

This version of the curriculum is applicable to students admitted during the academic years 2025–2029.

Doctor of Philosophy Program in Materials Science and Engineering (International Program)

2.1: Research and Coursework (3-year program) MSE

Total Credits of the Program

Not less than 50 Credits

Curriculum Structure

1) Core Courses	Not less than	14 Credits
1.1) Seminar	Not less than	2 Credits
MSE 678 Seminar III (GD)		1(---)
MSE 679 Seminar IV (GD)		1(---)
1.2) Graduate Development Courses		6 Credits (non-Credits)
VIS 661 Professional Development I (SU)		3(3-0-6) (non-credit)
VIS 662 Professional Development II (SU)		3(3-0-6) (non-credit)
1.3) Elective Core Courses*		12 Credits
Total not less than 12 credits, of which no less than 6 credits can be chosen from courses in the MSE field of study. The remaining 6 credits can be chosen from the courses in the MSE field of study or outside the MSE field of study. The approval of the program coordinator or school director is required if students select the elective courses not listed below.		
1.3.1) Frontiers in Materials Science and Engineering		
MSE 512 Solid State Chemistry and Physics (GD)		3(3-0-6)
MSE 515 Modeling and Simulation of Materials (GD)		3(3-0-6)
MSE 611 Surface and Interface Properties of Materials (GD)		3(3-0-6)
MSE 612 Electronic Structures of Solid Surface and Nano-scale Materials (GD)		3(3-0-6)
MSE 615 Molecular Structures and Properties of Polymers (GD)		3(3-0-6)
MSE 616 Chemistry and Physics of Nanostructures (GD)		3(3-0-6)
MSE 617 Electrochemistry and Corrosion (GD)		3(3-0-6)
MSE 619 Frontiers in Materials Science and Technology (GD)		3(3-0-6)
BSE 612 Biocatalysis and Mechanistic Enzymology (GD)		3(3-0-6)
CHE 612 Electrochemical Energy Systems (GD)		3(3-0-6)
1.3.2) Specialized Courses on Molecular Design and Synthesis Processes		
MSE 521 Advanced Synthesis for Organic and Inorganic and Biological Materials (GD)		3(3-0-6)
MSE 522 Synthesis and Processing of Electronic and Photonic Materials (GD)		3(3-0-6)
MSE 624 Molecular Design of Functional Polymers (GD)		3(3-0-6)

MSE 627 Qualitative Property Predictions for Transition Metal Complexes (GD)	3(3-0-6)
CHE 521 Applied Catalysis (GD)	3(3-0-6)
CHE 522 Design and Preparation of Heterogeneous Catalysts (GD)	3(3-0-6)
CHE 622 Quantum Simulation of Molecules and Materials (GD)	3(3-0-6)
CHE 623 Advanced Catalysis and Electrocatalysis (GD)	3(3-0-6)
CHE 624 Industrial Catalysis (GD)	3(3-0-6)
1.3.3) Advanced Courses on Cutting-Edge Analysis and Characterization of Materials	
MSE 631 X-ray Science and Applications (GD)	3(3-0-6)
MSE 634 Spectroscopic Methods for Organic Compounds (GD)	3(3-0-6)
MSE 635 Advanced Characterization of Semiconducting Materials (GD)	3(3-0-6)
1.3.4) Novel Materials, New Processes and Applications	
MSE 541 Materials for Energy Environmental and Biological Applications (GD)	3(3-0-6)
MSE 542 Photovoltaic and Solar Cell Materials and Devices (GD)	3(3-0-6)
MSE 545 Catalytic Materials and Applications (GD)	3(3-0-6)
MSE 642 Nano Electronic and Photonics Materials and Devices (GD)	3(3-0-6)
MSE 644 Composite and Hybrid Materials (GD)	3(3-0-6)
MSE 645 Biomaterials and Soft Materials (GD)	3(3-0-6)
MSE 646 Thin-Film Semiconductors and Devices (GD)	3(3-0-6)
MSE 647 Innovative Biomaterials (GD)	3(3-0-6)
MSE 648 Crystallization of Materials (GD)	3(3-0-6)
MSE 667 Selected Topics: "Advanced NMR Analysis" (GD)	3(3-0-6)
MSE 667 Selected Topics: "Coordination and Organometallic Chemistry" (GD)	3(3-0-6)
MSE 667 Selected Topics: "Solid State Chemistry" (GD)	3(3-0-6)
MSE 667 Selected Topics: "Functional Porous Materials and Periodic Structures" (GD)	3(3-0-6)
MSE 667 Selected Topics: "Critical Thinking and Effective Communication" (GD)	3(3-0-6)
BSE 642 Biosensor and Electrochemistry (GD)	3(3-0-6)
CHE 696 Selected Topics: "Advanced Materials" (GD)	3(3-0-6)
CHE 696 Selected Topics: "Advanced Zeolites in Catalysis" (GD)	3(3-0-6)
CHE 696 Selected Topics: "Crystallization" (GD)	3(3-0-6)
CHE 696 Selected Topics: "Solid State Chemistry I" (GD)	3(3-0-6)
CHE 696 Selected Topics: "Solid State Chemistry II" (GD)	3(3-0-6)
CHE 696 Selected Topics: "Material Chemistry: Metal-Organic Frameworks - Characterization and Applications" (GD)	3(3-0-6)
1.3.5) Other Compulsory Elective Courses	
MSE 501 Thermodynamics and Kinetic Processes in Materials (GD)	3(3-0-6)

MSE 502 Chemical Synthesis of Materials (GD)	3(3-0-6)
MSE 503 Structure and Properties of Materials (GD)	3(3-0-6)
MSE 504 Characterization of Materials (GD)	3(3-0-6)

2) Thesis**Not less than 36 Credits**

MSE 699 Thesis (SU)	1-36
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