests: Combustion, sprays, laser diagnostics, air quality, turbulent transport, alternative fuels, modeling reacting flows, practical systems, energy and environmental conflict.

Yun Wang
Professor of Mechanical and Aerospace Engineering

Research Interests: Fuel cells, computational modeling, thermo-fluidics, two-phase flows, electrochemistry, CFD, turbulent combustion.

Yoonjin Won
Assistant Professor of Mechanical and Aerospace Engineering

Research Interests: Multi-scale structures for thermal and energy applications, in particular fabrication, characterization, and integration of structured materials.
Thermal and Transport Science- Courses - Highlight

- MAE 216 Statistical Thermodynamics
- MAE 217 Generalized Thermodynamics
- MAE 220 Conduction Heat Transfer
- MAE 221 Convective Heat Transfer
- MAE 210 Advanced Fundamentals of Combustion
- MAE 212 Engineering Electrochemistry: Fundamentals and Applications
- MAE 214A. Fuel Cell Fundamentals and Technology
- MAE 214B. Fuel Cell Systems and Degradation
- MAE 214C PEM Fuel Cells
- MAE 215 Advanced Combustion Technology
- MAE 224 Advanced Transport Phenomena
- MAE 227 Thermal Resistance Analysis in Microdevices and Nanomaterials
- MAE 228 Nanoscale Phase Change Transport Physics
- MAE 260 Current Issues Related to Air Quality, Climate, and Energy
- MAE 295 Chemical Kinetics and Simulations

ENGRMAE 260. Current Issues Related to Air Quality, Climate, and Energy. 4 Units.

Current issues related to the atmosphere, climate, and air quality in the context of energy conversion and sustainability. Topics include transportation systems; building design; impacts on humans and ecosystems; modeling and meteorology; economics; and application to public policies.

Prerequisite: ENGRMAE 261 or CHEM 245 or EARTHSS 240

Restriction: Graduate students only.
Aerospace Engineering

A broad theme that encompasses many research and educational activities in MAE, including:

- Aircraft systems design and operations
- Innovative engine cycles for airbreathing propulsion
- Electrified propulsion for aircraft
- Subsonic and supersonic aerodynamics
- Dynamics and control of aerospace vehicles, including geometric nonlinear control
- Aeroacoustics of integrated aerial platforms
- Aeroelasticity and morphing structures
- Spacecraft propulsion
- Autonomy and Cyber Physical Systems
- Navigation Systems
Aerospace Engineering - Faculty

Manuel-Gamero
Associate Professor of Mechanical and Aerospace Engineering
Research Interests:
Electric propulsion, colloidal thrusters, electrospays.

Edwin Peraza Hernandez
Assistant Professor of Mechanical and Aerospace Engineering
Research Interests:
Morphing structures, deployable structures, origami, tensegrity, active materials, structural optimization.

Zak Kassas
Associate Professor of Mechanical and Aerospace Engineering
Research Interests:
Cyber-physical systems (CPS), autonomous vehicles (aerial, ground, underwater), satellite-based navigation, intelligent transportation systems (ITS), cognitive and software-defined radio (SDR), sensor fusion.

Solmaz Kia
Associate Professor of Mechanical and Aerospace Engineering
Research Interests:
Systems and control; decentralized/distributed algorithm design for multi-agent systems; cooperative navigation; sensor fusion; fault detection.

Robert Liebeck
Adjunct Professor of Mechanical and Aerospace Engineering
Research Interests:
Aerodynamics, hydrodynamics, and aircraft design.

Feng Liu
Professor of Mechanical and Aerospace Engineering
Research Interests:
Computational fluid dynamics, turbomachinery, propulsion.

Dimitri Papamoschou
Professor of Mechanical and Aerospace Engineering
Research Interests:
Aeroacoustics, compressible turbulence.
Aerospace Engineering - Faculty

William Sirignano  
Distinguished Professor of Mechanical and Aerospace Engineering  
Research Interests:  
Combustion theory, multiphase flows, turbulent reacting flows, computational methods. Rocket and jet propulsion, gas turbine and internal combustion engines.

Haithem Taha  
Associate Professor of Mechanical and Aerospace Engineering  
Research Interests:  
Geometric nonlinear control theory; unsteady aerodynamics and aeroelasticity; optimal control; flight dynamics and autopilot design.

