

# Naval Science and Technology

## Chair, Department of Mechanical Engineering

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**Undergraduate certificate:** naval science and technology

**Website:** <https://engineering.uiowa.edu/mechanical-engineering-undergraduate-program/me-certificates/naval-science-and-technology>

Naval science and technology has a tremendous impact upon defense, world commerce, and energy production. The U.S. Navy is expanding its fleet to the largest size in nearly 20 years. Approximately 90% of world trade is carried by sea. The number of offshore solar, wind, and wave energy installations continues to increase.

The underlying science and technology challenges demand a workforce with a strong foundation in the engineering sciences related to fluid flow, computational and experimental methods, autonomous systems, and control. The Certificate in Naval Science and Technology introduces students to the principles of naval hydrodynamics, including propulsion, resistance, maneuvering, and seakeeping, as well as the fundamentals of autonomous systems, including control systems, robotics, and artificial intelligence.

Students who complete the certificate will work in a unique learning community where they will have an opportunity to contribute to projects of interest to the Navy and its supporting industry, and learn about potential career paths.

The Certificate in Naval Science and Technology is administered by the Department of Mechanical Engineering.

## Learning Objectives

The Certificate in Naval Science and Technology is built on eight learning objectives. The first six learning objectives are focused on providing students with strong technical and leadership skills and an understanding of marine systems, enabling them to work effectively in naval science and technology and other technology-intensive fields. Specifically, students will achieve the following.

- Demonstrate a foundation in the fundamentals of fluid mechanics and naval hydrodynamics.
- Use advanced numerical methods and/or measurement techniques to solve fluid-flow problems and design systems involving naval hydrodynamics.
- Demonstrate a foundation in the fundamentals of control theory and artificial intelligence, including optimal control, tracking, planning, machine learning, and reinforcement learning.
- Use simulators and experiments to evaluate, simulate, and design autonomous naval systems.
- Develop potential for continued growth and leadership in a complex and multidisciplinary technical environment.
- Demonstrate the organization and communication skills needed to manage open-ended projects.

The final two learning objectives focus on understanding the challenges faced by the Navy and helping students to identify related career paths.

- Recognize and address current science and technology challenges faced by the Navy.
- Be able to make decisions about career paths in the Navy, its contractors, and supporting industry.