# Introduction to the Department of Mechanical and Aerospace Engineering

# Outline of this Orientation

- Introduction to MAE
- General advice for new graduate students
- MAE Graduate Program logistics, points of contact and resources
- MAE areas of research
- MAE Graduate Student Association
- Graduate and Professional Studies Office (SoE)
- Q&A

**Roger Rangel**
Department Chair and Professor of Mechanical and Aerospace Engineering

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

**Manuel Gamero-Castaño**
Graduate Advisor and Professor of Mechanical and Aerospace Engineering

**Research Interests**:
Spacecraft propulsion, electrospraying, electrohydrodynamics and atomization

# 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

| Department History | Student Population and Degrees Offered | Research | Faculty and Recognition | Affiliated Centers |
|---|---|---|---|---|
| **1983**<br>Department of Mechanical Engineering founded<br><br>**1990**<br>Department expands to include Aerospace Engineering | **1223**<br>Undergrads<br><br>**177**<br>Graduate Students<br><br>Degree offered:<br>• Master of Science (M.S.)<br>• Doctor of Philosophy (Ph.D.)<br>• Master of Engineering (M.Eng.) | **$ 11.2 M** Research Expenditures<br><br>**5** Research Thrusts<br>• Dynamics and Controls<br>• Fluid Dynamics and Propulsion<br>• Thermal and Transport Sciences<br>• Mechanics of Materials and Structures<br>• Systems Engineering and Design | **30** Full-time faculty<br>**15** Emeritus and Adjuncts appointees<br><br>Honors:<br>**3** National Academy of Engineering<br>**2** Fellows AAAS<br>**4** Fellows ASME<br>**4** Fellows AIAA<br>**2** Fellows IEEE<br>**2** Fellow APS<br>**1** Mexican Academy of Science Foreign Member<br>**1** Swedish National Academy of Engineering Foreign Member<br>**1** Office of Naval Research Young Investigator Award<br>**7** NSF Career Awards<br>**1** National Academy of Inventors<br>**5** Distinguished Professors<br>**1** Chancellor's Professor | **7** World-Class Center and Institute Affiliations<br>• Advanced Power and Energy Program (APEP)<br>• UCI Combustion Laboratory<br>• Integrated Nanosystems Research Facility (INRF)<br>• National Fuel Cell Research Center (NFCRC)<br>• UCI Irvine Materials Research Institute (IMRI)<br>• Center for Complex and Active Materials (CCAM)<br>• Beckman Laser Institute |

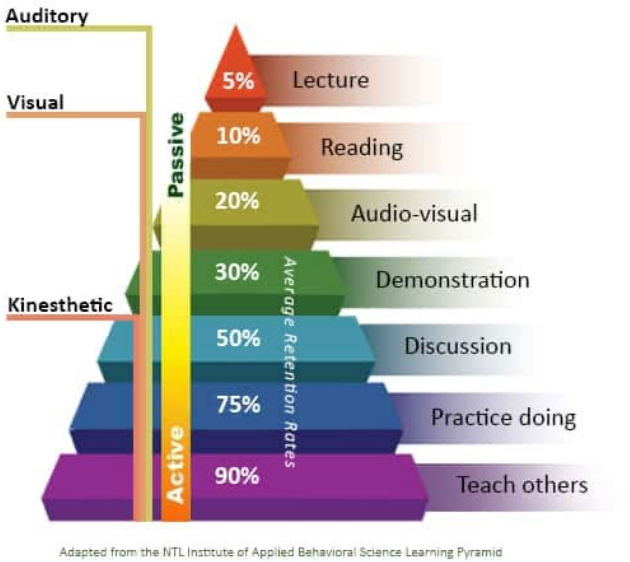
# Goals, Expectation and Advice for Graduate Students

- Make academics your first 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
- Develop excellent writing and presentation skills
- **Understand and Follow Degree Requirements**
  - Consult https://engineering.uci.edu/dept/mae/graduate

# Some Differences Between Graduate and Undergraduate Studies

- Research and Teaching
  - Participate in creating new knowledge, i.e. research
  - Work individually with faculty research advisor
  - Significant independent research
  - Opportunities to participate in teaching of undergraduate courses (TA) and mentoring of undergraduate research

- 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



Adapted from the NTL Institute of Applied Behavioral Science Learning Pyramid

# MAE Department Seminars (MAE 298)

**Why we want you to attend:**

Exposure to leading researchers, what they are doing, how they are doing it

**What is your role?**

Try to learn. Develop researcher mentality. What is the research problem? Why is it important? What methods are used to solve the problem? What is novel about the work? What are the most significant results and what is the next step?

How does the speaker present the work? What would you do the same? What would you do differently?

**Help us create a positive impression on influential seminar guests.**

Seminar etiquette

Be the audience member you would like to have at a seminar you give. Be attentive. Think of a question and ask it. Don't talk, text, check email, facebook, etc.


**Alexandra Voloshina**
Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests**:
Rehabilitation robotics, prosthetics, exoskeletons, locomotion biomechanics.

**Jacqueline Huynh**
Assistant Professor of Mechanical and Aerospace Engineering

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

# Graduate Program Logistics

## PEOPLE

**Prof. Manuel Gamero**
Graduate Studies Advisor

**Tenley Dunn**
Graduate Coordinator

**Mark Banderas**
Graduate Counselor, Graduate and Professional Studies , HSSoE

## RESOURCES

https://engineering.uci.edu/dept/mae/graduate

- 90% of your questions will be answered here

**Your faculty advisor**

- Course selection, timelines, focus area

**Graduate Coordinator**: Ms. Tenley Dunn
tdunn@uci.edu

- All forms and formalities

**Graduate Advisor**: Prof. Manuel Gamero,
mgameroc@uci.edu

- Questions that have not been answered

# Understand and Follow Degree Requirements

- Consult https://engineering.uci.edu/dept/mae/graduate
- Master of Science Degree Requirements

  MS Plan of Study Form is due during the first Quarter of your MS program

UCI Samueli School of Engineering — DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