Jacqueline Thomas  
Assistant Professor of Mechanical and Aerospace Engineering  
Research Interests:  
Design of aircraft systems and operations, aviation environmental impacts, aeroacoustics.
MAE Graduate Student Association

✓ Student-run organization with a focus on improving the academic lives of graduate students in the MAE department
✓ Enhance your educational experience through mentorship, outreach, and social activities.
✓ Provide guidance and support for your academic life
  ✓ Relationship with your PI
  ✓ Issues working as a TA or Grader
  ✓ Masters degree requirements/options, Preliminary exam, etc.
✓ Provide workshops and information sessions to prepare you for a career after graduation

@MAE.GSA

@UCIMAEGSA
MAE-GSA Officers

**President:** Maryam Asghari
**VP Internal:** Zahra Heydarzadeh
**VP External:** Shiva Farzinazar
**International Student Rep:** Kimia Montazeri
**Masters Student Rep:** Marzieh Ataei
**Outreach Coordinator:** Alejandra Hormaza

Are You Interested in Joining Us?
Email us: maegsa@uci.edu

**Available positions:** Secretary, Masters Student Rep, Treasurer, Web Master, Publicity, Faculty Ambassador,
HSSoE Graduate Affairs Office

204 Rockwell Engineering Center
(building #311)
http://www.eng.uci.edu/current/graduate
gradengr@uci.edu
Monday-Friday
9am-12pm; 1pm-4pm

Jean Bennett
Director
jean.bennett@uci.edu
Primarily works with
MSEM, M.Eng, and
Computational Science JDP

Dr. Fadi Kurdahi
Associate Dean

Mark Banderas
Graduate Counselor
mark.banderas@uci.edu
Primarily works with all MS
and PhD students

Revised 7/2020
FACULTY PROFILES
Ramin Bostanabad  
Assistant Professor  
09/2019-Present  

Education:  
• Ph.D. Northwestern, 2019  
• BSc. Tehran University, 2013  

Sample Research Projects  
• Deep Learning: Art + Engineering + Statistics  

Teaching  
• MAE 200A (Engineering Analysis), F19  
• MAE 295 (Engineering Design Under Uncertainty), S20, W21  
• MAE 150 (Mechanics of Materials), F20, S21  

Metamaterials Design: Mechanics + machine learning + topology optimization  

See https://pmacslab.eng.uci.edu/ for more and reach out if you are interested.
**Natascha Buswell**

Assistant Teaching Professor  
PhD, Engineering Education, Purdue University  
BS, Aerospace Engineering, Syracuse University  
Joined UCI in January 2018

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**Teaching:**

- **ENGR 290: Developing Teaching Excellence**
  - Features – student-led discussions, creating a statement of teaching philosophy, designing a course syllabus
- **MAE 189: MAE Projects, Large multi-level enrollment, various group sizes and projects**
  - Features – weekly check-in meetings, design documentation, design reviews
- **MAE 150: Mechanics of Materials, Large junior level core course**
  - Features – weekly reflections, peer-graded quizzes, application activities
  - Example of an application activity – model something in daily life as a beam

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**Research:**

I aim to understand the experiences of engineers and people in STEM (students, instructors, professionals) in academic and workplace contexts. I research the teaching experiences and methods of graduate students and faculty at a variety of institutional types, the writing processes of graduate students, and the identity formation of undergraduate students.

**Inclusive Excellence:**

I love supporting graduate students and colleagues with their teaching development plans, especially as they relate to inclusive teaching practices and ways of ensuring UCI is an equitable learning environment.

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**Personal:**

Hometown – Boulder, Colorado  
Interests – Reading, hiking, camping, visiting US National Parks, Quilting, and my dog, Kona

**Service:**

Undergraduate Studies Committee, Senior Design Task Force, ABET Evaluation Team Member, Engineering Faculty Learning Community facilitator
Jack Brouwer  
Associate Professor

Energy conversion device dynamics; coupled mass, energy and momentum conservation, chemical and electrochemical reaction and heat transfer; high temp. fuel cell and electrochemical device dynamics, renewable power dynamics

Undergraduate Courses: 
Fuel Cell Fundamentals (MAE114); Applied Engineering Thermodynamics (MAE115)

Undergraduate project supervision: 
• Solar Car  
• Advanced Energy Community

Graduate Courses: 
Fuel Cell Fundamentals and Technology (MAE214A); Fuel Cell Systems and Degradation (MAE214B); Radiation Heat Transfer (MAE 222)

Other:  
Regular Alternative Energy, Fuel Cell Seminar, and ICEPAG short course instructor

Joined Dept. — July 2011

RESEARCH TOPICS
• Electrochemical System Dynamics and Control  
• Cycle Conceptualization & Thermodynamic Analyses  
• Hybrid Fuel Cell Gas Turbine Systems  
• Built Environment Dynamics  
• Renewable Power Systems

RESEARCH CAPABILITIES
• State-of-the-Art High Temperature Electrochemical Measurements  
• Experimental Fuel Cell Systems Dev.  
• Multi-physics Modeling  
• Dynamic Simulation & Controls Dev.  
• Ceramic Fuel Cell Synthesis & Mfg.  
• Microstructural Characterization
Penghui Cao

group website: cao.eng.uci.edu

Assistant Professor
MAE@UCI
Jan. 2019 – present:
• Mechanical Behavior & Design Principles (UG)
• Material Failure & Fracture Mechanics (UG/G)
• Atomistic Theories (G)

Research: fundamental understanding of the mechanisms by which materials plastically deform and fail particularly in extreme environments.

