

**Doctor of Philosophy Program in Materials Science and Engineering (International Program)****Doctor of Philosophy (Materials Science and Engineering)****3 Year****2.1: Research and Coursework (3-year program) MSE**

<b>Total Credits of the Program</b>	No less than	50	Credit
<b>Curriculum Structure</b>			
1) Core Courses	No less than	14	Credit (non credit)
1.1) Seminar		2	Credit
MSE 678 Seminar III (GD)			1(0-0-0)
MSE 679 Seminar IV (GD)			1(0-0-0)
1.2) Professional Development		3	Credit (non credit)
MSE 668 Professional Development (SU)			3(3-0-6)
1.3) Leadership in Science and Engineering		3	Credit (non credit)
MSE 669 Leadership in Science and Engineering (SU)			3(3-0-6)
1.4) Compulsory Elective Courses		12	Credit
1.4.1) Frontiers in Materials Science and Engineering			
BSE 612 Biocatalysis and Mechanistic Enzymology (GD)			3(3-0-6)
CHE 612 Electrochemical Energy Systems (GD)			3(3-0-6)
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)
1.4.2) Specialized Courses on Molecular Design and Synthesis Processes			
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)
MSE 521 Advanced Synthesis for Organic and Inorganic and Biological			3(3-0-6)
MSE 522 Synthesis and Processing of Electronic and Photonic Materials (GD)			3(3-0-6)
MSE 523 Ceramic Processing (GD)			3(3-0-6)
MSE 525 Electrochemical Processing of Materials (GD)			3(3-0-6)
MSE 526 Rheology and Processing of Polymers (GD)			3(3-0-6)
MSE 621 Composite Materials and Processing (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)
1.4.3) Advanced Courses on Cutting-Edge Analysis and Characterization of Materials			
MSE 532 Electron Microscopy and Diffraction (GD)			3(3-0-6)
MSE 631 X-ray Science and Applications (GD)			3(3-0-6)
MSE 634 Spectroscopic Methods for Organic Compounds (GD)			3(3-0-6)

1.4.4) Novel Materials, New Processes and Applications

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)
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 543	Sensor and Transducer Materials and Technology (GD)	3(3-0-6)
MSE 544	Advanced Ceramics and Applications (GD)	3(3-0-6)
MSE 545	MSE 545 Catalytic Materials and Applications (GD)	3(3-0-6)
MSE 642	MSE 642 Nano Electronic and Photonics Materials and Devices (GD)	3(3-0-6)
MSE 643	MSE 643 High-Performance Structural Materials (GD)	3(3-0-6)
MSE 644	MSE 644 Composite and Hybrid Materials (GD)	3(3-0-6)
MSE 645	MSE 645 Biomaterials and Soft Materials (GD)	3(3-0-6)
MSE 646	MSE 646 Thin-Film Semiconductors and Devices (GD)	3(3-0-6)
MSE 667	MSE 667 Selected Topics: "Advanced NMR Analysis" (GD)	3(3-0-6)
MSE 667	MSE 667 Selected Topics: "Coordination and Organometallic Chemistry" (GD)	3(3-0-6)
MSE 667	MSE 667 Selected Topics: "Solid State Chemistry" (GD)	3(3-0-6)
MSE 667	MSE 667 Selected Topics: "Functional Porous Materials and Periodic Structures" (GD)	3(3-0-6)

1.4.5) Other Compulsory Elective Courses

MSE 501	MSE 501 Thermodynamics and Kinetic Processes in Materials (GD)	3(3-0-6)
MSE 502	MSE 502 Chemical Synthesis of Materials (GD)	3(3-0-6)
MSE 503	MSE 503 Structure and Properties of Materials (GD)	3(3-0-6)
MSE 504	MSE 504 Characterization of Materials (GD)	3(3-0-6)

2) Thesis		No less than	36	Credit
	MSE 699 Thesis (SU)			0(0-0-0)