**MASTER OF SCIENCE PLAN OF STUDY – THESIS OPTION**

| Last Name: | First Name: | Student ID# |
|---|---|---|
| Email: | Major area of study: | |
| Faculty advisor name: | | |
| M.S. degree requirements to be completed by: | | |

THESIS OPTION minimum requirements:

- Eight (8) technical or science, non-research, graduate courses, as specified in the table below. At least four (4) of these courses must be from the MAE Department.
- Three (3) seminar units (MAE 298)
- Twelve (12) units of M.S. Thesis Research (MAE 296)

| Applied Math Courses | | | | | Requirements |
|---|---|---|---|---|---|
| Dept | Course | Units | Qtr/Yr | Grade | At least one (1) course from the approved Applied Math area is required. |
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| **Courses Related to Major Area** | | | | | At least three (3) courses from the approved list of courses in one of the five MAE Major Areas are required. |
| Dept | Course | Units | Qtr/Yr | Grade | |
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| **Additional Courses** | | | | | Additional technical or science, non-research, graduate courses to bring the total number of such courses to at least eight (8). The approval of the Graduate Advisor is required for courses outside the MAE Department. |
| Dept | Course | Units | Qtr/Yr | Grade | |
| | | | | | With the approval of the Graduate Advisor, one upper division technical undergraduate course in MAE may be used to replace one of the additional courses; this substitution cannot be a core (required) course for the equivalent UCI program that the student received his/her undergraduate degree |
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| **Research and Seminar Units** | | | | | MAE 296: 12 units are required |
| Dept | Course | Units | Qtr/Yr | Grade | MAE 298: 3 units are required |
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| TOTALS: | | | | | |

**LIST OF APPROVED COURSES FOR THE M.S. DEGREE**

The courses below satisfy the requirement for the "Courses Related to Major Area" in the M.S. Plan of Study

| Major Area | Approved Courses |
|---|---|
| Applied Math | MAE 200A* Engineering Analysis I<br>MAE 200B* Engineering Analysis II<br>With the approval of the Graduate Advisor, a graduate-level math course offered by another engineering or science department at UCI |
| Dynamics and Controls | MAE 206* Nonlinear Optimization Methods<br>MAE 241* Dynamics<br>MAE 270A* Linear Systems I |
| Fluid Dynamics and Propulsion | MAE 230A* Inviscid Incompressible Fluid Mechanics I<br>MAE 230B* Viscous Incompressible Fluid Dynamics II<br>MAE 230C* Compressible Fluid Dynamics<br>MAE 230D Theoretical Foundations of Fluid Mechanics<br>MAE 231 Fundamentals of Turbulence<br>MAE 233 Turbulent Free Shear Flows |
| Solid Mechanics | MAE 248 Mechanics of Smart Structures<br>MAE 254* Mechanics of Solids and Structures<br>MAE 255 Composite Materials and Structures<br>MAE 256 Nanomechanics<br>MAE 258* Mechanical Behavior of Solids - Continuum Theories<br>MAE 259* Mechanical Behavior of Solids - Atomistic Theories |
| Systems and Design | MAE 242 Robotics<br>MAE 244 Theoretical Kinematics<br>MAE 245 Spatial Mechanism Design<br>MAE 247 Micro-System Design<br>MAE 249 Micro-Sensors and Actuators<br>MAE 250 Biorobotics<br>MAE 253 BioMEMS<br>MAE 279 Special Topics in Mechanical Systems |
| Thermal and Transport Sciences | MAE 212 Engineering Electrochemistry: Fundamentals & Applications<br>MAE 216* Statistical Thermodynamics |

# Understand and Follow Degree Requirements

- Ph.D. Degree Requirements
  - **Converge on your faculty advisor as soon as possible**, define your research topic. Students admitted without a nominal advisor must have an advisor on record by the end of the Winter quarter of the first year
  - **PhD Course Requirement I**: PhD students must have taken a course load equivalent to our MS. If the student does not already have an MS, this means that s/he will have to fulfill our MS requirements and obtain the MS degree enroute to the PhD. Check admission letter.
  - **PhD Course Requirement II**: 3 “advanced” graduate courses in addition to MS course requirement
  - **Preliminary Exam**: establishes whether the Ph.D. Candidate has command of specified fundamental material in Applied Mathematics and one of five Topic Areas of mechanical and aerospace engineering. Students that come with an MS must take the Prelim in Fall of the second year. Students that must obtain an MS in enroute to PhD take it in Spring of the second year. The student has two chances to pass the Prelim
  - **Qualifying Examination**:  the last step towards your Advancement to Candidacy in the doctoral program. The Qualifying Examination, and subsequent Advancement to Candidacy, are expected to occur in the third year (second year for students who entered with a master’s degree) of your graduate enrollment.

