

Michigan Technological University**Interdisciplinary Minor in Nanoscale Science and Engineering (Nanotechnology)**

Program Code IMNT, Academic Year 2021-22

Department of Physics

Total Credits Required: 18

Required Courses: 8 credits

Course	Credits
UN 2600 Fundamentals of Nanoscale Science and Engineering <i>Prereqs: none</i>	2
SS 3801 Science Technology & Society <i>Prereqs: UN1015 and UN1025</i>	3
Independent Study/Research/Co-op/Enterprise <i>Must be nano-related and approved by the minor advisor</i>	3

Elective Courses: 10 credits

Choose at least six credits that are not in your major (as defined by the course prefix). Courses that are cross-listed with your major are considered as being in your major. At least six of the 10 credits must be taken at the 3000- or 4000- level.

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

Course	Credits
BE 3800 Biomaterials II: Properties and Biological Interactions <i>Prereqs: BE2700(C) and BE2800</i>	3
BE 4300 Polymeric Biomaterials <i>Prereqs: BE3800</i>	3
BE 4330 Biomimetic Materials <i>Prereqs: BE3350 and BE3800</i>	3
BE 4335 Smart Polymers <i>Prereqs: BE3350 and BE3800</i>	3
BE 4670 Micro & Nano Technologies <i>Prereqs: BE3700</i>	3
BE 4700 Biosensors: Fabrication and Apps <i>Prereqs: BE3700 and BE3701</i>	3
BE 4800 Biomaterials Interfaces <i>Prereqs: BE3800</i>	3
BL 3020 Biochemistry I <i>Prereqs: (BL1020 or BL1040 or BE2400) or (BL1200 and BL1210) or (BL1400 and BL1410) and (CH2410 or CH2420)</i>	3
BL 4020 Biochemistry II <i>Prereqs: BL3020</i>	3
BL 4030 Molecular Biology <i>Prereqs: BL1020 or BL1040 or (BL1200 and BL1210) or (BL1400 and BL1410) and (BL3020 or CH4710)</i>	3
BL 4035 Bioimaging* <i>Prereqs: none</i>	2
BL 4042 Scanning Electron Microscopy Bio Specimens* <i>Prereqs: BL4035</i>	2
BL 4062 Transmission Electron Microscopy of Bio Specimens* <i>Prereqs: BL4035</i>	2
CH 3520 Physical Chem II - Molecular Structure <i>Prereqs: CH1122 or (CH1160 and CH1161) and MA3160 and PH2200(C)</i>	3
CH 4212 Instrumental Analysis* <i>Prereqs: CH2212 and CH3510(C) and CH3511(C)</i>	5
CH 4310 Inorganic Chemistry I <i>Prereqs: CH3520</i>	3
CH 4320 Inorganic Chemistry II <i>Prereqs: CH4310</i>	3
CH 4560 Computational Chemistry <i>Prereqs: CH3520</i>	3
CH/CM 4610 Intro to Polymer Science <i>Prereqs: CH1122 or (CH1160 and CH1161) or</i> MSE 4110 Intro to Polymer Engineering <i>Prereqs: (MY2100 or MSE2100 or BE2800) and CH1160</i>	3
CH 4620/CM4620 Polymer Chemistry <i>Prereqs: CH2420 or CH2440</i>	3
CH 4631/CM4631 Polymer Science Laboratory <i>Prereqs: CH4610(C) or CM4610(C) or BE4300(C) or MY4600(C) or MSE4110(C)</i>	2

CH 4640 Synthesis of Nanoparticles <i>Prereqs: (CH2410 or CH2430) and CH2411</i>	3
CH 4720 Biomolecular Chemistry II <i>Prereqs: BL3020 or CH4710</i>	3
CM/ENT 3979 Alternative Energy Technology <i>Prereqs: CH1112 or (CH1150 and CH1151) and (MA1160 or MA1161 or MA1121)</i>	1
CM 4710 Biochemical Processes <i>Prereqs: BL2100 or CH2410 or BL3020</i>	3
MGT 3800 Entrepreneurship <i>Prereqs: None</i>	3
MSE 3121 Materials Characterization I* <i>Prereqs: MSE2110 and MSE2100</i>	3
MSE 3122 Materials Characterization I Laboratory <i>Prereqs: MSE2110 and MSE2100 and MSE3121(C)</i>	1
MSE 3131 Materials Characterization II* <i>Prereqs: MSE2100 or BE2800</i>	3
MSE 3132 Materials Characterization II Lab <i>MSE2100 or BE2800</i>	1
MSE 3150 Intro to Semiconductor Materials & Devices <i>Prereqs: PH2200 and MA2160</i>	3
MSE/EE 4240 Introduction to MEMS <i>Prereqs: None</i>	4
MSE/PH 4292 Light and Photonic Materials <i>Prereqs: PH2200 or EE2190 or EE3140</i>	3
MSE 4410 Science of Ceramic Materials <i>Prereqs: MY2100 or MSE2100 or BE2800</i>	3
MSE 4510 Contact Mechanics and Nanoindentation <i>Prereqs: (MY2100 or MSE2100 or BE2800) and (MA3521 or MA3520 or MA3530) and MEEM2150</i>	3
MSE 4530 Scanning Electron Microscopy and X-Ray Micro* <i>Prereqs: None</i>	3
MSE 5580 Intro to Scanning Probe Microscopy* <i>Prereqs: None</i>	2
PH 3410 Quantum Physics I <i>Prereqs: PH2400 and (MA3520 or MA3521 or MA3530 or MA3560)</i>	3
PH 3411 Quantum Physics II <i>Prereqs: PH3410</i>	3
PH/MSE 4292 Light and Photonic Materials <i>Prereqs: PH2200(C) or EE2190 or EE3140</i>	3
PH 5530 Selected Topics in Nanoscale Science and Tech <i>Prereqs: None</i>	2
SS 3650 Intellectual Property Law Management <i>Prereqs: UN1015 and UN1025</i>	3

Additional electives may be selected from the courses below

Course	Credits
BL 2100 Principles of Biochemistry <i>Prereqs: BL1020 or BL1040 or BE2400 or (BL1200 and BL1210) or (BL1400 and BL1410) and CH1112 or (CH1150 and CH1151)</i>	3
BL 2200 Genetics <i>Prereqs: BL1020 or BL1040 or BE2400 or (BL1200 and BL1210) or (BL1400 and BL1410)</i>	3
CH 2420 Organic Chemistry II <i>Prereqs: CH2410</i>	3
PH 2400 University Physics IV: Waves & Modern Physics <i>Prereqs: PH2200 or PH2260</i>	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 department or instructor permission