

UNITED STATES NAVAL ACADEMY

DIVISION OF ENGINEERING & WEAPONS
ANNAPOLIS, MARYLAND



Photo courtesy of NASA

Within the Division of Engineering and Weapons at the United States Naval Academy, students may pursue the following majors.

- ★ Aerospace Engineering Department:
Major in Aerospace Engineering.
- ★ Electrical and Computer Engineering Department:
Major in Electrical Engineering
Major in Computer Engineering
- ★ Naval Architecture and Ocean Engineering Department:
Major in Naval Architecture
Major in Ocean Engineering
- ★ Mechanical Engineering Department:
Major in Mechanical Engineering
Major in Nuclear Engineering
Major in General Engineering
- ★ Weapons and Systems Engineering Department:
Major in Systems Engineering

Each department offers great opportunities for cutting-edge research and intense study of the latest trends in engineering.



Electrical and Computer Engineering Department

Electrical Engineering is the study and application of electricity, electronics, and electromagnetism and prepares students to lead fleet forces and manage the sophisticated Navy systems used in combat and combat support. Electrical engineers understand, develop, and employ devices that harness and control electricity, electric fields, magnetic fields, and the resulting electromagnetic energy. Tracks within the major include:

- Computer digital design and interfacing
- Electronics
- Communication systems
- Power systems
- Digital Signal Processing
- Biometrics
- Electromagnetics
- Microelectromechanical Systems

Computer Engineering is a discipline that combines fundamentals from both electrical engineering and computer science. Computer Engineers understand different aspects of a computer, ranging from low-level physics to high-level computer software in order to design, implement, analyze and evaluate computer systems and devices. Tracks within the major include:

- Computer Architecture and Parallel Processing
- Integrated Circuits and VLSI Design
- Algorithms and Coding
- Computer Networking
- Digital Logic Design
- Embedded Systems
- Operating Systems
- Electronics

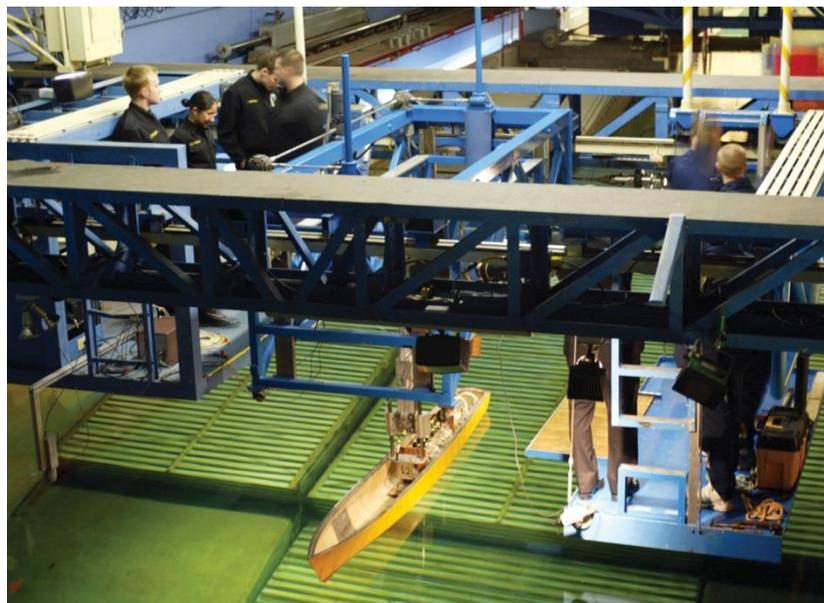


Naval Architecture and Ocean Engineering Department

Naval Architecture combines imagination, artistic instincts, scientific principles, and engineering considerations in designing future means of ocean transportation. Building on a foundation of basic engineering topics such as fluid mechanics and material science, the naval architecture student learns modern techniques of marine vehicle performance and design analysis culminating in the design of their own ship as their senior design project.