# Main Disciplinary Areas

https://engineering.uci.edu/dept/mae/research

- Dynamics and Controls

Athanasios Sideris

- Fluid Dynamics and Propulsion

Feng Liu

- Mechanics of Materials and Structures

Mark Walter

- Systems and Design

J. Michael McCarthy

- Thermal and Transport Sciences

Jaeho Lee

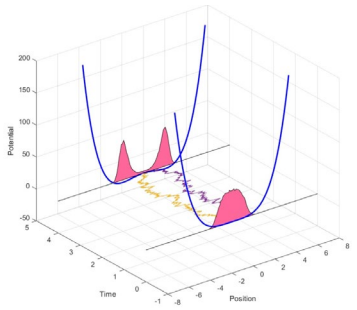
- Aerospace Engineering

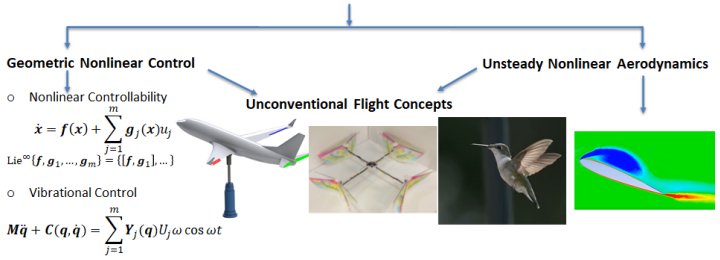
Dimitri Papamoschou

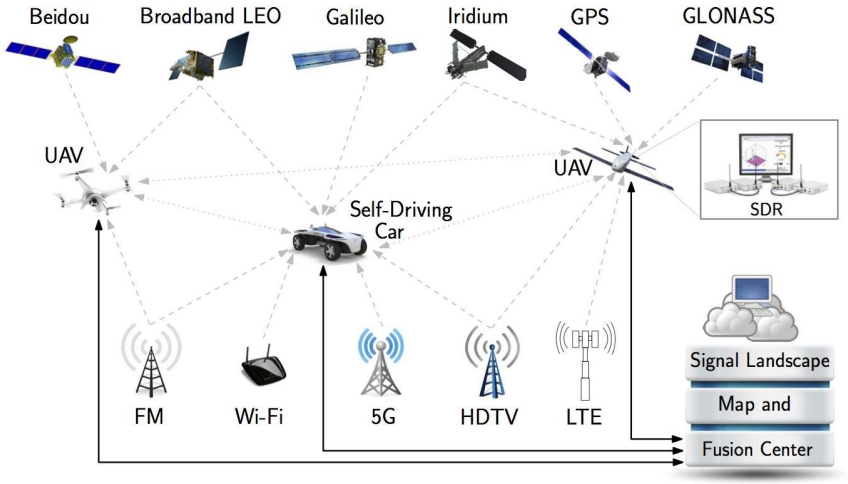
# Dynamics and Controls - Research

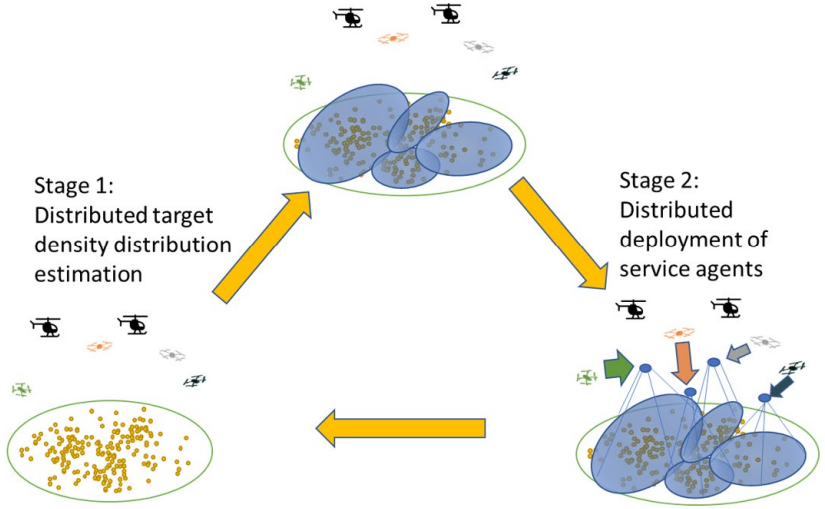
## Areas of Interest

- 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.

**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

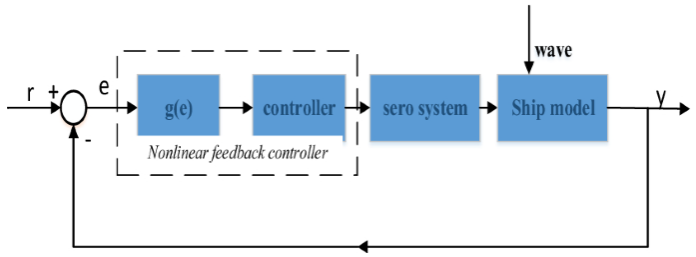
**Research Interests**:. Machine learning, Neural network control, Robust control

**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.

# Dynamics and Controls - Courses




ENGRMAE 275. Nonlinear Feedback Systems. 4 Units.

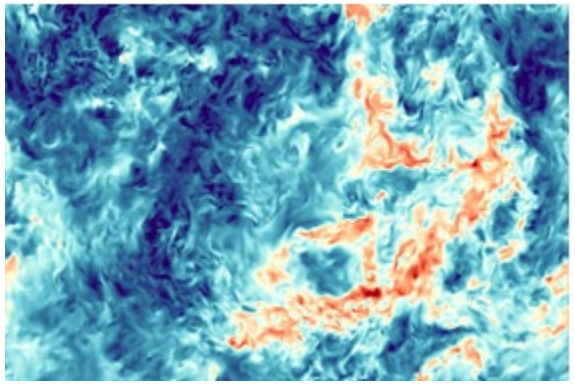
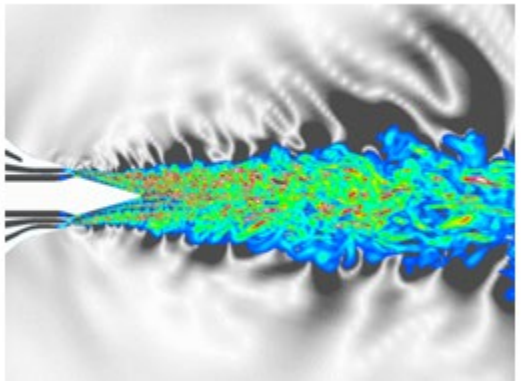
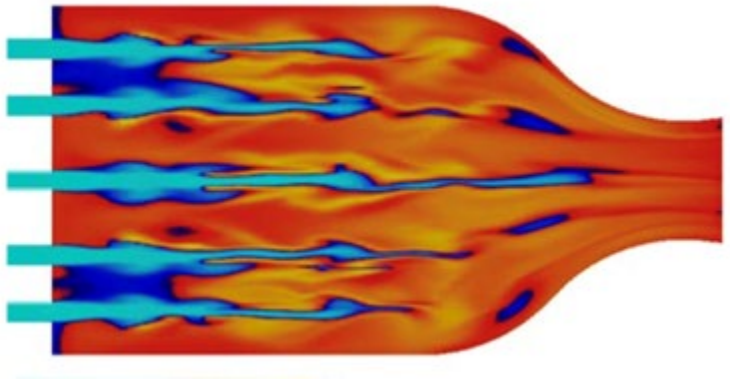
Advanced tools for feedback control system analysis and synthesis. Norms, operators, Lp spaces, contraction mapping theorem, Lyapunov techniques along with their extensions. Circle criterion positivity and passivity. Applications to nonlinear control methods, such as sliding mode or adaptive techniques.

