MECHANICAL ENGINEERING & MATERIALS SCIENCE

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M.S., M.Phil., Ph.D.

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Udo Schwarz

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Professors Charles Ahn,† Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Aaron Dollar, Alessandro Gomez, Sohrab Ismail-Beigi,* Shun-Ichiro Karato,* Marshall Long (*Emeritus*), Corey O'Hern, Vidvuds Ozolins,* Brian Scassellati,* Jan Schroers, Udo Schwarz, Mitchell Smooke

Associate Professors Rebecca Kramer-Bottiglio, Madhusudhan Venkadesan

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Senior Lecturer Beth Anne Bennett

Lecturers Joran Booth, Lawrence Wilen, Joseph Zinter

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

FIELDS OF STUDY

Fluids and thermal sciences Electrospray theory and characterization; electrical propulsion applications; aerodynamic instrumentation for separation of clusters and aerosol particles; heterogeneous nucleation in the gas phase; combustion and flames; computational methods for fluid dynamics and reacting flows; interfacial flows and instabilities and transport phenomena in disordered media.

Soft matter/complex fluids Jamming and slow dynamics in gels, glasses, and granular materials; mechanical properties of soft and biological materials; rheology and statistical mechanics of muscle; structure and dynamics of proteins and other macromolecules and wetting of soft solids, elastocapillarity, and poroelasticity.

Materials science Studies of structure-property-processing relationships; thin films; nanoscale effects on electronic, optical, and emergent properties of two-dimensional layered materials; picoscale characterization and engineering; correlated electron systems; molecular beam epitaxy; metallic glasses; sustainable metallurgy; data-centered research approaches; nanomaterials; characterization of crystallization and other phase transformations; nanoimprinting; atomic-scale investigations of surface interactions and properties; classical and quantum nanomechanics; nanostructured energy applications; combinatorial materials science; data science in materials

science; materials genome; scanning probe microscopy; theoretical spectroscopy and computational materials science; and halide perovskites.

Robotics/mechatronics Machine and mechanism design; dynamics and control; robotic grasping and manipulation; legged locomotion; multi-agent search and exploration; optimal control for learning; model-predictive control; reinforcement learning; human-machine interface; rehabilitation robotics; haptics; soft robotics; flexible and stretchable electronics; soft material manufacturing; responsive material actuators; artificial muscle; soft-bodied control; electromechanical energy conversion; biomechanics of human movement and human-powered vehicles.

Bioengineering Engineering sciences of living systems; biomechanics; motor control; animal locomotion; cell and tissue mechanics; biomaterials and therapeutics; human health and orthopaedics; bio-inspired computation and design.

For degree requirements and courses, see Engineering & Applied Science.