

# Frank Batten College of Engineering and Technology

**Web Site:** <http://www.odu.edu/eng> (<http://www.odu.edu/eng/>)

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## Mission Statement

In accordance with the mission of Old Dominion University, the Frank Batten College of Engineering and Technology promotes the advancement of engineering knowledge, both by its creation and dissemination and by providing successful graduates and a continuously improving learning environment to its constituents, while maintaining ethical, multicultural and global standards.

## Overview

The Frank Batten College of Engineering and Technology at Old Dominion University offers degrees in engineering and engineering technology.

The graduate engineering programs at Old Dominion University are specifically designed to take advantage of and enhance unique assets in the Hampton Roads area, a complex of seven major cities. These assets include: 1) a strong military presence with multiple high technology facilities, particularly as it relates to modeling and simulation; 2) the NASA Langley Research Center with its focus on aeronautics and space exploration; 3) the Jefferson Laboratories, a major center of nuclear physics and home of a major Free Electron Laser; 4) one of the major international deep-water ports on the east coast of the United States; 5) a major ship building and ship repair industry, including Newport News Shipbuilding, the only builder of nuclear aircraft carriers in the U.S.; 6) a major high technology industry base; and 7) a variety of commercial enterprises. These assets have enabled the development of distinctive engineering curricula.

## Master's Programs

The Batten College of Engineering and Technology grants the following master's degrees: Master of Science in Engineering, Master of Engineering, Master of Science in Engineering Management, and Master of Engineering Management. For program options, admission information and degree requirements, interested students should refer to the list available on the Programs tab as well as the individual program descriptions in this catalog.

## Doctoral Programs

The Batten College of Engineering and Technology grants degrees of Doctor of Philosophy in Engineering and Doctor of Engineering. For program options, admission information and degree requirements, interested students should refer to the below list of programs as well as the individual program descriptions in this catalog.

## Linked Bachelor's/Master's Degree Programs

Linked Bachelor's/Master's programs are designed to allow qualified students to secure a space in a master's program available in the Frank Batten College of Engineering and Technology while they are still pursuing their undergraduate degrees. An eligible student can choose a master's program in the same discipline as his/her bachelor's program or in a complementary discipline. Subject to the approval of the undergraduate and graduate

program directors, a student enrolled in a linked program can count up to six credit hours of course work towards both the undergraduate and the graduate degrees. Full-time students may be able to complete the requirements for the bachelor's degree in four years and the master's degree in one additional year. Students in linked programs must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree).

Students who are matriculated in an undergraduate major in the Frank Batten College of Engineering and Technology with a GPA of at least 3.00 overall and 3.00 in the major are eligible to apply for admission to a Linked Bachelor's/Master's program. Transfer students who desire to be admitted to a linked program at the time they join an undergraduate major at Old Dominion University are eligible to apply if their overall GPA at their previous institution is 3.25 or higher. Prerequisite courses may be required for engineering technology majors to pursue a master's degree in engineering.

Continuance in a Linked Bachelor's/Master's program requires maintenance of a GPA of 3.00 or higher overall and in the major.

## Linked Bachelor-to-PhD Programs

For a select number of exceptionally well-qualified students, the college has established a linked doctoral program that enables students to be admitted directly into the PhD program upon completion of the baccalaureate degree. A select number of exceptionally well-qualified students can be admitted to the Bachelor/PhD program in their junior year while they are pursuing one of the undergraduate programs at Old Dominion University. This program encourages admitted students to work closely with faculty members and pursue a research experience. Just as in the Linked Bachelor/Masters program, six credit hours of graduate course work may again be counted towards the undergraduate degree and doctoral course work mentioned above for the Bachelor/PhD program. For linked bachelor's to doctoral programs, students must earn a minimum of 198 credit hours (120 discrete credit hours for the undergraduate degree and 78 discrete credit hours for the graduate degree). Students in these programs must maintain a GPA of 3.50 or better throughout their bachelor's and doctoral studies.

The student may opt to obtain the master's degree along the way to the doctorate. To obtain the master's degree, the student must utilize the six graduate credits obtained as part of their undergraduate program, use 18 credits of the graduate course work that is part of the PhD, and work with the Graduate Program Director to plan the final 6 credits.