Prerequisite: ENGRMAE 270B

Restriction: Graduate students only.

- MAE206 Nonlinear Optimization Methods
- MAE241 Dynamics
- MAE270A Linear Systems I
- MAE 239 Dynamics of Unsteady Flow
- MAE 270B Linear Systems II
- MAE 272 Robust Control
- MAE 273 Robot Control
- MAE 274 Optimal Control
- MAE 275 Nonlinear Feedback
- MAE 276 Geometric Nonlinear Control
- MAE 277 Learning Control Systems
- MAE 278 Estimation/Filtering
- MAE 295 Inertial Navigation
- MAE 295 Networks & Control
- MAE 295 Stochastic Control
- MAE 295 Satellite Systems

# 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**

Professor of Mechanical and Aerospace Engineering

**Research Interests:**

Electric propulsion, colloidal thrusters, electrosprays.

**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.

# Fluid Dynamics and Propulsion - Faculty

**Dimitri Papamoschou**

Professor of Mechanical and Aerospace Engineering

**Research Interests**:

Aeroacoustics, compressible turbulence.

**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 Huynh**

Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests**:

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

# Fluid Dynamics and Propulsion - Courses

ENGRMAE 231.Fundamentals of Turbulence. 4 Units.

Phenomenon of turbulence. Reynolds equations. Dynamics of turbulence. Free turbulent shear flows. Wall-bounded turbulent shear flows. Turbulent transport of scalar quantities. Spectral dynamics. Mathematical models of turbulence.

Prerequisite: ENGRMAE 230A and ENGRMAE 230B

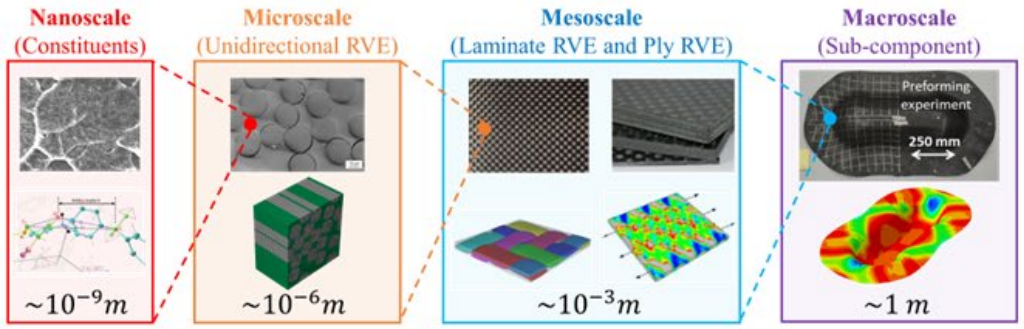
Restriction: Graduate students only.

- 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

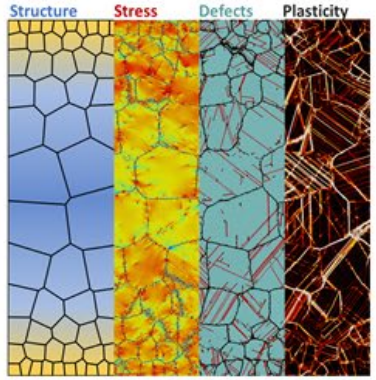
# Mechanics of Materials and Structures - Research

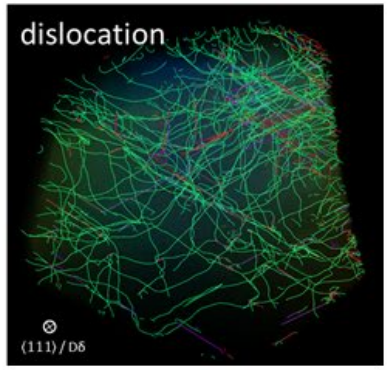
## Areas of Interest:

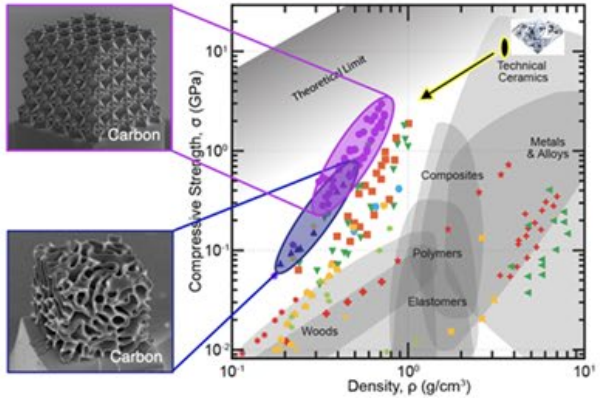
- Computational mechanics
- Advanced manufacturing
- Machine learning
- Multiscale materials modeling
- Deformation and failure
- Low-dimensional materials



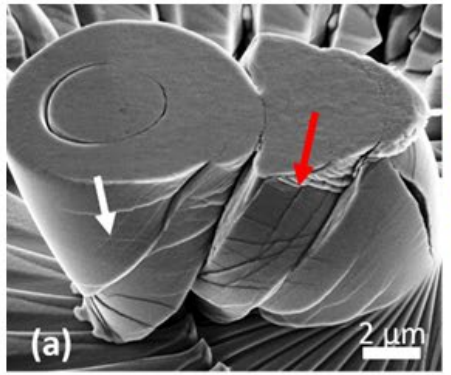

**Multiscale Materials Modeling:** Uncertainty quantification, Deep learning, …

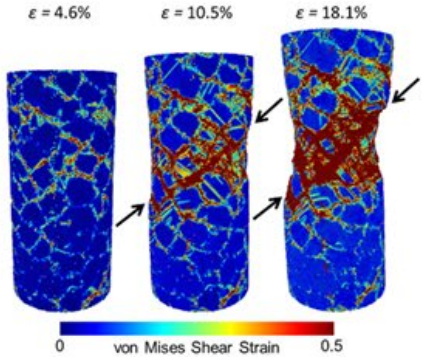






# Mechanics of Materials and Structures - Faculty

**Ramin Bostanabad**

Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests:** Design under uncertainty, probabilistic machine learning, materials informatics, multiscale modeling, computational microstructure characterization, topology optimization.

