

*"As an alumnus of the undergraduate program and now finishing my graduate studies in Ocean Engineering at Virginia Tech, I feel that I am well positioned for a career exploring interesting issues in marine hydrodynamics. The growing department is currently working on a diverse range of topics in the aerospace and ocean fields. This provides the opportunity to become involved with some really exciting research using great experimental and computational resources on campus. Not to mention, Blacksburg is a pretty nice place to live and study!"*

*--Andrew Bloxom, Ph.D. graduate student*

# Ocean Engineering Master of Science Degree Virginia Tech

## 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.



## 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.

## Engineering by Design

Journey to success with Virginia Tech's  
Master of Science Degree in Ocean Engineering

## 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.



For more information, visit our website  
at [www.aoe.vt.edu](http://www.aoe.vt.edu)  
or call 540-231-6612.





## 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 with any of these degrees.

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. While the properties of the ambient fluid may differ dramatically for ocean, atmospheric, and space vehicles/structures, the dominant physical processes that govern the behavior of these systems are quite similar. Graduate students may leverage the department's broad faculty expertise to master tools and methods that span a wide range of application domains.

The aerospace and ocean engineering graduate programs emphasize a broad background in aero/hydrodynamics, vehicle structures, and vehicle dynamics and control, 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, aero/hydrodynamics, dynamics and control, 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 5074: 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 graduate program at 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 6-10 credits of AOE 5994<sup>1</sup>.
- Students must complete a minimum of 12 credits of graded course work numbered 5000 and higher.
- A maximum of 6 credits of AOE 5974<sup>1</sup> and AOE 5984<sup>1</sup> 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 6 credits of AOE 5904<sup>1</sup> or take AOE 5315-5316<sup>1</sup>.
- Students must complete a minimum of 12 credits of graded course work numbered 5000 and higher.
- A maximum of 9 credits of AOE 5974<sup>1</sup> and AOE 5984<sup>1</sup> is allowed.
- A maximum of 6 credits of approved 4000 level course work is allowed.

## Points of Interest

Number of Active Faculty: 24

Number of Masters and Ph.D. Students: More than 100

Unique Facilities: Stability, Open-Jet, Boundary-Layer, Low Speed, Transonic, Supersonic, and Hypersonic Wind Tunnels; new propulsion laboratory, new Space@VT building, new Kentland Experimental Aerial Systems Laboratory, new Center for Renewable Energy and Aerodynamic Testing (CREATe)

Multidisciplinary Research Programs: Collaborative Center for Multidisciplinary Sciences, Naval Engineering Program, Virginia Center for Autonomous Systems

## Naval Engineering Graduate Certificate

Naval engineering is defined as a field of study and expertise that includes all engineering and sciences as 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 U.S. Navy for the nation's defense. It is inherently multidisciplinary involving all departments from the College of Engineering and from other colleges as well. This certificate program will attract and enable graduate students throughout the College of Engineering to better prepare for this critical profession. It is open to all graduate students in the College of Engineering.

This graduate certificate consists of AOE 5304<sup>1</sup>, AOE 5305<sup>1</sup> or 5306<sup>1</sup>, and AOE 5314<sup>1</sup>. AOE 4264<sup>1</sup> is a prerequisite for AOE 5314<sup>1</sup>. Students applying for the certificate will submit the program of study for the certificate to the Graduate School upon approval by one of the faculty members on the Graduate Certificate in Naval Engineering Oversight Committee. A minimum of 3.0 GPA on a 4.0 scale in the designated courses is required.

<sup>1</sup> Course titles are found in the Graduate Catalog ([graduateschool.vt.edu/graduate\\_catalog/](http://graduateschool.vt.edu/graduate_catalog/)).

## Program Eligibility

### 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 of a good academic record. A 3.0 GPA or better on a 4.0 scale is required.
- Full admission to the Virginia Tech Graduate School ([www.graduateschool.vt.edu](http://www.graduateschool.vt.edu)).

### Application Documents

- Official transcripts sent to both the Graduate School and to the Aerospace and Ocean Engineering Department.
- Statement of Interest and Curriculum Vitae, which can be attached to the online graduate application ([www.applyweb.com/apply/vtechg/index.html](http://www.applyweb.com/apply/vtechg/index.html)).
- Graduate Record Examination (GRE) Scores.
- Three Letters of Recommendation.
- Test of English as a Foreign Language (TOEFL) Scores for international applicants.
- Immigration Information Form for international applicants.

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