**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
- 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
- Project Engineer

**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

**SALARIES**

$92,560
The nationwide average salary for employees with a bachelor’s degree in Naval Architecture and Marine Engineering (from [http://www.bls.gov/ooh/](http://www.bls.gov/ooh/))

$65,875
Average starting salary of Bachelors graduates (from the Department of Naval Architecture and Marine Engineering)

**JOB OUTLOOK**

Employment of marine engineers and naval architects is projected to grow 12 percent from 2016 to 2026, faster than the average for all occupations. The need to design environmentally friendly ships and systems to transport energy products, such as liquefied natural gas, across the globe will help to spur employment growth for this occupation. Demand for marine engineers and naval architects will also come from the desire to have cargo ships that pollute less. The technology to do this is becoming more cost-effective and the United States and other countries are focusing more on reducing pollution. This will also include the adoption of new and alternative energy sources, such as offshore wind turbines and tidal power generators.

**MORE INFORMATION**
- www.myplan.com
- stats.bls.gov/ooh
- www.name.engin.umich.edu (UM program website)
- Engineering Career Resource Center, 230 Chrysler
- See an NAME advisor. Call 764-6471 or visit 221 NAME Building
WHICH NAME CLASSES SHOULD YOU START WITH?

To begin, a good option is to take NAVARCH 210 (or ME 211) and NAVARCH 270, followed by NAVARCH 235 (or ME 235), MECHENG 240, and NAVARCH 280. Note that 270 is offered in the Fall and 280 is only offered in the Winter.

Read more about the NAME Department at: http://www.engin.umich.edu/dept/name/

COURSE DESCRIPTIONS

**NAVARCH 210 – 3 credits**

**Introduction to Solid Mechanics and Marine Structures**  
(Winter term only)

*Prereq: Physics 140 and Math 116*

Fundamentals of mechanics of solids: stress, strain and equilibrium concepts used in the analysis of deformable materials and structures. Idealizations of marine structures including bars, beams, and frames; deflections due to bending and torsion. Methods of structural analysis including equilibrium and strength requirements in consideration of stresses, forces and moments.

**NAVARCH 235 – 3 credits**

**Marine Thermodynamics**  
(Fall term only)

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


**NAVARCH 270 – 4 credits**

**Marine Design**

*Prereq: Math 116*

Introduction to the marine industries, ships and platforms. Engineering economics as applied in marine design decision making. Overview of preliminary ship design with brief team design project. Hydrostatics, stability and trim of ships, boats, and marine platforms. This course is the first design course in the Naval Architecture and Marine Engineering major sequence.

**NAVARCH 280 – 3 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.

**MECHENG 240 – 4 credits**

**Dynamics and Vibrations**

*Prereq: Physics 140, preceded or accompanied by Math 216*