**Penghui Cao**

Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests:** Fundamental understanding of the mechanisms by which materials plasticity deform and fail, particularly in extreme environments.

**SungWoo Nam**

Associate Professor of Mechanical and Aerospace Engineering

**Research Interests:** Materials, mechanics and multifunctionality; understanding mechanically coupled properties in low-dimensional materials; building devices based on advanced materials

**Julián Rimoli**

Professor of Mechanical and Aerospace Engineering

**Research Interests:** Computational solid mechanics, aerospace structures, multiscale modeling.

**Tim Rupert**

Professor in Materials Science and Engineering

Professor (Joint Appt.) in Mechanical and Aerospace Engineering

**Research Interests:** Nanoscale Mechanics and 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)

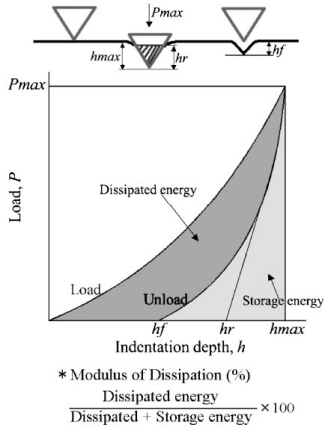
**Research Interests:** Optimal design, fabrication and experimental characterization of micro-architected materials

**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



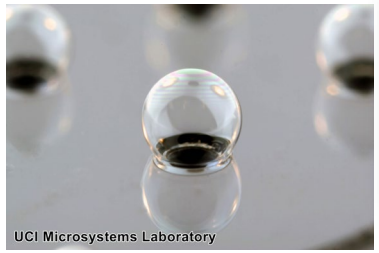

ENGRMAE 256. Nanomechanics. 4 Units.

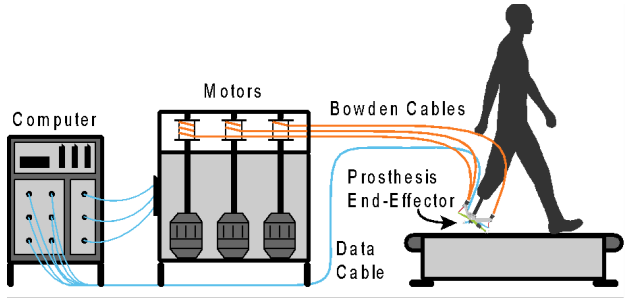
Nanoscale materials and the experimental and computational techniques used to measure their properties. Mechanical behavior is the main focus, but other material properties such as diffusion and electron transport are discussed.

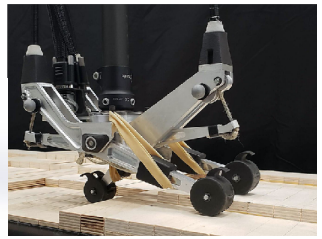
Restriction: Graduate students only.

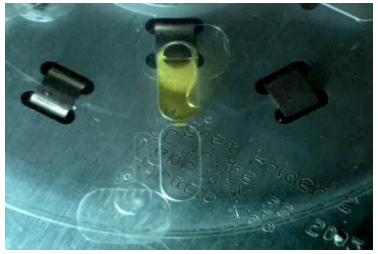
- MAE 207 Advanced Finite Elements
- MAE 248 Mechanics of Smart Structures
- MAE 254 Mechanics of Solids and Structures (Continuum Mechanics)
- MAE 255 Composite Materials and Structures
- MAE 256 Nanomechanics
- MAE 258 Mechanical Behavior of Solids - Continuum Theories (Materials Modeling)
- MAE 259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

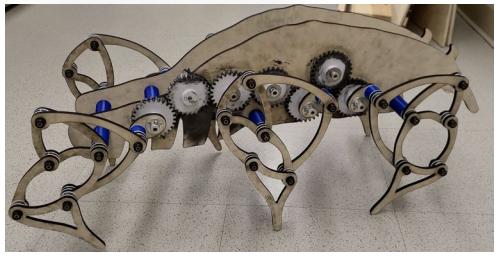
# Systems and Design - Research

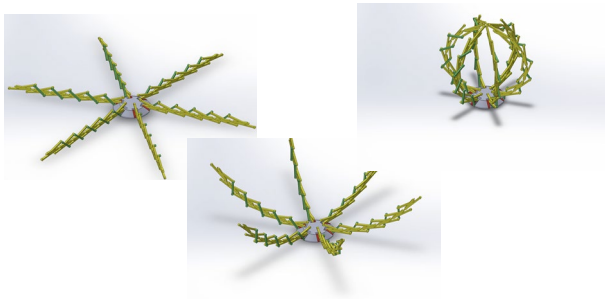








## Areas of Interest

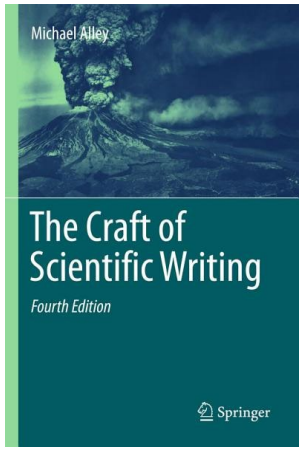
- Design and control of MEMS
- Machine information systems integration
- Computer Aided Design
- Robotics including microrobotics
- Biomechanics
- Carbon- and Magnetic MEMS
- CD-Based Fluidics
- Rehabilitation, prosthetics and exoskeletons
- Kinematics of spatial motion
- Design of Mechanical Systems

# Systems and Design - Faculty

**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.




Natasha Buswell
MAE 295 Academic Writing in Engineering

**Donald Dabdub**

Professor Emeritus of Mechanical and Aerospace Engineering; Civil and Environmental 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**

Distinguished Professor Emeritus 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.