## Interdisciplinary Graduate Certificate Programs

The college has established several certificate programs that enable students to specialize in technical areas of current interest to industry, government and academia. Both non-degree and degree-seeking students can enroll in the certificate programs. The programs provide the opportunity for practicing engineers to further their knowledge and become more competent in their profession.

## Departments

- Department of Civil and Environmental Engineering (<http://catalog.odu.edu/graduate/engineering-technology/civil-environmental-engineering/>)
- Department of Electrical and Computer Engineering (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/>)
- Department of Engineering Management and Systems Engineering (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/>)
- Department of Mechanical and Aerospace Engineering (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/>)

## Programs

### Doctor of Engineering Programs

- Engineering with a Concentration in Cybersecurity (DEng) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-cybersecurity-deng/>)
- Engineering with a Concentration in Electrical and Computer Engineering (DEng) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-electrical-computer-deng/>)
- Engineering with a Concentration in Engineering Management and Systems Engineering (DEng) (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/engineering-management-systems-deng/>)
- Engineering with a Concentration in Modeling and Simulation (DEng) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-modeling-simulation-deng/>)

### Doctor of Philosophy Programs

- Engineering with a Concentration in Aerospace Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-aerospace-phd/>)
- Engineering with a Concentration in Biomedical Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-biomedical-phd/>)
- Engineering with a Concentration in Civil and Environmental Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/civil-environmental-engineering/engineering-civil-environmental-phd/>)
- Engineering with a Concentration in Electrical and Computer Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-electrical-computer-phd/>)
- Engineering with a Concentration in Engineering Management and Systems Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/engineering-management-systems-phd/>)
- Engineering with a Concentration in Mechanical Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-mechanical-phd/>)
- Engineering with a Concentration in Modeling and Simulation Engineering (PhD) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-modeling-simulation-phd/>)

### Master of Engineering Programs

- Engineering with a Concentration in Aerospace Engineering (ME) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-aerospace-me/>)
- Engineering with a Concentration in Biomedical Engineering (ME) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-biomedical-me/>)
- Engineering with a Concentration in Mechanical Engineering (ME) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-mechanical-me/>)
- Engineering with a Concentration in Systems Engineering (ME) (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/engineering-systems-me/>)

### Master of Engineering Management Program

- Engineering Management (MEM) (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/engineering-management-mem/>)

## Master of Science Programs

- Engineering Management (MS) (<http://catalog.odu.edu/graduate/engineering-technology/engineering-management-systems/engineering-management-ms/>)
- Engineering with a Concentration in Aerospace Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-aerospace-ms/>)
- Engineering with a Concentration in Biomedical Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-biomedical-ms/>)
- Engineering with a Concentration in Civil Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/civil-environmental-engineering/engineering-civil-ms/>)
- Engineering with a Concentration in Electrical and Computer Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-electrical-computer-ms/>)
- Engineering with a Concentration in Environmental Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/civil-environmental-engineering/engineering-environmental-ms/>)
- Engineering with a Concentration in Mechanical Engineering (MS) (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/engineering-mechanical-ms/>)
- Engineering with a Concentration in Modeling and Simulation (MS) (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/engineering-modeling-simulation-ms/>)

## Certificate Programs

- Advanced Engineering with a Concentration in Biomedical Engineering Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/advanced-engineering-biomedical-certificate/>)
- Advanced Engineering with a Concentration in Cyber Systems Security Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/advanced-engineering-cyber-systems-security-certificate/>)
- Advanced Engineering with a Concentration in Energy Systems Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/advanced-engineering-energy-systems-certificate/>)
- Coastal Engineering Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/coastal-engineering-certificate/>)
- Engineering Management Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/engineering-management-certificate/>)
- Entrepreneurship and Innovation for Engineers Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/entrepreneurship-innovation-engineers-certificate/>)
- Mission Analysis and Engineering Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/mission-analysis-engineering-certificate/>)
- Modeling and Simulation - Engineering Certificate (<http://catalog.odu.edu/graduate/engineering-technology/electrical-computer-engineering/modeling-simulation-engineering-certificate/>)
- Naval Architecture and Marine Engineering Certificate (<http://catalog.odu.edu/graduate/engineering-technology/mechanical-aerospace-engineering/naval-architecture-marine-engineering-certificate/>)
- Project Management Certificate (<http://catalog.odu.edu/graduate/engineering-technology/programs/project-management-certificate/>)