Mechanics of Amorphous Solids

Mechanics of Heterogeneous Materials

Long Timescale Atomistic Simulation
### Undergraduate courses:
- Electric Circuits (MAE 60)
- Dynamics (MAE 80)
- Mechanical Systems Laboratory (MAE 106)
- Vibrations (MAE 147)
- Capstone Design (MAE 189)

### MAE Projects:

### Graduate courses:
- Convex Optimization

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**David Copp**

Assistant Professor of Teaching

Joined UCI - 2019

Dynamics, Controls, Robotics

Ph.D., UCSB
M.S., UCSB
B.S., Univ. of Arizona

Formerly Research Staff, Sandia Natl Labs

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**Teaching**

**Undergraduate courses:**
- Electric Circuits (MAE 60)
- Dynamics (MAE 80)
- Mechanical Systems Laboratory (MAE 106)
- Vibrations (MAE 147)
- Capstone Design (MAE 189)
- MAE Projects:

**Graduate courses:**
- Convex Optimization

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**Research**

**Optimal Control and Estimation** - biomedical, robotics, and aerospace applications

**Energy Systems** - analysis, optimization, stability, and control

**Engineering Education** - increasing participation and persistence of underrepresented students
Derek Dunn-Rankin
Professor Emeritus of Mechanical and Aerospace Engineering; Civil and Environmental Engineering; Environmental Health Sciences
Experimental research in fluid and thermal sciences, including combustion

Undergraduate Courses:
Air pollution, combustion, engineering design, engineering design in industry

Undergraduate project supervision:
Droplet evaporation in turbulence, Formula SAE, advanced combustion technology

Graduate Courses:
Thermodynamics, statistical thermodynamics, combustion, optical diagnostics

Some Research Directions:
Ballistic imaging holography
Combustion of fuel hydrates and other water-laden fuels
Electrical effects on combustion
Miniature engine performance

Web: lfa.eng.uci.edu
Donald Dabdub
Mechanical & Aerospace Engineering
Advanced Power and Energy Program

Research Interest:
Mathematical Modeling of Air Pollution

http://albeniz.eng.uci.edu/dabdub/

Using parallel computation to understand the dynamics of the troposphere

**Undergraduate Courses:**
Air pollution; Engineering computations; Machine Learning and Artificial Intelligence

**Undergraduate Supervision:**
Scientific computation: UNIX, FORTRAN; Web technology; Scientific Visualization

**Graduate Courses:**
Physics and chemistry of the atmosphere; Engineering analysis; Applied mathematics

**New Research Directions:**
- Alternative fuels (hydrogen, electric vehicles, biofuels) and their impacts on the troposphere
- Study of the role of NH$_3$ on the dynamics of SOA formation
Said Elghobashi
Distinguished Professor Emeritus
Numerical simulations of turbulent reacting and multiphase flows
Joined UCI - 1978

2D slice in a 3D turbulent flow laden with fully resolved particles (JFM 2010). Red zones indicate dissipation rate of turbulence kinetic energy.

Undergraduate Courses:
Computational Fluid Dynamics

Graduate Courses:
Fluid mechanics
Turbulence Theory
Numerical methods

http://mae2.eng.uci.edu/~selghoba/

- Direct numerical simulations (DNS) of turbulent reacting flows
- DNS of turbulent flows laden with particles, droplets or bubbles.
- DNS of the flow inside the human airway
Edwin A. Peraza Hernandez
Assistant Professor, University of California, Irvine

Contact: eperazah@uci.edu

• Ph.D., Aerospace Engineering, Texas A&M University, 2016
• B.S., Aerospace Engineering, Texas A&M University, 2012

morphing.eng.uci.edu
Morphing Structures Group

Instruction
• Fall: MAE 254, Mechanics of Solids and Structures
• Winter: MAE 157, Lightweight Structures
• Spring: MAE 148 and MAE 248, Mechanics of Smart Structures

u = x – X

Mechanics and Design of Deployable and Lightweight Structures

Mechanics and Design of Small-Scale Structures

Pop-up Origami Structures
Morphing Wings
Stackable Structures

Lattices with Custom Thermal Expansion

Unfolded model
Patterned film
Folded structure

Origami Microfabrication
Manuel Gamero-Castaño
Associate Professor

Research in electrospray atomization and technological applications such as electric micropropulsion for spacecraft, nanodroplet beams, and electrospray ionization.