**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.

# Systems and Design - Faculty

**Nina Robson**

Associate Adjunct Professor of Mechanical and Aerospace Engineering

**Research Interests:** Kinematics, mechanical systems design, robotics, biomechanics.

**Andrei Shkel**

Professor of Mechanical and Aerospace Engineering; Biomedical Engineering; Electrical Engineering and Computer Science

**Research Interests**: Design and advanced control of (MEMS); High-precision micro-machined gyroscopes; MEMS-enhanced optical systems; Electro-mechanical and machine-information systems integration.

**Jacqueline Huynh**

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

**Research Interests**: Magnetic,microsystems & Microrobotics. Emphasis on Advanced manufacturing of magnetic materials, biohybrid–powered microrobots, and microrobot swarms.

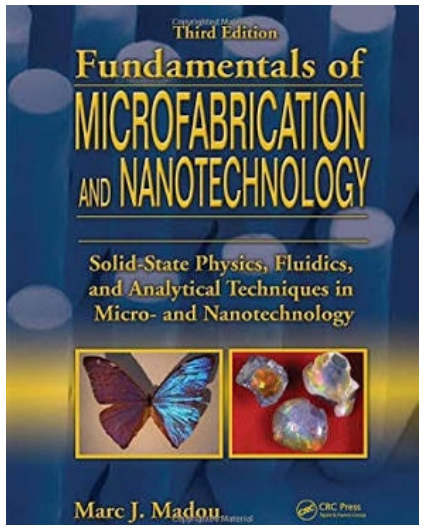
**Alexandra Voloshina**

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



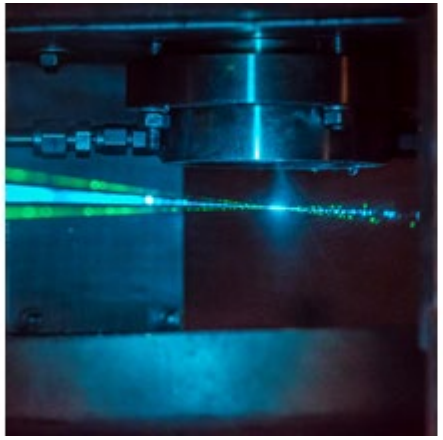

ENGRMAE 252. Fundamentals of Microfabrication. 4 Units.

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.

- MAE 242 Robotics
- MAE 244 Theoretical Kinematics
- MAE 245 Spatial Mechanism Design
- MAE 212 Electrochemistry for Engineers
- MAE 247 Micro-System Design
- MAE 249 Micro-Sensors and Actuators
- MAE 250 Bio-Robotics
- MAE 252 Fundamentals of Microfabrication
- MAE 253 BIOMEMS
- MAE 286 Design for Human Movement
- MAE 282 Computational Methods in Design
- Engr 265 Advanced Manufacturing Choices
- MAE 279 Special Topics in Mechanical Systems
- ENGR 290 Developing Teaching Excellence
- MAE 295 Academic Writing in Engineering

# 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**
Associate 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.

**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.

**Yun Wang**
Professor of Mechanical and Aerospace Engineering

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

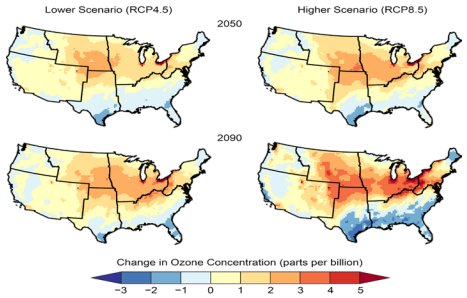
**Yoonjin Won**
Associate Professor of Mechanical and Aerospace Engineering

**Research Interests**:
Multi-scale structures for thermal and energy applications, in particular fabrication, characterization, and integration of structured materials.

**Xian Shi**
Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests**:
Energy conversion and propulsion, high-speed reacting flows, detonation and shock, chemical kinetics, renewable fuels, carbon materials, nanoparticle synthesis and dynamics

# Thermal and Transport Sciences - Courses




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

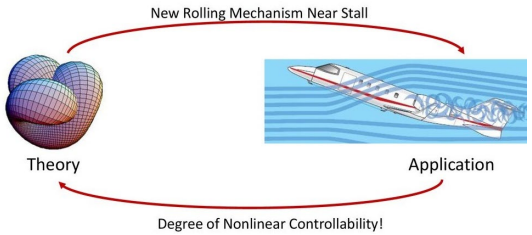
Current issues related to the atmosphere, climate, and air quality in the context of energy conversion and sustainability. Topics include transportation systems; building design; impacts on humans and ecosystems; modeling and meteorology; economics; and application to public policies.

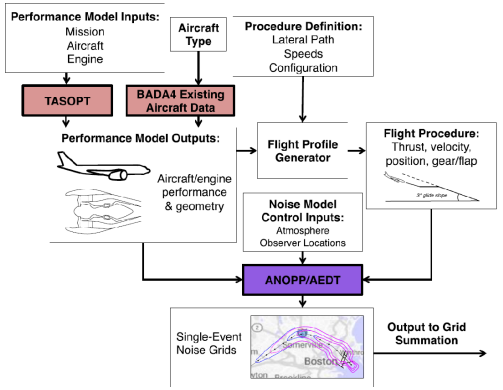
Prerequisite: ENGRMAE 261 or CHEM 245 or EARTHSS 240

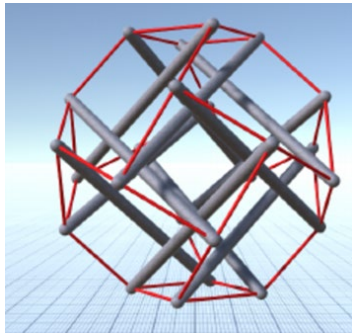
Restriction: Graduate students only.

