Program Overview

Ocean engineering design requires a comprehensive background in all of the areas of study associated with ocean engineering:

- **Hydrodynamics:** The flow of water around a ship’s hull, into the propeller, and over the rudder is critical to its performance.
- **Structures:** The structural loads on ships and submarines are among nature’s most intense, ranging from extreme diving pressures to huge storm waves to the weight of thousands of tons of cargo.
- **Propulsion:** From propellers to propulsion plants to control systems, ocean engineering students use their backgrounds to understand and analyze the propulsion systems of today and of the future.
- **Vehicle Dynamics:** An understanding of ship motions in a seaway (called seakeeping) and ship maneuverability are important to designing a functional and comfortable ship.
- **Marine Engineering:** Study of the machinery that goes into running a ship, including main engines, electric generators, heating, and air conditioning among many others.

Who Should Be Interested?

- Recent graduates with engineering or science backgrounds.
- Individuals seeking to apply mathematics, physics, or associated scientific principles to the design, development, and operation of ocean related systems.
- Ocean engineering professionals who want to advance in their career.
- Anyone interested in maximizing their career potential in a field of growing demand.

Virginia Tech’s Program is Designed for Student Success

- Earn a degree from Virginia Tech’s College of Engineering ranked as one of the Top 25 graduate schools by U.S. News and World Report.
- Engage in an exciting curriculum that provides students with the knowledge and tools to enter the diverse field of ocean engineering.
- Work with the best—Virginia Tech is the home of MAESTRO, today’s most advanced computer-based method for analysis and optimization of ships, submarines, and offshore structures.
- Learn from leading ocean engineering faculty experts, who bring real-world experience from the U.S. Navy, industry research, and design arenas.
- Collaborate with students from all over the world to bring a dynamic exchange to the classroom.
Graduate Programs
The Aerospace and Ocean Engineering Department offers Masters and Doctoral programs in aerospace engineering, a Masters program in ocean engineering, and a certificate program in naval engineering. Within aerospace engineering, graduate students may pursue a non-thesis Master of Engineering degree, a Master of Science degree (thesis or non-thesis option), or a Doctor of Philosophy degree. Within ocean engineering, graduate students may pursue a Master of Science degree (thesis or non-thesis option). Students wishing to pursue a doctorate in an ocean engineering related topic may do so as a specialization within the aerospace engineering Ph.D. program. A certificate in naval engineering may be obtained.

The department’s unique blend of aerospace engineering and ocean engineering exploits commonalities in the design and analysis of vehicles and structures that operate in fluids, as well as the behavior of the fluid itself, thereby providing a unified framework for understanding the physical processes that drive the dominant physical processes of the ocean and atmosphere. The students are taught to master fundamental tools and methods that span a wide range of applications domains.

The aerospace and ocean engineering graduate programs emphasize a broad background in aeronautics/aerospace engineering, ocean engineering, and physics and controls, with deeper specialization in areas of interest to the student. Doctoral students, for example, must declare a specialization in applied mathematics, applied physics and space engineering, aerodynamics, controls, dynamics and control, or ocean engineering, or structures.

Aerospace and ocean engineering graduate alumni have been highly successful in their chosen discipline. Many seek and obtain research and development positions with industry or government research and development laboratories while others pursue academic positions at colleges or universities. The department’s strong academic reputation and the outstanding professional performance of our alumni and alumnae ensure that aerospace and ocean engineering graduates remain in very high demand.

Tracks and Courses
Masters students must complete 30 graduate credit hours, including four core courses listed below:

- AOE 4404: Applied Numerical Methods
- AOE 5304: Advanced Ship Structural Analysis
- AOE 5104: Advanced Aero and Hydrodynamics
- AOE 5334: Advanced Ship Dynamics

Up to 50% of the graded courses on the Plan of Study may be transferred from a naval engineering major or another institution. A final comprehensive oral exam is required. Specific requirements for each track can be found in the graduate Study Policies and Procedures Manual.

Master of Science Thesis Track
- Students must complete 9-12 credits of approved electives.
- Students must complete a minimum of 12 credits of graded course work numbered 5000 and higher.
- A maximum of 6 credits of AOE 59741 and AOE 59841 is allowed.
- A maximum of 6 credits of approved 4000 level course work is allowed.

Master of Science Non-Thesis Track
- Students must complete 18 credits of approved electives.
- Students must complete a minimum of 12 credits of graded course work numbered 5000 and higher.
- A maximum of 9 credits of AOE 59741 and AOE 59841 is allowed.
- A maximum of 6 credits of approved 4000 level course work is allowed.

Admissions Requirements
- A bachelor’s degree, typically in engineering, mathematics, or physics from an accredited institution.
- Applicants should provide evidence that shows genuine promise of success in graduate study and a strong academic record. A 3.0 GPA or better on a 4.0 scale is required.
- Full admission to the Virginia Tech Graduate School.

Program Eligibility
- Official transcripts sent to both the Graduate School and to the Aerospace and Ocean Engineering Department. (www.applyweb.com/apply/vtechg/index.html).
- Statement of Interest and Curriculum Vitae, which can be attached to the online graduate application.
- Three Letters of Recommendation.
- A bachelor’s degree, typically in engineering, mathematics, or physics from an accredited institution.
- A 3.0 GPA or better on a 4.0 scale is required.

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For more information, visit our website at www.aoe.vt.edu or call 540-231-6612.