MATERIALS DESIGN AND INNOVATION (MDI)

MDI.BUFFALO.EDU

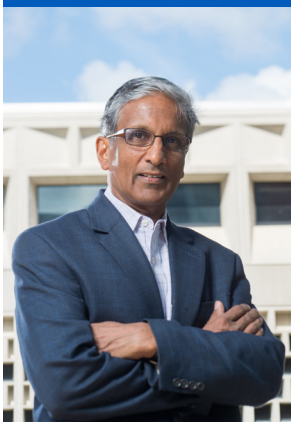
A new perspective for a new paradigm

Our goal is to give you disciplinary knowledge and expertise in materials science and data science with a strong analytical and quantitative perspective. Students are trained to have interdisciplinary perspectives and the necessary skills and tools to apply informatics to experiments, modeling and simulation together with experimental driven science so that you have the ability to contribute to and work to accelerate the pace of materials discovery and engineering design.

Core foundations with new distinctive courses

The curriculum consists of the core foundations of materials science subjects but taught from the perspective of statistics, interpretation of databases and data mining methods. Beyond these core foundations, new distinctive courses in materials science that cover materials informatics, advanced computing methods and machine learning, robotics for materials engineering and an integrated "atoms to device" experimental development laboratory are offered.

Professor Krishna Rajan, Erich Bloch Chair of the MDI Department at UB



Graduates prepared to work in cutting-edge industries across the globe

Graduates of MDI will leave UB prepared to work in a wide range of technologies, including microelectronics, aerospace, biotechnology, energy, data analytics and software sectors of the economy. The interdisciplinary training will prepare you for a wide array of professional opportunities including careers in research, teaching, business entrepreneurship and public policy.

Experiential learning that focuses on a systems design approach

Even if you have a degree in materials science or related fields, our programs will provide you with unique skills that integrate mathematics, statistics and computational methods into the principles of both experimental and computational materials science. At UB, you'll gain a data intensive perspective that embeds the training into the development and interpretation of databases. For PhD students we offer a formal training program for scientific entrepreneurship, public policy and science communications tailored specifically for materials science and engineering.

Our new collaborative faculty teaching model for graduate education links the training of computational and experimental sciences in the classroom.

University at Buffalo
Department of Materials Design and Innovation
School of Engineering and Applied Sciences
College of Arts and Sciences

[WHAT IS MDI?]

MDI is a new interdisciplinary department at the University at Buffalo that pushes the boundaries of traditional approaches in materials science research and education by harnessing the tools of materials informatics to link experimental and computational materials science. This new paradigm permits one to significantly accelerate the discovery and design of new materials to promote new innovations in materials driven technologies in a socially responsible manner.

DID YOU KNOW?

Our 30-credit master's program can be completed in as little as 12 months based on successful completion of the MDI core curriculum and a project.

Our doctoral program involves completing the core MDI course curriculum, a qualifying exam, a set of elective courses tailored to your research, and a thesis.

[MDI FAQs]

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What degrees are offered in MDI?

MDI presently offers MS and PhD degrees. We plan to offer an undergraduate degree program in the coming years. Funding opportunities for graduate students are competitive and prospective applicants are encouraged to follow through with the application process first. Qualified PhD students may be supported financially depending upon the advisor and through other competitive mechanisms.

My undergraduate degree is not in materials science or a directly related science and engineering field. Am I still eligible to apply?

Yes, absolutely! We welcome students from ALL branches of science and engineering disciplines. Our highly interdisciplinary core curriculum is uniquely designed to fit the diverse backgrounds of our students.

If I have a degree that is not in an engineering field, can you give examples of how MDI will teach me skills leveraging my prior training in non-engineering disciplines?

Biology: MDI will teach you how to apply the principles governing the relationship between structure and function in biological systems to a wide array of topics at the nexus of life sciences and materials science, including design of new biomaterials, bio-imaging, biochemistry and biophysics.

Chemistry: MDI will teach you the link between materials chemistry and materials properties, as well as ways to manipulate chemistry to design new materials guided by techniques such as combinatorial chemistry.

Computer Science: MDI will train you in the application of machine learning and data mining methods for materials discovery and design.

Geology: MDI will teach you how to use the fundamentals of geochemistry and geophysics to design and discover new materials based on their behavior under extreme conditions of pressure and temperature associated with geological systems.

Mathematics: MDI will focus on the application of statistics and data science methods to solve problems in materials science and engineering.

Physics: MDI will teach you how fundamental physical properties of materials link to electronic and molecular structure as well as ways to harness the principles of solid state physics for materials discovery using high throughput computational methods and advanced structural probes of materials behavior.

If I already have a degree in materials science and engineering, what are the advantages for me to continue graduate studies in MDI rather than existing materials science programs?

Even if you have a degree in materials science or related fields, you will find in MDI an exciting experiential learning environment that focuses on a systems design approach in materials and provide you with a set of skills unique to our curriculum.

I already have a Master's degree in a science or engineering discipline. Can I apply directly for a PhD?

Yes, you can apply directly for a PhD program. The designation as a PhD student involves you completing the core MDI courses at a minimum GPA level followed by a PhD qualifying exam based on those courses. PhD students will also interface with UB's new Computational Data-enabled Science and Engineering graduate program, providing intensive training in all facets of computational data science that would be of value to both experimental and computational materials scientists.

What is required for admission to the MDI program?

All applicants must complete an online application, upload transcripts, and provide a personal statement and resume. GRE scores are required for admission to the PhD program. Letters of Recommendation are required for the MS and PhD programs. International students are required to submit proof of English language proficiency.

OK, I am interested. What's next?

Complete your online application at **mdi.buffalo.edu**
We encourage you to submit your application by February 15th to receive full consideration for Fall entry.

More questions?

Contact Professor Krishna Rajan at **mdigrad@buffalo.edu**