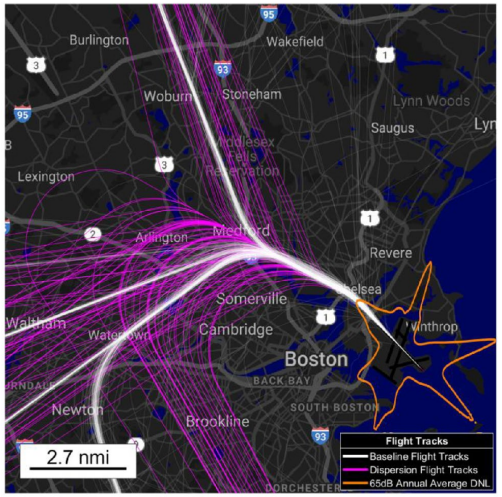
- MAE 216 Statistical Thermodynamics
- MAE 217 Generalized Thermodynamics
- MAE 220 Conduction Heat Transfer
- MAE 221 Convective Heat Transfer
- MAE 210 Advanced Fundamentals of Combustion
- MAE 212 Engineering Electrochemistry: Fundamentals and Applications
- MAE 214A. Fuel Cell Fundamentals and Technology
- 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

# 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
- Computational solid mechanics
- Spacecraft propulsion
- Autonomy and Cyber Physical Systems

# Aerospace Engineering - Faculty

**Manuel Gamero Castano**

Professor of Mechanical and Aerospace Engineering

**Research Interests:**

Spacecraft propulsion, electrospraying, electrohydrodynamics and atomization

.

**Jacqueline Huynh**

Assistant Professor of Mechanical and Aerospace Engineering

**Research Interests**:

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

**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**

Distinguished 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.

# Aerospace Engineering - Faculty

**Dimitri Papamoschou**

Professor of Mechanical and Aerospace Engineering

**Research Interests**:

Aeroacoustics, compressible turbulence.

**Julian Rimoli**

Professor of Mechanical and Aerospace Engineering

**Research Interests:**

Computational solid mechanics, aerospace structures, multiscale modeling

**William Sirignano**

Distinguished Professor of Mechanical and Aerospace Engineering

**Research Interests**:

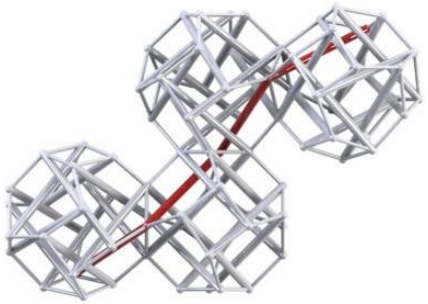
Combustion theory, multiphase flows, turbulent reacting flows, computational methods. Rocket and jet propulsion, gas turbine and internal combustion engines.

**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.



# 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 advisor
  - Issues working as a TA or Grader
  - Degree requirements/options, Preliminary exam, etc.
- Provide workshops and information sessions to prepare you for a career after graduation

**@MAE.GSA**

**@UCIMAEGSA**

**Maryam Asghari**
Recipient of the ARCS (Achievement Rewards for College Scientists)
Academic Goal: Ph.D.
Research Interests:
Dynamic Modeling;
Tri-Generation

# MAE GSA Officers

**President:** Maryam Asghari

**VP Internal:** Zahra Heydarzadeh

**VP External:** Shiva Farzinazar

**International Student Rep:** Kimia Montazeri

**Masters Student Rep** : Marzieh Ataei

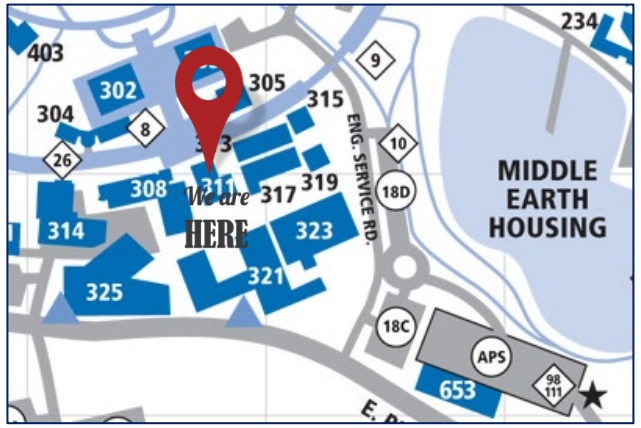
**Outreach Coordinator**: Alejandra Hormaza

