



## OUTSTANDING DESIGN

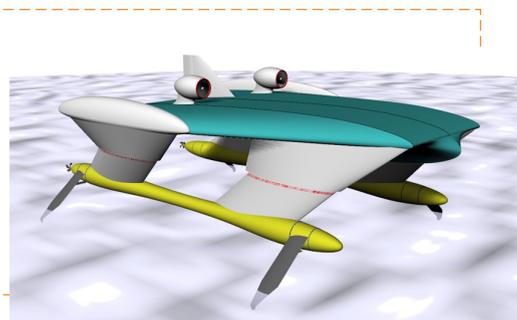
Ocean engineering is a diverse field. At Virginia Tech, the major focus areas are ocean energy systems and ocean vehicles and structures, which include ships, advanced marine vehicles, offshore platforms, and submarines. Both undergraduate and graduate programs focus on computer-aided analysis and design of ships, using methods based on first principles.

- Hydrodynamics: The flow of water as it moves around a ship's hull, into the propeller, and over the rudder is critical to a craft's performance, as are stability, slamming, and minimizing resistance.
- Structures: Loads on ocean vehicles are severe, ranging from extreme diving pressures and huge storm waves to thousands of tons of cargo. Students use finite element analysis to design structures that can withstand these loads
- Vehicle Dynamics: An understanding of ships' motions in a seaway and ship maneuverability is an important consideration in the design of a functional and comfortable ship.

## COMPUTER BASED DESIGN TOOLS

Virginia Tech is home to MAESTRO, today's most advanced computer-based method for the structural analysis and optimization of ship, submarine, and offshore platform structures. Other computer tools

used include FASTSHIP for geometry definition, NAVCAD for powering, GHS and SHCP for stability, and many other industry standard ship design programs.



## PROGRAM OBJECTIVES

The undergraduate programs' educational objectives are that graduates will combine their undergraduate education and post-graduation experience to:

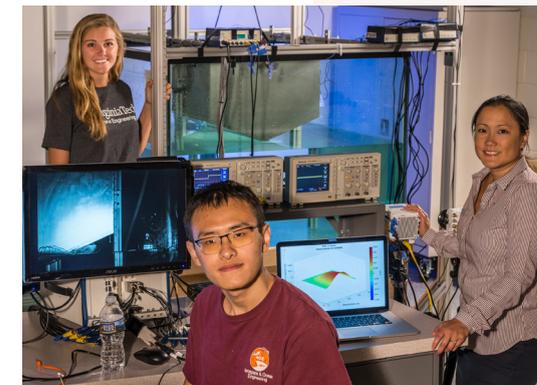
- Be successful in entry-level professional positions or in graduate study in aerospace and ocean engineering.
- Apply the theoretical, experimental and computational fundamentals of science and engineering to professional practice, advanced study and continuing professional development.
- Apply their broad understanding of fluid dynamics, vehicle dynamics and control, propulsion and structures to design and synthesis of aerospace or ocean systems in a team environment.
- Communicate their work effectively to both experts in their field and non-technical individuals.

## ACCREDITATION

ABET is the recognized accreditor for college and university programs in applied science, computing, engineering, and technology. Among the most respected accreditation organizations in the U.S., ABET has provided leadership and quality assurance in higher education for over 75 years.

The Kevin T. Crofton Department of Aerospace and Ocean Engineering is unique in offering Bachelor of Science degrees in both aerospace engineering and ocean engineering. Both of these engineering programs are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

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## YOU ARE WHAT TOMORROW WILL NEED

A number of engineering achievements in the past century shaped the world we live in today: flight, space exploration, the birth of computers and the internet. Future engineers expect to tackle complex 21st century issues such as providing energy from fusion, engineering the tools for Earth and planetary sciences, and securing cyber-physical systems.

Ocean engineers develop, design, and analyze technology that operates in the unpredictable environment on or below the surface. You will design ships that are faster and ensure protection from cyber-physical threats, keeping our waters safe and secure.