Joined UCI – July 2007

Undergraduate Courses:
Electric Circuit and Interfaces (MAE180), Electric Propulsion (MAE113)

Undergraduate project supervision:
UCISat

Graduate Courses:
Statistical Thermodynamics (MAE216), Classical Thermodynamics (MAE217), Electric Propulsion (MAE213)

Current and Past Research

- Fundamental research on electrospray atomization
- Nanodroplet sputtering of inert materials
- Colloid thrusters for formation flying, NASA's ST7 and LISA missions
- Fundamental research on ion field evaporation, ion induced nucleation, etc.

Instruction

Other Areas for Future Research

- MEMS multiemitter electrospray source for colloid thrusters
- Focused nanodroplet beams for micromachining
- Optimal design of colloid thruster electrodes
- Study of shock-induced amorphization using nanoprojectiles

TEM of amorphous Si layer on single-crystal Si, produced by the impact of nanodroplets
Tryphon T. Georgiou
Distinguished Professor
Department of Mechanical & Aerospace Engineering

Teaching
Undergraduate course:
Control Systems MAE 170

Graduate courses:
Mathematical Analysis MAE 200A
Linear Control Systems MAE 270A
Robust Control MAE 272
Stochastic Control MAE 295
Network Control MAE 295
Estimation and Filtering MAE 278

Research and research interests:
Stochastic control and thermodynamics, Optimal mass transport, Quantum control

Education
Phd, Electrical Engineering
University of Florida, 1983

Diploma in Mechanical and Electrical Engineering
National Technical University of Athens, 1974

Recognition
IEEE Fellow, IFAC Fellow
Royal Swedish Academy of Eng. Sciences, (IVA)

UCIrvine
Faryar Jabbari
Professor and Associate Dean
Control Systems and Applications
Joined UCI: 1986

Research Areas:
- Robust Control
- Actuator Saturation
- Modeling/Control of fuel cells
- Smart BEV charging
- Multi-agent systems
- Structural systems

Active Collaborations:
- Zareian - CEE (earthquake engineering)
- Browuer (Fuel Cell Systems)

Undergraduate Courses:
- Dynamics (Intro)
- Mechanical Vibrations
- Engineering Analysis
- Engr. Design in Industry

Graduate Courses:
- Linear Systems A,B
- Nonlinear Feedback Systems
- System Identification
- Engineering Analysis

Diagram:
- Single-Cable Model
- Octopus Charger Model
- Grid Analysis with Updated Cost
Teaching:
→ Intro to Fluid Mechanics (MAE 130A)
→ Viscous Incompressible Flow (MAE 230B)
→ Fundamentals of Turbulence (MAE 231)
→ Turbulent Wall-Bounded Flows (MAE 295)

Research:
Physics & Simulation of Turbulence

Turbulence physics:
→ Multiscale interactions
→ Multiphase flows
→ Boundary layers

Turbulence simulation:
→ Large-eddy simulation
→ Subgrid modeling
→ Scientific computing

Perry Johnson
Assistant Professor

Turbulent atmospheric boundary layer flows over a wind farm (credit: Vattenfall)

Turbulent boundary layer and wake on a cone at Mach 4. (credit: Schneider 2004)

Turbulent oil spill (credit: US DoE)

Turbulent sneeze (credit: Bourouiba 2020)

\[
\frac{\partial u}{\partial t} + u \cdot \nabla u = -\frac{1}{\rho} \nabla p + \nu \nabla^2 u + f
\]
Teaching
Undergrad:
• Intro. to Control Systems (MAE170)
• Fundamentals of Navigation Systems (TBD)
Grad:
• Satellite-Based Navigation (MAE295)
• Advanced Detection & Estimation Theory (MAE295)

Research
• Cyber-physical systems (CPS)
• Autonomous vehicles: Aerial, Ground, Underwater
• Satellite-based navigation
• Intelligent transportation systems (ITS)
• Cognitive and software-defined radio (SDR)
• Sensor fusion

Autonomous Systems Perception, Intelligence, & Navigation Laboratory
http://aspin.eng.uci.edu

Zak Kassas
Assistant Professor
MAE & EECS (Joint Appointment), & ITS
Solmaz S. Kia  
Assistant Professor

Research Interest: Control system design and analysis, Networked systems, Robot motion planning, Filtering and probabilistic robotics

Ph.D., Mechanical and Aerospace Eng., UC Irvine  
M.Sc., Aerospace Eng. (Flight Dynamics), Sharif Univ. of Tech.  
B.S., Aerospace Eng., Sharif Univ. of Tech.