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

# Graduate and Professional Studies (GPS)

UCI Samueli School of Engineering

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

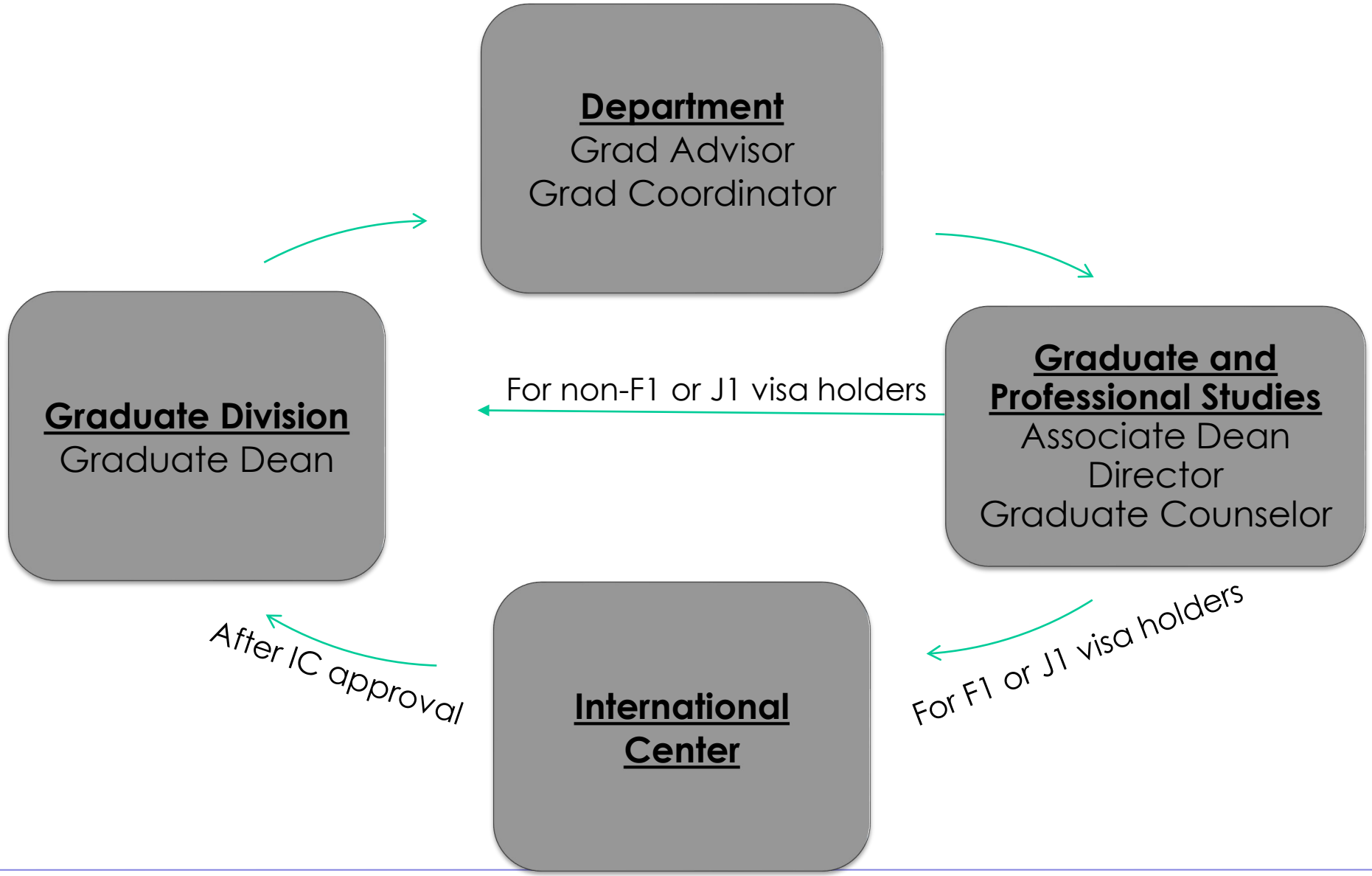



Dr. Athina Markopoulou
Associate Dean

Jean Macneil
Director
jean.macneil@uci.edu
***Primarily works with M.Eng and Computational Science JDP***

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

Revised 7/2022


Department
Grad Advisor
Grad Coordinator
Graduate and Professional Studies
Associate Dean
Director
Graduate Counselor
For non-F1 or J1 visa holders
Graduate Division
Graduate Dean
For F1 or J1 visa holders
After IC approval
International Center

## Full-time

- 12 units minimum
- 16 units maximum
- 17+ units – need to email GPS Graduate Counselor for approval
- Required every quarter until graduation

## Part-time

- 1 units minimum
- 8 units maximum
- For domestic MS students only
- For international MS students in their last quarter only
- Requires form and approval by certain deadline

**ABSOLUTE REGISTRATION DEADLINE**: Friday of Week 3 @ 4:00pm

**ADD/DROP/UNIT CHANGE DEADLINE**: Friday of Week 2 @ 5:00pm
Missed Deadline?
Submit electronic Enrollment Exception through StudentAccess
No guarantee that request will be approved

All Students:

- 3.0 GPA or higher
- Passing courses = B or higher or Satisfactory (S)
  - P/NP courses = not acceptable toward degree
  - Academic Conditional Status = lower than 3.0 GPA OR 2 Consecutive Term GPAs lower than 3.0


PhD Students:

- Match with PhD advisor by end of 1st year and maintain an advisor at all times
- Stay within normative time (see catalogue for specific timelines)

CHOOSE OPTION
Plan I: Thesis
Plan II: Non-Thesis

| Plan I: Thesis | Plan II: Non-Thesis |
|---|---|
| Begin coursework | Begin coursework |
| Submit Plan of Study to Grad Coordinator | Submit Plan of Study to Grad Coordinator |
| Identify thesis advisor and topic | Continue coursework |
| Advancement to Candidacy<br>must be submitted at least one quarter prior to graduation | Advancement to Candidacy<br>must be submitted at least one quarter prior to graduation |
| Complete thesis and exit survey, submit thesis University Archives | Complete coursework and exam/project (differs by department) and exit survey |

- Choose research advisor
- Complete any necessary coursework
- Take preliminary exam
- Continue research and choose dissertation topic
- Nominate qualifying committee
- Take qualifying exam and submit PhD Form I
- Select doctoral committee
- Complete dissertation
- Defend dissertation and submit PhD Form II
- Submit dissertation to university archives, submit exit survey

# Policies and Procedures

UCI Samueli School of Engineering

- You can find a list of course descriptions as well as your requirements in the 2022-23 UCI General Catalogue.
- You can find the policies and procedures to guide you through your graduate study in the Engineering Graduate Student Handbook.
- Also refer to your departmental handbook for additional/specific requirements.
- Additional policy information can be found on the Graduate Division Forms.

# Contact Graduate and Professional Studies

- *"I need help planning my classes" OR "I want to graduate in…."* – academic advising

- "*What do I need to do for…. (advancing to candidacy, taking my qualifying exam, defending my dissertation, etc.)"* – we send important information to you when appropriate

- "*I need the Associate Dean's signature*" – this request is most likely for a DocuSign form. If so, the form will be routed to our office so we can get the signature for you

- "*I am going on CPT*" - we can provide you with authorization to enroll in the necessary course and obtain required signature

- "*I have concerns about my research lab/research advisor*" - we are here to listen and counsel you on how to proceed depending on the situation

# Campus Resources

UCI Samueli School of Engineering

Division of Career Pathways

COUNSELING CENTER
University of California, Irvine

Counseling Center


Graduate Division

Graduate & Postdoctoral Scholar Resource Center

UCI International Center

International Center

Libraries

LinkedIn