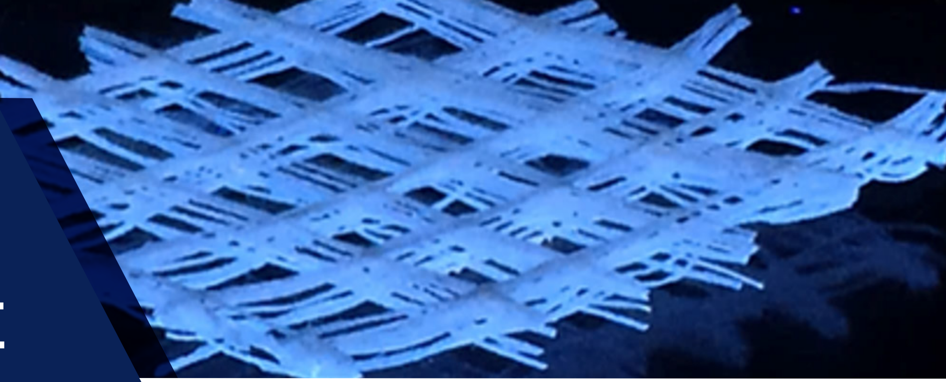

LIVE Virtual

PREDICTIVE MULTISCALE MATERIALS DESIGN

MIT PROFESSIONAL EDUCATION

OVERVIEW

From AI to multiscale modeling, master the state-of-the-art computational methods that are revolutionizing the materials design world. Over the course of five days, you'll delve into innovative applications for polymers, metals, and ceramics, as well as composites and sustainable construction materials, as you:

- Explore a variety of computational tools, ranging from multiscale modeling to machine learning to artificial intelligence
- Discover strategies for coupling computational tools with manufacturing methods
- Learn how superior material properties in nature can be mimicked to create new technologies

Through lectures and hands-on exercises, you'll gain the skills, strategies, and best practices you need to fabricate a vast array of advanced, innovative designs for a wide range of applications.

This course was previously titled *Multiscale Materials Design*.

EARN A PROFESSIONAL CERTIFICATE IN DESIGN & MANUFACTURING

This course may be taken individually or as a part of the *Professional Certificate Program in Innovation & Technology* or the *Professional Certificate Program in Design & Manufacturing*. Learn more at **professional.mit.edu/d&m**.

LEAD INSTRUCTOR: Markus Buehler
COURSE DATES: June 21–25, 2021
COURSE LENGTH: 5 days
COURSE FEE: $4,500
CEUs: 3.0

WHO SHOULD ATTEND

This course is designed for scientists, engineers, managers, and policy makers working in the areas of materials design, development, manufacturing, or testing. Tailored to individuals who want to optimize material structure and performance, this course will be of particular interest to those in industries that build on a material interaction platform (such as pharmaceuticals, regenerative medicine, energy, or civil engineering). In addition, the course will encompass mechanical properties such as biomaterials and implants, adhesives, construction materials, and structural materials for the aero-astro, manufacturing, and automotive industries.

Computer Requirements: Laptops are required for this course. Software used will include Visual Molecular Dynamics and web-based tools. Please note that tablets will not be sufficient for the computing activities performed in this course.

REGISTER and learn more at **professional.mit.edu/mmd** or email **shortprograms@mit.edu**

PREDICTIVE MULTISCALE MATERIALS DESIGN

PARTICIPANT TAKEAWAYS

- Discover practical problem-solving computational tools and experimental techniques used to probe, understand, and design the ultimate structure of materials
- Apply tools to predict mechanical properties such as strength, toughness, deformability, and elasticity, as well as optical, thermal, and electronic properties
- Leverage multiscale tools in energy recovery and sustainable materials and structures
- Demonstrate the synthesis of computationally designed hierarchical composites using 3D printing and other advanced manufacturing techniques, as well as conduct mechanical testing
- Evaluate the use of computational tools in materials design (synthesis and testing)—molecular mechanics, nanotechnology, multiscale and hierarchical materials, and emerging materials technologies
- Gain the best practices needed to perform state-of-the-art techniques, such as molecular dynamics, molecular mechanics, and coarse-graining

INSTRUCTOR

MARKUS J. BUEHLER is the McAfee Professor of Engineering at MIT. Involved with startups, innovation and a frequent collaborator with industry, his primary research interest is to identify and apply innovative approaches to design better materials from less, using a combination of high-performance computing and AI, new manufacturing techniques, and advanced experimental testing. He directs the Laboratory for Atomistic and Molecular Mechanics (LAMM), and is Principal Investigator on numerous national and international research programs. He combines bio-inspired materials design with high-throughput approaches to create materials with architectural features from the nano- to the macro-scale, and applies them to various domains that include composites for vehicles, coatings for energy technologies, and innovative and sustainable biomaterials. Using an array of theoretical, computational and experimental methods, his work seeks to understand the means by which nature creates materials, with applications in bio-inspired engineering. His most recent book, *Biomateriomics*, presents a new design paradigm for the analysis of biomaterials using a categorization approach that translates insights from disparate fields. In recent work he has developed a new framework to compose music based on proteins—the basic molecules of all life, as well as other physical phenomena such as fracture singularities, to explore similarities and differences across species, scales and between philosophical and physical models. His work spans multiple disciplines and straddles the interface of science and art in multiple dimensions, both as a tool to educate and as a tool to understand and design.

ABOUT MIT PROFESSIONAL EDUCATION

For 70 years, MIT Professional Education has been providing technical professionals worldwide a gateway to renowned MIT research, knowledge and expertise, through advanced education programs designed specifically for them. In addition to industry-focused, two-to-five-day on-campus Short Programs, MIT Professional Education offers professionals the opportunity to take online-blended learning courses and programs through Digital Plus Programs, attend courses abroad through International Programs, enroll in regular MIT academic courses through the Advanced Study Program, or attend Custom Programs designed specifically for their companies.

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