Undergraduate courses:  
Dynamics (MAE 80)

Graduate courses:  
Linear systems (MAE 270A)  
Optimal control (MAE 274)  
Nonlinear Optimization methods (MAE 206)

Selected Research Activities:  
- Cooperative Localization for Mobile Agents  
- Cognitive and Reflective Monitoring Systems for Urban

Distributed Optimal Decision Making  
Universal Navigation Solution Manager  
Particle Filter Navigation Software  
Location Referenced Maps, Environment Models, Images, Signal source & Algorithms For Integrity Monitoring Platform Models Databases  
Tracked Platforms

Cooperative Localization for Mobile Agents
Lawrence Kulinsky
Adjunct Professor


Joined UCI in 2005

https://faculty.sites.uci.edu/kulinsky

Instruction

Undergraduate courses:
Introduction to Engineering (ENGR 7A and 7B), Heat Transfer (MAE 120), Introduction to Viscous and Compressible Flows (MAE 130B), Theory of Machines and Mechanisms (MAE 145), Mechanics of Structures Lab (MAE 150L).

Graduate courses:
Fundamentals of Microfabrication (MAE 252), Advanced BioMEMs (MAE 253).

Research Interests

Most Recent Research
John LaRue  
Professor and Associate Dean, Undergraduate Student Affairs  

Experimental research in fluid and thermal sciences and MEMS  

Joined UCI – 1980  

**Undergraduate Courses:** Instruction  
Heat Transfer, Fluid Mechanics, Engineering Design, Aero Lab  

**Undergraduate project supervision:** Research  
SAE Cargo Airplane, Stirling Engine, PEM Fuel Cell, Solar Powered Car  

**Graduate Courses:**  
Fluid Mechanics and Turbulence  

**Some New Directions:**  
Turbulent Mixing as a function of multiple length scales  
Fundamental turbulence studies  
Fluid-structure interaction  
Particle motion in turbulent flows  
Electrically Conducting Polymers for use as structural elements in MEMS devices
Feng Liu
Professor
Ph.D. 1991, Princeton University
AIAA Fellow

Research Areas:
Fluid Dynamics, Aerodynamics,
Combustion, Turbomachinery, and Jet Propulsion

Graduate Teaching:
• Engineering Analysis (MAE200B)
• Compressible Fluid Dynamics (MAE230C)
• Non-equilibrium Gas Dynamics (MAE236)
• Computational Fluid Dynamics (MAE237)

Research Projects:
• Computational Fluid Dynamics
• Turbulent and Reactive Flows
• Vortex stability
• Flow control using plasma actuators
• Fluid-structure interactions
• Aerodynamic Design and Optimization
• Jet engine cycle innovation
• Jet noise prediction

Flutter of F16 with Store
Flow over NASA CRM Airplane Model
LES Simulation of Vortices over Delta Wing
Unsteady Flow Through NASA Rotor 35 Fan Stage
LES Simulation of Noise Emission from Supersonic Jet
Jaeho Lee
Assistant Professor
MAE, UCI since 2015

- Postdoc, Lawrence Berkeley Lab, 2015
- PhD, ME, Stanford University, 2012
- BS, ME, Georgia Tech, 2007

INSTRUCTION

Undergraduate Course
- Heat and Mass Transfer (MAE 120)

Graduate Courses
- Conduction Heat Transfer (MAE 220)
- Thermal Resistance Analysis in Microdevices and Nanomaterials (MAE 227)

Senior Design Project
- Wear A Thermoelectric Calorie Harvester (WATCH)

RESEARCH

My work targets use-inspired basic research in heat transfer and advances in both knowledge and technology (https://lee.eng.uci.edu/)

Bio-Inspired Thermoregulation?
3D-Manufactured Metamaterials?
Nanowire-Based Energy Harvesting?
Marc Madou
- Chancellor’s Professor
- NAI Fellow
- IIT Kharagpur, Honorary Distinguished Visiting Professor
- Tec de Monterrey, Mexico, Star Faculty
- Joined UCI 2002

Instruction:
- Undergraduate courses/supervision:
  - Advanced Manufacturing Choices (rapid Prototyping)
  - Carbon micro- and nanofabrication
  - Diagnostics on a CD
- Graduate courses:
  - Electrochemistry for Engineers
  - Fundamentals of Microfabrication
  - Fundamentals of BioMEMS
  - Advanced Manufacturing Choices (rapid Prototyping)

