MATERIALS, INFORMATICS AND DESIGN - CERTIFICATE

This certificate addresses the need to develop approaches for the accelerated discovery and design of materials to meet technological challenges of the 21st century associated with environmental, national security, energy and medical issues.

The Department of Materials Science and Engineering offers a certificate in Materials, Informatics and Design requiring completion of six courses (15 credit hours).

This program provides an interdisciplinary framework to employ informatics and engineering system design tools to the development of materials. The curriculum includes (i) cross-disciplinary components on materials science, informatics and design; (ii) an interdisciplinary, integrative studio course on the application of informatics and design tools to develop materials; (iii) elective tracks on entrepreneurship, energy, computational materials science as well as professional internships in industry and national laboratories.

The educational goals of the certificate program are to train the next generation of scientists and engineers who:

1. are grounded in their major discipline (degree program);
2. are capable of applying tools and methods from other disciplines to their major discipline;
3. are able to translate tools developed in their major discipline to engineering problems in other fields;
4. can communicate with experts in varying disciplines;
5. can effectively contribute to interdisciplinary efforts while developing a comprehensive understanding of the potentials and limitations of their major discipline as well as other disciplines;
6. have the skills necessary to thrive in their chosen career path.

Program Requirements

Code	Title	Semester Credit Hours
MEEN 601	Advanced Product Design	3
or MEEN 683	or Multidisciplinary System Analysis and Design Optimization	
MSEN 655	Materials Design Studio	3
MSEN 659	Materials Design ePortfolio	0
MSEN 660/ ECEN 769	Materials Informatics	3
Select one of the following:		3
CHEM 466	Polymer Chemistry	
CHEM 468	Materials Chemistry of Inorganic Materials	
CHEM 623	Surface Chemistry	
CHEN 641	Polymer Engineering	
CHEN 642	Colloidal and Interfacial Systems	
MEEN 607/ MSEN 607	Polymer Physical Properties	
MSEN 601	Fundamental Materials Science and Engineering	
MSEN 603	Fundamentals of Soft and Biomaterials	
MSEN 618	Composites Processing and Performance	
PHYS 617	Physics of the Solid State	
Select one of the following:		3
CHEM 483	Green Chemistry	
CHEM 658	Molecular Modeling	
CHEM 684	Professional Internship	
CHEN 459	Gas and Petroleum Processing	
CHEN 665	Sustainable Design of Chemical Processes	
CHEN 684	Professional Internship	
ECEN 684	Professional Internship	
ECEN 711	Sustainable Energy and Vehicle Engineering	
ECEN 712	Power Electronics for Photovoltaic Energy Systems	
ECEN 715	Physical and Economical Operations of Sustainable Energy Systems	
ENGR 681	Professional Development Seminar	
MEEN 633	Combustion Science and Engineering	
MEEN 662	Energy Management in Industry	
MEEN 665	Application of Energy Management	
MEEN 684	Professional Internship	
MGMT 632	Technology Commercialization	
MGMT 637	Foundations of Entrepreneurship	
MGMT 640	Managing for Creativity and Innovation	
MSEN 619/ NUEN 660	Materials Modeling of Phase Transformation and Microstructural Evolution	
MSEN 657	Multiscale Modeling in Materials	
MSEN 670/ MEMA 670	Computational Materials Science and Engineering	
MSEN 684	Professional Internship	
PHYS 619	Modern Computational Physics	
Total Semester Credit Hours		**15**