- The Kevin T. Crofton Department of Aerospace and Ocean Engineering is ranked as one of the Top 15 aerospace and ocean engineering schools by U.S. News and World Report.
- Engage in an exciting and challenging curriculum. While courses on a wide range of traditional ocean engineering subjects are offered, you will also explore modern-day issues such as cyber-physical systems and distributed control, aero/hydroacoustics and ethics in autonomous systems.
- Learn from leading ocean engineering faculty who bring real-world experience from the naval ship design and marine engineering. Undergraduates are able to gain hands-on experience in a wide variety of ongoing research projects in the department.

## UNDERGRADUATE PROGRAMS

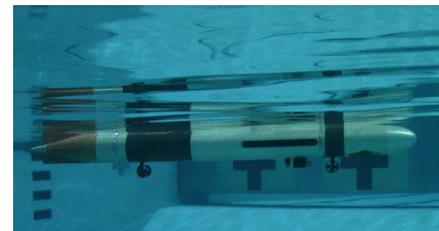
The Kevin T. Crofton Department of Aerospace and Ocean Engineering offers a bachelor of science degree in aerospace and ocean engineering. Students may major in either aerospace engineering or ocean engineering. These degrees share many course requirements because the two curricula cover a broad range of common interests and offer a wide range of technical electives. Students with an interest in both majors may choose to combine the programs in a double major with either aerospace or ocean as their primary major.

## CAPSTONE DESIGN EXPERIENCE

Our undergraduate programs emphasize propulsion, aero/hydrodynamics, stability and control, vehicle performance, and vehicle structures, which leads to a year-long capstone design experience in the senior year. Design project assignments are developed by industry and government experts as part of international design competitions. AOE students have won numerous awards for their aircraft, spacecraft, and ship designs.

## NAVAL ENGINEERING MINOR

Naval Engineering includes engineering and sciences applied in the research, development, design, construction, operation, maintenance and logistic support of surface and subsurface ships, craft, aircraft, and vehicles (manned and autonomous) used by the Navy for the nation's defense.



By its nature, naval engineering is multidisciplinary, involving all departments from the College of Engineering. This minor enables undergraduate students throughout the college to better prepare for and aspire to this critical profession. This minor supports the requirements of the Naval Engineering Education Consortium in which students may participate. The consortium provides students with opportunities to find industry and U.S. Navy mentors, projects, internships, co-ops, and job opportunities.

## UNDERGRADUATE TO GRADUATE DEGREE PROGRAMS

Aerospace and ocean engineering seniors who have an overall GPA of at least 3.3 may be eligible for Undergraduate/Graduate (UG/G) Status or Dual Status, allowing students to count up to 12 credits of coursework for both the undergraduate and graduate degree programs during the last semesters of their undergraduate degree.

Guidelines for the UG/G and Dual Status Programs are on the AOE website at <http://www.aoe.vt.edu/undergrad/undergrad-advising/index-undergrad-advising.html>.

## EXCELLENCE IN INSTRUCTION

The faculty/student ratio in the aerospace engineering undergraduate major is about 1 to 15, allowing each faculty member to really get to know you. Our faculty brings diverse and extensive experience in naval ship design, marine propulsion, and aero/hydrodynamics. Other developing fields, such as global positioning system (GPS) and cyberphysical security, will enhance your classroom and lab experience.

The department is home to a number of unique ocean engineering facilities, including Hydro-Elasticity Laboratory, Hydrodynamics Laboratory, Marine Robotics Laboratory, and Newport News Shipbuilding (NNS) / Aerospace and Ocean Engineering (AOE) Teaching and Research Laboratory.

## DESIGNED FOR STUDENT SUCCESS

AOE students have been highly successful after graduation. About 15% of our graduates continue their studies in graduate school while others find excellent employment opportunities in the shipbuilding, naval engineering, and ship design fields. Some of our alumni choose to go into related fields such as automotive engineering, structural engineering, or environmental engineering. The department's long history and reputation for excellence have ensured that our graduates are recruited by industry even during difficult economic times.