Research:
- Compact disc-based microfluidics
- Molecular diagnostics: sensors and systems
- Carbon Micro and Nanomachining (- C-MEMS and C-NEMS)
- Collaborators: Lund Sweden, IIT Kanpur, KIT Germany, IIT Kharagpur, UNIST South-Korea, ETH Lausanne and Tec de Monterrey in Mexico.
For $N=11$ coordinated angles this yields 70 equations in 70 unknowns. Bezout bound $d = 2^\text{70} = 1.18 \times 10^{21}$, the multi-homogeneous degree is $d = 264 \times 10^6$. 
Vincent McDonell
Adjunct Professor
Experimental Gas Turbine Combustion and Spray Science, Alternative Fuels, Fuel Interchangeability Laser Diagnostics
Joined UCI 1990, Adjunct since 2004

**Instruction:**
- Combustion and Fuel Cell Practical Systems (110)
- Design of Experiments (284)
- Advanced Combustion Systems (215)
- Engineering Design in Industry (188)
- Diagnostic Methods (295)

**Current Research Directions:**
- Atomization of Homogeneous & Heterogeneous Liquids
- Combustion Characteristics of Alternative Gas and Liquid Fuels
- Interaction of Alternative Liquid Fuels and Materials
- Fuel Interchangeability Criteria
- Distributed Energy Systems
- Active Combustion Control/Smart Burners
- Optical Diagnostics
Bihter Padak
Assistant Professor, Mechanical and Aerospace Engineering
Associate Director, UCI Combustion Laboratory
Advanced Power & Energy Program

Research interests:
• Combustion
• Emission controls
• Reaction Kinetics
• Molecular Modeling

Instruction:
Combustion, Heat Transfer, Design
Dimitri Papamoschou

Research

• Jet and fan aeroacoustics
• Aeroacoustics of propulsion-airframe integration
• Jet noise reduction
• Advanced microphone phased array techniques
• Compressible turbulence

Graduate teaching

• MAE 200B - Partial Differential Equations
• MAE 230C - Compressible Fluid Dynamics
• MAE 233 – Shear Flow Turbulence
Roger H. Rangel
Professor

Fluid mechanics and heat transfer of dispersed multiphase systems, including droplets and sprays; atomization; particle interaction in viscous and viscoelastic fluids; mixing in microdevices.

Joined UCI – Aug 1985

INSTRUCTION

Undergraduate Courses:
- Introduction to Thermodynamics (MAE91), Introduction to Fluid Mechanics (MAE130A)

Undergraduate project supervision:
- none

Graduate Courses:
- Viscous Incompressible Fluid Mechanics (MAE230B)

Other:
- Balsells Fellowship Coordinator

PAST RESEARCH

Metal drop solidification

Droplet Radiation Absorption

CURRENT AND FUTURE RESEARCH

Particle Deformation and Breakup

Mixing in Microdevices
Current and past research:
Robot-assisted movement training after stroke and spinal cord injury
Human motor learning

Instruction:

Undergraduate Courses:
Mechanical system laboratory; Sensory Motor Systems

Undergraduate Project Supervision:
Rehabilitation Robotics

Graduate Courses:
Biorobotics, Sensory Motor Systems

New research directions
Wearable devices for monitoring stroke recovery
Neural models of brain recovery
Robot-assisted wheelchair driver training
Motor learning in golf and dance
Combining rehabilitation with neuroregeneration
Web: biorobotics.eng.uci.edu
**Tim Rupert**
Associate Professor
(Joined UCI in 2011)

**Research Interests:**
Solid mechanics and materials science of nanomaterials; designing the internal structure of materials

Website: rupert.eng.uci.edu

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**Research**

**Vision:**
Enable next-generation technologies by understanding novel structure-property scaling laws and structural stability of nanomaterials.