## Collaborative Programs

### Cardinal Education

Stacie Ringleb, Associate Dean for Faculty Affairs and Student Engagement, ODU Cardinal Education Site Director

The Cardinal Education Program offers ODU engineering graduate students a selection of online graduate courses and programs to compliment the on-campus course offerings. It is a unique cooperative agreement that enables

engineering students at ODU to enroll (and receive credit for) select online courses from six respected Virginia universities. The Cardinal Program (formerly CGEP) has a 35+ year record of leadership in distance learning.

Partnering engineering schools in the Commonwealth of Virginia include: Old Dominion University, Polytechnic Institute and State University, The University of Virginia, George Mason University, Virginia State University, and Virginia Commonwealth University. The program also serves the diverse continuing education needs of students working in industry and government.

Students seeking course registration via the Cardinal Education Program should contact the Cardinal Education Program Office in the Batten College of Engineering and Technology at Old Dominion University: <https://www.odu.edu/engineering/programs/cardinal-education> (<https://www.odu.edu/engineering/programs/cardinal-education/>)

### **Enterprise Centers**

The Batten College of Engineering and Technology is a catalyst for the economic development of Hampton Roads. To this end, the college has established a number of centers to serve as engines for enterprise development. These centers utilize all University resources, including students and faculty.

### **Applied Research Center (ARC)**

Hani Elsayed-Ali, Director

ARC is an advanced materials engineering and laser technology research center. Staffed with industry/university teams utilizing the Jefferson Lab technologies, ARC provides commercial product-related research in the areas of thin-film technology, laser and plasma processing of materials, materials analysis, and devices and sensor fabrication. For more information: [www.odu.edu/engineering/applied-research-center](http://www.odu.edu/engineering/applied-research-center) (<https://www.odu.edu/engineering/applied-research-center/>).

### **Frank Reidy Research Center for Bioelectrics**

Andrei Pakhomov, Executive Director

The mission of the Center is to increase scientific knowledge and understanding of the interaction of electromagnetic fields and ionized gases with biological cells and to apply this knowledge to the development of medical diagnostics, therapeutics, and environmental contamination. The objectives of the Center are to perform leading-edge interdisciplinary and multi-institutional research, recruit top faculty and exceptional graduate students, support regional, national, and international programs, and increase external funding and institutional visibility. For more information: [www.odu.edu/bioelectrics](http://www.odu.edu/bioelectrics) (<https://www.odu.edu/frank-reidy-research-center-bioelectrics/>).

## **Affiliated Centers**

### **Center for Secure and Intelligent Critical Systems**

Sachin Shetty, Director

The Center for Secure and Intelligent Critical Systems (CSICS) conducts research on developing and integrating secure and intelligent technologies to ensure safe, reliable, and resilient infrastructure for the future. CSICS focuses on both theoretical and practical research in computational modeling, simulation, and analysis. For more information: <https://sics-c.org/>

### **Institute for Coastal Adaptation and Resilience**

Jessica Whitehead, Director

ICAR's mission is to advance the practice of coastal resilience and adaptation by engaging with communities, organizations, and businesses to develop and deploy solutions based on integrated, innovative, and applied research. For more information: <https://oduadaptationandresilience.org/>.

### **Commonwealth Center for Recurrent Flooding**

Carol Considine, ODU Contact

The Commonwealth Center for Recurrent Flooding Resiliency engages the expertise, resources, and intellectual vibrancy of William & Mary and Old Dominion University in support of building resilience to rising waters. The Center serves, advises, and supports Virginia by conducting interdisciplinary studies and providing training, technical and non-technical services, and policy guidance in the area of recurrent flooding resilience to the Commonwealth and its local governments, state agencies, industries, and citizens.. For more information: <https://www.floodingresiliency.org/>

