

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

2.2: Research and Coursework (5-year program) MSE

Total Credits of the Program	No less than	76	Credit
Curriculum Structure			
1) Core Courses	No less than	28	Credit
1.1) Seminar		4	Credit
MSE 578 Seminar I (GD)			1(0-0-0)
MSE 579 Seminar II (GD)			1(0-0-0)
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 Core Courses		12	Credit
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)
1.5) Compulsory Elective Courses		12	Credit
1.5.1) 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)
1.5.2) 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 Materials (GD)			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)
	1.5.3)	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)
	1.5.4)	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	Catalytic Materials and Applications (GD)			3(3-0-6)
	MSE 642	Nano Electronic and Photonics Materials and Devices (GD)			3(3-0-6)
	MSE 643	High-Performance Structural Materials (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 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)
	1.5.5)	Other Compulsory Elective Courses			
	CHE 696	Selected Topics: "Material Chemistry: Metal-Organic Frameworks - Characterization and Applications" (GD)			3(3-0-6)
2) Thesis			No less than	48	Credit
	MSE 698	Thesis (SU)			0(0-0-0)