**Current Projects:**
- Development of bulk nanostructured materials with optimal combinations of properties
- Engineering grain boundary chemistry and network connectivity
- Connecting atomistic modeling to experimental techniques
- Unique techniques for characterizing materials and measuring important properties

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**Teaching**

**Undergraduate:**
- Lightweight Structures (MAE 157) - Winter

**Graduate:**
- Mechanical Behavior of Solids: Atomistic Theories (MAE 259) - Fall
- Nanomechanics (MAE 295) - Spring
Scott Samuelsen
Director, Advanced Power and Energy Program
Research Professor
Mechanical, Aerospace, and Environmental Engineering

Joined UCI: July 1970
Andrei Shkel
Professor
Diploma (Hons), Moscow State University, Russia, 1991
PhD, UW-Madison, 1997
Postdoc, Berkeley, 1997-1999
Joined UCI – January 2000

Undergraduate Courses:
Vibrations (MAE 147)

Graduate Courses:
Micro-Systems Design (MAE247)
Micro-sensors and Actuators (MAE 249)
Inertial Navigation (MAE 248)

Instruction

Research

- MicroSystems, MEMS
- Gyroscopes
- Inertial Navigation
- Vestibular Prosthetics

MicroSystems Laboratory
http://mems.eng.uci.edu
Athanasios Sideris
Professor

Robust Control Design,
Optimal Control, Neural
Networks and Statistical
Learning Algorithms.

Joined UCI – January 1992

Undergraduate Courses:
Introduction to Control Systems (MAE170)
Digital Control Systems (MAE171)

Graduate Courses:
Linear System Theory (MAE 270A)
Optimization Methods (MAE206)
Robust Control (MAE 272)
Neural Control (MAE277)

INSTRUCTION

CURENT RESEARCH PROJECTS

MULTIRATE CONTROLLER DESIGN

NUMERICAL OPTIMAL CONTROL ALGORITHMS

\[
\min_{x, y} \sum_{n} J(x(n), y(n), n)
\]

subject to:
\[
\begin{align*}
x(n+1) &= f(x(n)) + B(s)u(n), \\
x(0) &= x_0, \\
C(l)x(l) + D(l)u(l) + r(l) &= 0, \\
G(k)x(k) + H(k) &= 0,
\end{align*}
\]

LEARNING OPTIMAL CONTROL

Performance Objectives
Optimal Control
Plant

Control
Output

Adaptation & Learning

feedback
William A. Sirignano
Distinguished Professor of Mechanical and Aerospace Engineering
Theory / Computation for Combustion, Fluid Dynamics, and Jet Propulsion
Princeton 1964-1979
Carnegie-Mellon 1979-84
UCI 1985 - present

Undergraduate Courses:
Propulsion, Astronautics, Engineering Analysis

Graduate Courses:
Incompressible Fluid Dynamics, Viscous Fluid Dynamics, Nonequilibrium Gasdynamics, Combustion, Engineering Analysis, Perturbation Methods, Turbulence, Theoretical Foundations of Fluid Mechanics

http://mae.eng.uci.edu/Faculty/WAS/index.html
Lorenzo Valdevit
Professor, Materials Science and Eng.
Professor, Mechanical and Aeros. Eng.
Director, Institute for Design and Manufacturing Innovation (IDMI)
(Joined UCI in 2007)
http://valdevit.eng.uci.edu

Research Interests:
- Nanoarchitected materials
- Mechanical metamaterials
- Additive Manufacturing
- Mechanics of Materials
- Materials Processing and Characterization

Teaching

Undergraduate:
- MSE190 – Materials Selection and Design (S21)

Graduate:
- MSE265 – Phase Transformations (W21)

Past teaching:
- MAE295 – Architected Materials
- MAE155/255 – Composite Materials
- MAE254 – Continuum Mechanics
- MAE258 – Mech. Behavior: Continuum Theories
- MAE150 – Mechanics of Structures
- MAE157 – Lightweight Structures

Research

- Optimal design of multifunctional architected materials
- Processing of ceramic micro- & nano-architected materials by Direct Laser Writing and Direct Ink Writing
- Shell and plate-based metamaterials
- Laser Powder Bed Fusion
- Micro/nanoscale mechanical testing and microstructural characterization
- Cold Spray
Undergraduate Courses:
- Dynamics & Control of Aerospace Vehicles (MAE 175)

Graduate Courses:
- Geometric Nonlinear Control (MAE 276)
- Dynamics (MAE 241)
- Unsteady Aerodynamics (MAE 295)

Flapping MAV:
Design, build and fly of a flapping micro-air-vehicle

LIBRA
Design of an unconventional flight control system for operation near stall.

Geometric Nonlinear Control
- Nonlinear Controllability
  \[ \dot{x} = f(x) + \sum_{j=1}^{m} g_j(x)u_j \]
- Lie bracket
  \[ \text{Lie}^{m}\{f, g_1, \ldots, g_m\} = \{[f, g_1], \ldots \} \]

Unsteady Nonlinear Aerodynamics
- Vibrational Control
  \[ M\ddot{q} + C(q, \dot{q}) = \sum_{j=1}^{m} Y_j(q)U_j \omega \cos \omega t \]
Jacqueline Thomas
Design of aircraft systems and operations, aviation environmental impacts, aeroacoustics. Joined UCI Faculty 2020

Instruction
Undergraduate courses:
Airplane Performance (MAE 158), Design Build Fly (MAE 189)

Past Research
Noise abatement flight procedure design and analysis, development of systems framework consisting of flight dynamics and noise source models to determine community noise impacts of aircraft.