Ocean Engineering blends the fundamentals of mathematics, physics, material science, and oceanography with the basic elements of civil, mechanical, and electrical engineering and applies this knowledge within the ocean environment. Students may specialize in one of the following tracks of study:

- Offshore Civil Engineering
- Underwater Technology
- Environmental Engineering
- Coastal Engineering



Mechanical Engineering Department

Mechanical Engineering is an exciting field of study where math and physics are used for practical purposes: to design, build and improve devices of a modern world. As one of the oldest disciplines in engineering, it consists of study in mechanical systems and thermal-fluid systems. Specialty tracks include:

- Energy and Propulsion
- Structures and Materials

Nuclear Engineering is an appreciation of disciplines which explore the theory and use of nuclear energy for power generation and weapons development. Courses include reactor theory, nuclear instrumentation and control, and energy conversion.

General Engineering is a standard fundamental engineering program that is the most broadly focused of all of our programs and offers the greatest flexibility in minors and technical electives.



Systems Engineering Department

Systems Engineering is an interdisciplinary major whose primary objective is dedicated to control systems and automation; the design and construction of systems or devices that work by themselves with little or no direct human control. Our weapon systems origin explains why our systems major differs from other institutions where they deal with the management and integration of engineering systems. We use skills from Electrical, Mechanical and Computer Engineering to make smart devices through a sequence of courses in Automatic Control Systems with electives in Robotics, Autonomous Vehicles, Sensors and Computer Systems. Systems Engineering majors may elect to specialize in control systems, information systems, computer engineering or robotics.



Aerospace Engineering Department

Aerospace Engineering is structured to prepare naval officers to serve at the forefront in the inception, design, development and employment of Navy air and space assets culminating with each student designing, building, and flying their own working aircraft or satellite. Students study fundamental courses focused on aerospace principles, aircraft structural mechanics, aviation materials and gas dynamics. The department also offers the following specialty tracks of study:

- Aeronautics
- Astronautics
- Rotary wing aircraft



Research and Design

All engineering majors offer opportunities in research and design. The midshipmen are competitive participants in many nationwide engineering organizations. These include design projects such as ASME FIRST Robotics; the SAE Formula One Car; the Aerospace: Design, Build, Fly Project; Concrete Canoe competition; Human Powered Submarine; Robotic Football; Nanorobots; and various air, land, surface and subsurface autonomous vehicles such as Sailbot and Robosub.

Faculty

The Division of Engineering and Weapons faculty is an integrated group of highly dedicated and motivated professional officers and civilians in approximately equal numbers. All of the civilian faculty members have earned doctorate degrees with the military holding a minimum of a master degree in their field. The professional scholarship and teaching experience of the civilian faculty, combined with the operational experience of the officers, provides a faculty uniquely qualified to educate and motivate midshipmen for a career in the United States Navy and Marine Corps.



USNI Photo Archive

Admiral Hyman G. Rickover, father of the nuclear navy

Degree

All of the degree programs in the Division of Engineering and Weapons are fully accredited by the Accreditation Board for Engineering and Technology (ABET), <http://www.abet.org>, with the exception of Nuclear Engineering which is a brand new program at USNA whose accreditation will be pursued at the next accreditation cycle and fully retroactive to all students.

*For more information:
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State of the Art Facilities

The Division is supported by an array of sophisticated laboratory facilities, with state of the art equipment, including:

- ★ aerodynamics laboratory including a supersonic wind tunnel capable of Mach 4.2.
- ★ full-size helicopter rotor test cell, and a propulsion cell supporting turbine, reciprocating and rocket engines.
- ★ hydrodynamics laboratory including a 380-foot towing tank, several smaller tanks, and a circulating water channel to test propeller and rudder design.
- ★ Computer Aided Design (CAD) laboratories with individual high-performance workstations.
- ★ satellite ground station capable of communicating with orbital spacecraft and the International Space Station.
- ★ advanced materials laboratory with a Scanning Electron Microscope (SEM) with X-ray microanalysis capabilities.
- ★ electrical engineering laboratories supporting signal processing, fiber optics, communications and biometrics.
- ★ nucleonics lab including a sub-critical nuclear reactor.
- ★ directed energy lab conducting laser weapon research.
- ★ systems labs with 3D printing capability, robotics and a wide range of air, surface and subsurface autonomous vehicles

