Michigan Technological University
Registrar's Office

Academic Year 2017-18
Department of Physics
Interdisciplinary Minor in Nanoscale Science and Engineering (Nanotechnology) IMNT
Credits Required: 18

Student Name and ID Number

Estimated Graduation Term

Required Courses (8 Credits)	**Credits**
UN 2600 Fund of Nanoscale Sci and Engr (2)	
SS 3801 Science Technology & Society (3)	
Independent Study/Research/Co-op/Enterprise (3)* Approved Courses:	

*must be nano-related; program approval required

Electives (10 Credits) *Choose at least 6 credits not in your major (as defined by the course prefix) from among the Upper- and Lower- Level Elective courses below. Courses that are cross-listed with your major are considered as being in your major.*

Upper Level Electives: Minimum 6 credits	**Credits**
BE 3800 Biomaterials II: Prop and Biological Interactions (3)	
BE 4300 Polymeric Biomaterials (3)	
BE 4330 Biomimetic Materials (3)	
BE 4335 Smart Polymers (3)	
BE 4700 Biosensors: Fabrication and Apps (3)	
BE 4800 Biomaterials Interfaces (3)	
BL 4010 Biochemistry I (3)	
BL 4020 Biochemistry II (3)	
BL 4030 Molecular Biology (3)	
BL 4035 Bioimaging (2)*	
BL 4042 Scanning Electron Microscopy (2)*	
BL 4062 Transmission Electron Microscopy (2)*	
CH 3501 Physical Chem For Env & Life Sci (2)	
CH 3520 Physical Chem II - Molecular Structure (3)	
CH 4212 Instrumental Analysis (5)*	
CH 4310 Inorganic Chemistry I (3)	
CH 4320 Inorganic Chemistry II (3)	
CH 4560 Computational Chemistry (3)	
CH/CM 4610 Intro to Polymer Science (3) **OR** MY 4600 Intro to Polymer Engineering (3)	
CH 4620/CM4620 Polymer Chemistry (3)	
CH 4631/CM4631 Polymer Science Laboratory (2)	
CH 4640 Synthesis of Nanoparticles (3)	
CH 4720 Biomolecular Chemistry II (3)	
CM 4974/ENT 3974 Fuel Cell Fundamentals (1)	
CM 4710 Biochemical Processes (3)	
CM 4770 Analytic Microdevice Technologies (3)	
EE 3290 Photonic Material Devices and Apps (4)	
EE 4231 Physical Electronics (3)	
EE 4240 Introduction to MEMS (4)	
EE 5470 Semiconductor Fabrication (3)	
EE 5480 Advanced MEMS (4)	

Upper Level Electives, Continued	**Credits**
EET 3131 Instrumentation (3)	
FW 3075 Plant Biotechnology (3)	
FW 4099 Programming Skills for Bioinformatics (3)	
MEEM 4405 Intro to Finite Element Method (3)	
MEEM 4640 Micromanufacturing Processes (3)	
MEEM 5130 Nanotechnology (3)	
MGT 3800 Entrepreneurship (3)	
MY 3200 Materials Characterization I (4)*	
MY 3210 Materials Characterization II (4)*	
MY 3500 Intro to Semiconductor Materials & Devices (3)	
MY 3701 Intro to Semiconductor Materials Sci & Eng (2)	
MY 4200 Intro to Scanning Electron Microscopy (2)	
MY 4201 Introduction to SEM Lab (1)*	
MY 4205 Scanning Electron Microscopy and X-Ray Micro (3)	
MY 4240 Introduction to MEMS (4)	
MY 4292/PH 4292 Light and Photonic Materials (3)	
MY 4310 Practical Scanning Probe Microscopy (1)*	
MY 4630 Contact Mechanics and Nanoindentation (3)	
MY 5200 Adv Scanning Electron Microscopy (3)*	
MY 5550 Solid Surfaces (3)	
MY 5580 Atomic Force Microscopy (2)*	
MY 6100 Computational Materials Science & Eng (3)	
PH 3410 Quantum Physics I (3)	
PH 3411 Quantum Physics II (3)	
PH 5530 Selected Topics in Nanotechnology (2)	
SS 3650 Intellectual Property Law Management (3)	

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Additional Electives may be selected from the courses below to bring the total elective credits to a minimum of 10.	
BL 2100 Principles of Biochemistry (3)	
BL 2200 Genetics (3)	
CH 2420 Organic Chemistry II (3)	
PH 2400 Univ Physics IV: Waves & Modern Physics (3)	

Other appropriate electives (including those at the graduate level) may be chosen with written permission by the Nanotechnology Minor faculty advisor. Graduate level courses may require dept or instructor permission.	

*** Denotes an instrumetation-related course. Students are encouraged, though not required, to take at least one course related to instrumentation.**

Total Credits Required = 18	

Courses listed in this minor have the following prerequisites (shown in parenthesis). Concurrency is illustrated by the letter C: Courses listed in this minor have the following prerequisites (shown in parenthesis). Concurrency is illustrated by the letter C: BE3800 (BE2700(C) and BE2800), BE4300 (BE3800), BE4330 (BE3350 and BE3800), BE4335 (BE3350 and BE3800), BE4700 (BE 3600 or (BE 3700 and BE 3701)), BE4800 (BE3800), BL2100 ((BL1040 or BL1020) and (CH1110 or CH1100)), BL2200 ((BL1020 or BL1040) and (BL2100 or CH4710)), BL4010 ((BL1020 or BL1040 or BL2010) and BL2100 and (CH2400 or CH2420) and CH2420), BL4020 (BL4010), BL4030 ((BL1020 or BL1040) and (BL2100 or CH4710)), BL4042 (4035), BL4062 (4035), CH3501 ((CH1100 or CH1110) and (CH1120 or CH1140) and (MA2150 or MA2160)), CH3520 (CH1120 and PH2200 C and (MA3150 or MA3160) and PH2200 C), CH4212 (CH2212 and CH3510 C and CH3511 C), CH4310 (CH3520), CH4320 (CH4310), CH4560 (CH3520), CH4610 (CH1120), CM3974 (CH1100 or CH1110), CM4610 (CH1120), CM4710 (CM3110 C), EE4231 (EE3130), EE5480 (EE4240 or MY4240), EET3353 (EET1411 or EET2220 or EET2311 or EE3010), ENG3974 (CH1100 or CH1110), MEEM4405 (MEEM3502 and (MA2320 or MA2321 or MA2330) and (MA3520 or MA3521 or MA3530 or MA3560)), MEEM4640 (MEEM3502 C), MET3131 (EET2311 or EET2221), MY3200 (MY2110), MY3210 (MY2100),MY4201 (MY4200 C), MY4600 (MY2100), MY5480 (EE4240 or MY4240), PH2400 (PH2200 or PH2260), PH3410 (PH2400 and (MA3520 or MA3521 or MA3530 or MA3560)), PH3411 (PH3410), SS3650 (UN 1015 and (UN 1025 or Modern Language - 3000 level or higher)), SS3801 (UN 1015 and (UN 1025 or Modern Language - 3000 level or higher))

Student Signature Date

Departmental Approval Date