Current Research
Application of systems-based noise analysis to the design of delayed deceleration approaches, validation of noise models. Design and environmental analysis of future aircraft concepts.
Alexandra (Sasha) Voloshina
Assistant Professor
- BSE, U. of Michigan, 2007
- MS, U. of Michigan, 2010
- MSE, U. of Michigan, 2013
- PhD, U. of Michigan, 2015
- Postdoc, Tech. University of Darmstadt, 2015-2017
- Postdoc, Stanford, 2017-2020

Undergraduate Courses:
- Vibrations (MAE 147)

Graduate Courses:
- Design for Human Movement (MAE 295)

Instruction

Research

Wearable robotics

Gait augmentation and rehabilitation

Locomotion control and mechanics

Robotic emulator system

Assistive exoskeletons

Active prostheses

Gait on variable surfaces
Mark Walter
Professor of Teaching, Co-Director Center for Experiential Learning
• Research and Development for a more Energy Efficient and Sustainable Future

Teaching:
Undergraduate Courses:
Mechanics of Structures, Lightweight Structures, Intro to Controls, Intro to Eng. Computations, Building Science for Mechanical Engineers
Undergraduate Project Supervision:
Plant-Based Greywater Recycling, Dripless Faucet Aerator, Co-Director MAE Senior Design Projects Program
Graduate Courses:
Fracture and Failure, Experimental Mechanics

Past Research:
• Reliability and Durability of SOFC Electrolytes and Seals
• Thermal Barrier Coatings
• Carbon Fiber Composites

Current Research:
• Ground-Coupled Heat Loss
• Model Predictive Ventilation Conditioning

Future Directions:
• Software Defined Buildings
• Reliability and Durability of Building Components

Joined UCI - 2015
Yun Wang
Professor
Joined UCI-2006

- Ph.D Mechanical Engineering, Penn State University, 2006
- M.S. Mechanical and Engineering Science, Peking University, 2001
- B.S. Mechanical and Engineering Science, Peking University, 1998

**Undergraduate courses:**
Thermo-Fluid Laboratory (MAE107)
Solar and Renewables (MAE117)

**Undergraduate project supervision:**
Fuel cell drone, Solar airplane

**Graduate courses:**
PEM fuel cell (MAE214C), Advanced mass transfer (MAE224)

**Web:** [http://ywang.eng.uci.edu](http://ywang.eng.uci.edu)

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**Research**

Some new directions:
- Machine learning of fuel cells;
- Electrolzyer and fuel cell modeling;
- Two-phase flow in channel/porous media;
- Molecular Dynamics (MD) of transport;

**Instruction**

PEM fuel cell
Prof. Yoonjin Won

UCI mechanical engineer sees tiny solution to big problem

"If there's power, there's heat, which causes a performance problem. In 2013, as an assistant professor in UCI's Department of Mechanical & Aerospace Engineering, I was appointed in the Department of Chemical Engineering & Materials Science, which was a great opportunity to develop new materials for cooling high-performance electronics."

"Air cooling is the prevalent technology in electronics now," she says, "but what if we could put it in the structures of computer components? The research we do is to make these microfluidics work, which bear a resemblance to the structures in nature to improve the cooling of high-powered electronics devices."

"Don't you think it's cool to build materials that can improve our daily electronic devices?"

Water Energy Harvesting

Chip Cooling

Material Development

Nanoscale Multiphase Heat Transfer

Phase Change Physics

Electronics Packaging

Mr. Vinnyson Won

won.eng.uci.edu / won@uci.edu
MAE Adjunct Faculty

R.H. Liebeck
Boeing

V.G. McDonell
ERC

L. Muzio
FERCo

Nina Robson

Lawrence Kulinsky

Mircea Gradu

MAE Active Emeritus Faculty

G.S. Samuelsen

John LaRue

Jim Bobrow

Ken Mease

Said Elghobashi

Derek Dunn-Rankin
MAE Joint Appointees

- Arash Kheradvar BME
- Mohammad Al Faruque EECS
- Iryna Zenyuk CBE
- Joyce Keyak Medicine
- Aparna Chandramowlishwaran EECS
- Tim Rupert MSE
- Abe Lee BME
- Vasan Venugopalan ChEMS
- Lorenzo Valdevit MSE