

Naval Architecture and Marine Engineering

WHAT IS NAVAL ARCHITECTURE AND MARINE ENGINEERING?

Naval Architects and Marine Engineers design, build, and maintain ships from aircraft carriers to submarines, from sailboats to oil tankers. Naval architects are primarily responsible for the ship design, including the form, structure, and stability of hulls. Marine engineers are primarily responsible for the internal systems of a ship, such as propulsion, electrical, refrigeration, and steering.

NEEDED SKILLS:

- Engineering skills
- Hydrodynamics
- Ship dynamics
- Structural dynamics
- Design skills
- Computer skills
- Decision making
- Creative thinking
- Critical thinking
- Scientific reasoning
- Communication and active listening skills

JOB TITLES

- Naval Architect
- Marine Engineer
- Marine Architect
- Naval Engineer
- Boat Designer
- Structural Designer
- Piping Designer
- Technical Manager

SALARIES

\$93,110

The nationwide average salary for employees with a bachelor's degree in Naval Architecture and Marine Engineering (from <http://www.bls.gov/ooh/>)

\$61,857

Average starting salary of Bachelors graduates (from the Department of Naval Architecture and Marine Engineering)

INDUSTRIES AND OCCUPATIONS

- Offshore Industries
- National Defense
- International Trade and Shipping
- Coastal and Great Lakes Shipping
- Oil and Gas Exploration
- Regulatory Agencies
- Research
- Other Transportation Industries

JOB OUTLOOK

Employment of naval architects and marine engineers is expected to grow 9% from 2014 to 2024, about as fast as the average for all occupations. The need to design ships and systems to transport energy products, such as liquefied natural gas, across the globe will help to spur employment growth for this occupation. Additional employment of naval architects and marine engineers also will be supported by the need to modify existing ships and their systems because of new emissions and pollution regulations on cargo shipping.*

MORE INFORMATION

- www.myplan.com
- stats.bls.gov/ooh
- www.name.engin.umich.edu (UM program website)
- <http://www.sname.org> (Society of Naval Architects & Marine Engineers)
- Engineering Career Resource Center, 230 Chrysler
- See an NAME advisor. Call 764-6471 or visit 221 NAME Building

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WHICH NAME CLASSES SHOULD YOU START WITH?

To begin, a good option is to take MECHENG 211 and NAVARCH 270, followed by MECHENG 235, MECHENG 240, and NAVARCH 260. Note that NAVARCH 260 and 280 are only offered in the Winter Term. Read more about the NAME Department at: <http://www.engin.umich.edu/dept/name/>

COURSE DESCRIPTIONS

MECHENG 211 – 4 credits

Introduction to Solid Mechanics

Prereq: Physics 140 and Math 116

Statics: moment and force resultants, equilibrium.
Mechanics of deformable bodies: stress/strain, classification of material behavior, generalized Hooke's law.

Engineering applications: axial loads, torsion of circular rods and tubes, bending and shear stresses in beams, deflection of beams, combined stresses, stress and strain transformation. Four lecture classes per week.

MECHENG 235 – 3 credits

Thermodynamics I

Prereq: Chem 130/125 or Chem 210/211 and Math 116

Introduction to engineering thermodynamics. First law, second law, system and control volume analyses; properties and behavior of pure substances; application to thermodynamic systems operating in steady state and transient processes. Heat transfer mechanisms. Typical power producing cycles and refrigerators. Ideal gas mixtures and moist air applications.

MECHENG 240 – 4 credits

Dynamics & Vibrations

Prereq: Physics 140, preceded or accompanied by Math 216

Vector description of force, position, velocity and acceleration in fixed and moving reference frames. Kinetics of particles, of assemblies of particles and of rigid bodies. Energy and momentum concepts. Euler's equations. Moment of inertia properties. The simple oscillator and its applications.

NAVARCH 260 – 2 credits

Marine Systems Manufacturing (Winter term only)

Prereq: NAVARCH 270

The marine industry and its environment as it relates to all aspects of naval architecture and marine engineering, including industry characteristics; organization; product types and components; materials used, joining methods, shipbuilding, boatbuilding and offshore equipment manufacturing methods; design; production engineering; planning' contracts and specifications; cost estimating; production and material control.

NAVARCH 270 – 4 credits

Marine Design (Fall term only)

Prereq: Math 116

Introduction to the marine industries, ships, and platforms. Engineering economics as applied to marine design decision making. Overview of preliminary ship design with brief team design project. Hydrostatics, stability, and trim of ships, boats, and marine platforms.

NAVARCH 280 – 2 credits

Probability for Marine Engineers (Winter term only)

Prereq: Math 116

Introduction to the fundamentals of probability theory, with marine applications. Events, Probabilities, Combinatorics, Independence, Bayes Theorem; Discrete and Continuous Random Variables, Central Limit Theorem, Elements of Engineering Statistics, goodness of fit, regression, correlation.