

**Michigan Technological University**  
**Minor in Naval Systems Engineering**  
Program Code EMNS, Academic Year 2023-24  
College of Engineering  
Total Credits Required: 18

**Required Courses: 10 Credits**

- MEEM 2150 Mechanics of Materials (3) *Prereqs: MEEM2110*
  - or ENG 2120 Statics-Strength of Materials\* (4) *Prereqs: MA2160 and PH2100 and ENG1102*
- MEEM 3201 Introductory Fluid Mechanics & Heat Transfer (4) *Prereqs: MEEM2201 and MEEM2911 and MA3160*
  - or MSE 3110 Materials Processing II (4) *Prereqs: (MY2110 or MSE2110) and (MY3100 or MSE3100) and (MA3520 or MA3521 or MA3530 or MA3560)*
  - or ENG 3200 Thermodynamics/Fluid Mechanics\* (4) *Prereqs: CH1112 or (CH1150 and CH1151) and PH2100 and ENG1102 and MA2160*
- MEEM 4850 Naval Systems and Platforms (3) *Prereqs: MEEM3201 or ENG3200 or MY3110 or MSE3110*

**Elective Courses: Select remaining credits from the following course list**

- CEE 5520 Intro to Hydrodynamic Modeling (3) *Prereqs: MA3520 or MA3521 or MA3530 or MA3560*
- CS 4001 Cybersecurity Policy and Law (3) *Prereqs: none*
- CS 4471 Computer Security (3) *Prereqs: CS3411 or CS4411*
- CS 4723 Network Security (3) *Prereqs: EE4272 or CS4461 or SAT4812*
- CS 4811 Artificial Intelligence (3) *Prereqs: CS2311 and CS2321 and (CS3411 or CS3421 or CS3425 or CS3331)*
- CS 4821 Data Mining (3) *Prereqs: (CS3425 or MIS3100) and (MA2330 or MA2320 or MA2321) and MA2710 or MA2720 or MA3710*
- EC 4050 Game Theory/Strategic Behavior (3) *Prereqs: UN1015 and UN1025*
- EE 3160 Signals and Systems (3) *Prereqs: (EE3010 or EE2112) and (MA2320 or MA2321 or MA2330) and (MA3520 or MA3521 or MA3530 or MA3560)*
- EE 3173 Hardware/Software System Integration (4) *Prereqs: EE2174 and (CS1111 or CS1142) and CS3421 and (MA3710 or EE3180)*
- EE 3180 Probability – Signal Analysis (3) *Prereqs: EE3160*
- EE 3190 Optical Sensing and Imaging (3) *Prereqs: MA3520 or MA3521 or MA3530*
- EE 3280 Robot Operating Systems (3) *Prereqs: EE2179 and SAT2711*
- EE 4227 Power Electronics (3) *Prereqs: EE3120 and (EE3130 or EE3131)*
- EE 4228 Power Electronics Lab (1) *Prereqs: EE4227*
- EE 4252 Digital Signal Processing and Applications (4) *Prereqs: EE3160*
- EE 4490 Laser Systems and Applications (4) *Prereqs: EE3140*
- ENT 4950 Enterprise Project Work V\*\* (2) *Prereqs: (BE3350 or BE3700 or BE4900) or (CEE3620 or CEE3810) or (CM4855(c)) or (CS3712 or CS4711 or CS4760) or (ENT3960 and EE3131 and EE3901)*
- ENT 4960 Enterprise Project Work VI\*\* (2) *Prereqs: ENT4950 and (BE4900 or CEE3620 or CEE3810 or CM4855 or CS3712 or CS4711 or CS4760 or EE3171 or EE3173 or GE3880 or GE3890 or MSE4141 or CMG4210 or EET4253 or MET4460 or SAT4541 or SU4100 or ENG3830 or (ENG3505 and ENG4505) or (MEEM3750 and MEEM3201)*
- ENT 4961 Enterprise Project Work VII\*\* (1) *Prereqs: ENT3950 and ENT3960 and (ENT4950 and ENT4960) or (ENT4900 and ENT4960)*
- MEEM 4150 Intermediate Mechanics of Materials (3) *Prereqs: MEEM2150*
  - or MSE 4100 Mech Behavior of Materials (3) *Prereqs: (MY2100 or MSE2100) and (MEEM2150 or ENG2120)*
- MEEM 4170 Failure of Materials in Mechanics (3) *Prereqs: MEEM3501 or MEEM3400*
- MEEM 4180 Engineering Biomechanics (3) *Prereqs: MEEM2150 and MEEM2700*
- MEEM 4210 Computational Fluids Engineering (3) *Prereqs: MEEM3201(c)*

*Elective courses continued on Page 2*

*Minor in Naval Systems Engineering, elective courses continued*

- MEEM 4295 or EE 4295 Introduction to Propulsion Systems for Hybrid Electric Vehicles (3) *Prereqs: MEEM2200 or ENG3200 or MEEM2201*
- MEEM 4630 Human Factors (3) *Prereqs: none*
- MEEM 4650 Quality Engineering (3) *Prereqs: MEEM3600(c) and (MA3710 or MA3720 or MA2710 or MA2720)*
- MEEM 4701 Analytical & Experimental Modal Analysis (4) *Prereqs: MEEM3750*
- MEEM 4702 Shock and Vibration (3) *Prereqs: (MEEM3911 and MEEM3750) or MEEM4775*
- MEEM 4704 Acoustics and Noise Control (3) *Prereqs: MA2160*
- MEEM 4705 Intro to Robotics and Mechatronics (4) *Prereqs: MEEM3750*
- MEEM 4707 Autonomous Systems (3) *Prereqs: MEEM3750 or MEEM4700 or MEEM4775(C)*
- MIS 4200 Management of Cyber Security (3) *Prereqs: MIS2000 or MIS2100 or CS1111 or CS1122 or CS1131*
- MSE 4120 Material and Process Selection in Design (3) *Prereqs: MY2100 or MSE2100 or BE2800*
- MSE 4320 Corrosion and Environmental Effects (3) *Prereqs: MY2100 or MSE2100 or BE2800*
- MSE 4325 Fundamentals of Corrosion (1) *Prereqs: CH1150 and CH1151*
- MSE 4430 Composite Materials (3) *Prereqs: MY2100 or MSE2100 or BE2800*
- SAT 3812 Cyber Security I (3) *Prereqs: SAT1200 or CS1111 or CS1121 or CS1131 or CS1142 or MIS2100*
- SAT 4520 Machine Learning in Security (3) *Prereqs: SAT3812 and SAT4310*
- SAT 4812 Cyber Security II (3) *Prereqs: SAT3812*
- SAT 4816 Digital Forensics (3) *Prereqs: SAT3812*
- SAT 4817 Sec Penetration Test and Audit (3) *Prereqs: SAT3812*

\* Minor credit cannot be granted for ME majors for these two courses

\*\*Requires naval systems project approved by minor advisor (SENSE enterprise)