University of Massachusetts - Amherst

Experience our program in Chemical Engineering

Amherst is a beautiful New England college town in Western Massachusetts. Set amid farmland and rolling hills, the area offers pleasant living conditions and extensive recreational opportunities. Urban centers of Boston and New York are nearby and easily accessible.

For application forms and further information on fellowships and assistantships, academic and research programs, and student housing, see:
http://che.umass.edu/

Graduate Program Director
Department of Chemical Engineering
159 Goessmann Lab., 686 N. Pleasant St.
University of Massachusetts
Amherst, MA 01003-9303

Faculty:

Lauren Andrews (*Colorado, Boulder)*
Omar A. Abdelrahman (*Syracuse)*
Peng Bai *(Minnesota)*
Peter J. Beltramo *(Delaware, Newark)*
Zhu Chen *(Princeton)*
W. Curtis Conner, Jr. — Emeritus (*Johns Hopkins)*
Jeffrey M. Davis (*Princeton*)
Christos Dimitrakopoulos *(Columbia)*
Wei Fan *(Tokyo)*
Neil S. Forbes (*California, Berkeley*)
Friederike Jentoft (Ludwig-Maximilians-Universität München)
Rolf Jentoft — Lecturer (*California, Davis*)
Ashish Kulkarni *(Cincinnati)*
Anna LaChance — Lecturer *(Connecticut)*
Jungwoo Lee (*Michigan)*
Michael F. Malone (*Massachusetts, Amherst*)
Dimitrios Maroudas (*MIT)*
Peter A. Monson — Emeritus (*London)*
T. J. (Lakis) Mountziaris — Emeritus (*Princeton*)
Sarah L. Perry (*Illinois, Urbana-Champaign*)
Shelly R. Peyton *(California, Irvine)*
Jessica D. Schiffman (*Drexel*)
H. Henning Winter (*Stuttgart*)
Nianqiang Wu (*Zhejiang*)
Dandan Xu — Lecturer (*Minnesota)*

Facilities and Research:

The Department occupies modern research space in Engineering Laboratory II, the Conte National Center for Polymer Research, and the Life Science Laboratories. Instructional and administrative facilities are located in Goessmann Laboratory. State of the art characterization and nanofabrication facilities are available through the NSF Nanoscale Science and Engineering Center on Hierarchical Manufacturing, the NSF Materials Research Science and Engineering Center on Polymers, and the W.M. Keck Center for Electron Microscopy.

We offer M.S. and Ph.D. programs. Current projects receive support at a level of over $9 million per year through external research grants. Examples of current research areas are listed in the right column.

Bioengineering and cellular engineering: Synthetic biology; metabolic engineering; engineered bacterial consortia; biosensors. living, antifouling, and antibacterial materials. thermostable vaccines; next-generation mRNA manufacturing; microfluidics for structural biology. artificial cell membranes; biomimetic materials. tissue-engineered trabecular bone marrow models; bone marrow microenvironmental regulation of disseminated tumor cell biology. bioengineering approaches to treat metastatic breast cancer; novel, functional, and force-sensitive biomaterials. immunoengineering; cancer immunotherapy; drug delivery; nanomedicine; nanomaterials for clinical imaging and diagnostics. targeted bacteriolytic therapy of tumors; localized quantification of tumor metabolism; bacterial migration and segregation in solid tumors. photodynamic therapy, drug delivery, bio-imaging, and precision medicine; biosensors, microfluidics, and point-of-care testing devices.

Catalysis, Reaction Engineering, Sustainable Energy, and the Environment: Renewable chemicals and fuels from biomass; synthesis of heterogeneous porous catalysts, zeolites, MOF, and COF materials; ultra-fast transport in hierarchical porous materials; polymeric membranes and nanofibers for environmental applications. green hydrogen production; CO_2 conversion; biomass valorization; operando characterization; electrochemical engineering. hydrocarbon chemistry; polymer upcycling; catalysis thermodynamics; enhanced sustainability through improved catalysis; surface chemistry; adsorption and transport in nanoporous solids; polymerization catalysts; catalytic spillover; compensation effects in catalysis. polymer upcycling; production of value-added products from waste polyolefins; dynamic, photo-, electro-, and photo-electrochemical catalysis; electrochemical energy storage.

Materials Science and Engineering: Renewable polymers and green engineering; bioinspired materials design; complex coacervation; sustainable and recyclable adhesives and plastics. polymer colloid synthesis; self and directed colloidal assembly; interfacial phenomena; soft matter; emulsions and foams; computational materials science; semiconductor thin films and nanostructures; graphene derivatives and composite 2D materials; plasma-facing materials in nuclear fusion devices; combinatorial materials synthesis; 2D nanomaterials for energy and catalysis; perovskite solar cells by graphene encapsulation; exfoliated phosphorene; graphene metamaterials; graphene applications in microfluidics and nanocomposites; organic semiconductors; photovoltaics; rheology of soft matter; novel methods for extracting material properties from rheological data; gelation & glass transition in amorphous materials. charge & energy transfer in electrochemical and optoelectronic materials & devices.

Molecular and Multiscale Modeling, Theory, and Computation: Density functional theory calculations; computational statistical mechanics; process-structure-properties-function relations; atomistic-to-continuum modeling of materials; system-level analysis using atomic-scale simulators; quantum chemistry and density functional theory; computational statistical mechanics; machine learning and high-throughput screening; biofluid dynamics and blood flow; microscale flow modeling; hydrodynamic stability & pattern formation; interfacial flows.