### **Mission Engineering Center**

Thomas Irwin, Director

The Center for Mission Engineering (CME) is an interdisciplinary applied research center focused on advancement in designing, analyzing, integrating, and improving the ability of systems to deliver desired mission outcomes. For more information: <https://oduinnovate.org/research-enterprise/center-for-mission-engineering/>

### **Virginia Digital Maritime Center**

Mark Whitney, Executive Director

The Virginia Digital Maritime Center's mission is to support Virginia's maritime enterprise by leveraging applied research & cutting-edge technology to advance the maritime workforce, foster collaborative partnerships, and drive economic growth in Hampton Roads. For more information: <https://digitalmaritime.org/>

### **Virginia Institute for Spaceflight and Autonomy**

Yiannis Papelis, Executive Director

The Virginia Institute for Spaceflight and Autonomy cultivates partnerships between governments, industry, and academia to grow the spaceflight and autonomy ecosystems on the Eastern Shore. For more information: <https://visaatodu.org/>

### **Virginia Modeling, Analysis, and Simulation Center**

Eric Weisel, Associate Vice President for Applied Research and Executive Director, VMASC

The Virginia Modeling, Analysis, and Simulation Center (VMASC) is an enterprise center of Old Dominion University, supporting the University's research mission through innovation, workforce development, and industry ecosystem engagement programs that create and integrate digital technologies into everyday practice. The Center performs applied research leading to digital transformation. For more information: [www.vmasc.org](http://www.vmasc.org) (<http://www.vmasc.org/>).

### **Virginia Beach Institute of Data Science**

Khan Iftekharuddin, Director

The Virginia Beach Data Science Institute is at the forefront of education, research and collaboration for Hampton Roads region, state and globally. The Institute aims to be a driving force for building a vibrant academic community that will educate new generations of builders, thinkers, and leaders.

## **College Institutes**

**Institute for Autonomous and Connected Systems:** The mission of IACS is to bring together faculty and students across campus from the Colleges of Engineering & Technology, Arts & Letters, and Sciences who have mutual interest in advancing the interdisciplinary research and development of autonomous and connected systems including un-crewed and autonomous vehicles in air, land, space, and maritime applications. Interim Director: Thomas Alberts

### **Institute for Engineering in Medicine, Health, and Human**

**Performance:** The Institute for Engineering in Medicine, Health, and Human Performance (EnMed) is the trans-disciplinary home for innovative biomedical research, founded on unique academic, industrial, and military footprints at ODU and in Hampton Roads, to improve patient and

community health outcomes and advance human performance. Director: Lobat Tayebi

## Departmental Centers and Institutes

**Sustainable Development Institute** promotes and provides engineering, ecological, environmental, and economic assistance to local, regional, and national governmental agencies, as well as international organizations and businesses. The institute actively participates in community service by conducting waste minimization and pollution prevention assistance to local businesses. Director: Mujde Erten-Unal.

**Transportation Research Institute** collaborates with centers and departments across the ODU campus to conduct innovation-based research in the core areas of transportation operations, transportation safety, transportation planning, freight transportation, and environment, energy, and sustainable transport. Director: Mecit Cetin.

**Virginia Institute for Photovoltaics** research spans from the Nanoscale (Fundamental Sciences and Engineering) through the Devices and balance of systems, to the deployment of Gigascale commercial power generation. The current focus is to research and develop the Science and Engineering of Photovoltaic Devices (or Solar cells) and bring them from the laboratory to the industry. Director: Sylvain Marsillac.

**Virginia Institute for Image and Vision Analysis** aims to leverage complimentary expertise of faculty in computer vision, signal/image processing and machine learning to become one of the leading institutes in the field. Research focuses on novel theory, state-of-art algorithms, architectures, real-time implementations for biomedical engineering, human and machine-centric recognition, environmental and geoscience applications and computer-aided medical diagnosis systems. Director: Khan Iftexharuddin.

**Center for Bioelectronics:** The mission of the Center is to lead the effort of advancing scientific frontiers, ensuring educational accessibility for underrepresented students in STEM, and securing research leadership in critical areas, such as smart health and biomedical research. The ODU Center for Bioelectronics is dedicated to the mission of diversity, equity, and inclusion in education and the workforce. Director: Gymama Slaughter.