

# VOLGENAU SCHOOL OF ENGINEERING

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## Administration

- Kenneth S. Ball, P.E. (Texas), Dean
- Sharon A. Caraballo, Associate Dean for Undergraduate Programs
- Liza Wilson Durant, Associate Dean for Strategic Initiatives and Community Engagement
- Art Pyster, Associate Dean for Research
- Ariela Sofer, Associate Dean for Administration and Faculty Affairs
- Kim Goodwin-Slater, Director of Finance

### College Code: VS

The Volgenau School of Engineering delivers a transformative learning experience to its students by integrating engineering and technology with other areas of scholarship. We produce visionary stewards of society who are prepared to discover solutions to complex global challenges and make the world safer, cleaner, and more prosperous. A faculty of engaged educators lead high-impact research in critical areas, including sustainability, big data, cybersecurity, robotics and artificial intelligence, signals and communications, and healthcare technology. These existing and emerging areas of expertise span departmental and disciplinary boundaries and reflect the breadth of the scholarly activities of our faculty and students.

The Volgenau School of Engineering prepares students to solve complex, multidisciplinary, global challenges by leveraging innovative learning tools, the inventive capacity of our region, and Mason's global presence. The faculty and administration support the needs of the 21st century learner by providing multiple paths to success, a diverse and inclusive academic community, and real time integration of new data and technology in the classroom.

## Undergraduate Programs

### Bachelor of Science Programs

Our undergraduate degree programs prepare students to enter directly into professional employment or continue studies at the graduate level. The requirements for the bachelor's degrees include required and elective courses in mathematics, humanities, Mason Core, and specialty courses applicable to the major. Each program strongly emphasizes English composition and communication.

The Volgenau School offers the following Bachelor of Science programs:

- Applied Computer Science
- Bioengineering
- Civil and Infrastructure Engineering

- Computer Engineering
- Computer Science
- Cyber Security Engineering
- Electrical Engineering
- Information Technology
- Mechanical Engineering
- Statistics
- Systems Engineering

### Minors

Minors are available in aviation flight training and management, bioengineering, computer science, data analysis, environmental engineering, information technology, mechanical engineering, software engineering, statistics, and systems engineering.

### BS/Accelerated MS Programs

Accelerated master's degree programs offer high-achieving Mason undergraduates the opportunity to complete their bachelor's and master's degrees within five years. Qualified candidates take advantage of a streamlined master's application process with no application fee and the ability to take up to 12 graduate credits at the undergraduate tuition rate.

- Applied Computer Science, BS/Computer Science, Accelerated MS
- Applied Computer Science, BS/Data Analytics Engineering, Accelerated MS
- Applied Computer Science, BS/Information Security and Assurance, Accelerated MS
- Applied Computer Science, BS/Information Systems, Accelerated MS
- Applied Computer Science, BS/Software Engineering, Accelerated MS
- BS (selected)/Operations Research, Accelerated MS
- BS (selected)/Statistical Science, Accelerated MS
- BS (selected)/Systems Engineering, Accelerated MS
- Bachelor's Degree (Green Leaf)/Environmental Science and Policy, Accelerated MS
- Bioengineering, BS/Data Analytics Engineering, Accelerated MS
- Bioengineering, BS/Operations Research, Accelerated MS
- Bioengineering, BS/Systems Engineering, Accelerated MS
- Civil and Infrastructure Engineering, BS/Civil and Infrastructure Engineering, Accelerated MS
- Civil and Infrastructure Engineering, BS/Operations Research, Accelerated MS
- Civil and Infrastructure Engineering, BS/Systems Engineering, Accelerated MS
- Computer Science, BS/Computer Science, Accelerated MS
- Computer Science, BS/Data Analytics Engineering, Accelerated MS
- Computer Science, BS/Information Security and Assurance, Accelerated MS
- Computer Science, BS/Information Systems, Accelerated MS
- Computer Science, BS/Software Engineering, Accelerated MS
- Cyber Security Engineering, BS/Digital Forensics and Cyber Analysis, Accelerated MS
- Cyber Security Engineering, BS/Operations Research, Accelerated MS
- Cyber Security Engineering, BS/Systems Engineering, Accelerated MS

- Electrical Engineering, BS/Electrical Engineering, Accelerated MS
- Electrical Engineering, BS/Telecommunications, Accelerated MS
- Individualized Study, BIS/Telecommunications, Accelerated MS
- Individualized Study, BIS/Applied Information Technology, Accelerated MS
- Information Technology, BS/Applied Information Technology, Accelerated MS
- Information Technology, BS/Digital Forensics and Cyber Analysis (title change pending SCHEV approval), Accelerated MS
- Information Technology, BS/Information Security and Assurance, Accelerated MS
- Information Technology, BS/Information Systems, Accelerated MS
- Information Technology, BS/Software Engineering, Accelerated MS
- Information Technology, BS/Telecommunications, Accelerated MS
- Statistics, BS/Operations Research, Accelerated MS
- Statistics, BS/Systems Engineering, Accelerated MS
- Systems Engineering, BS/Data Analytics Engineering, Accelerated MS
- Systems Engineering BS/Operations Research, Accelerated MS
- Systems Engineering BS/Systems Engineering, Accelerated MS
- Systems Engineering, BS/Telecommunications, Accelerated MS

## Graduate Programs

### Master of Science Programs

The ever-increasing complexity and technical challenges in engineering, computer science, and information technology demand studies beyond the bachelor's degree.

The Volgenau School offers the following master's programs:

- Applied Information Technology
- Bioengineering
- Biostatistics
- Civil and Infrastructure Engineering
- Computer Engineering
- Computer Science
- Data Analytics Engineering
- Digital Forensics and Cyber Analysis (title change Pending SCHEV Approval)
- Electrical Engineering
- Geotechnical, Construction, and Structural Engineering
- Information Security and Assurance
- Information Systems
- Management of Secure Information Systems
- Operations Research
- Software Engineering
- Statistical Science
- Systems Engineering
- Telecommunications

### Doctor of Philosophy Programs

PhD students will gain comprehensive knowledge in their area of study and will be prepared for careers in higher education and scientific research. They are required to demonstrate a comprehensive understanding and complete research that adds significantly to the body

of knowledge in engineering, computer science, information technology, or statistics.

The Volgenau School offers seven doctoral programs:

- Bioengineering
- Civil and Infrastructure Engineering
- Computer Science
- Electrical and Computer Engineering
- Information Technology
- Statistical Science
- Systems Engineering and Operations Research

### Commonwealth Graduate Engineering Program (CGEP)

CGEP is the premier provider of high-quality post-baccalaureate online engineering education in the Commonwealth of Virginia and is designed for practicing engineers and scientists interested in maintaining and enhancing their skills. Participating universities are: George Mason University, Old Dominion University, University of Virginia, Virginia Commonwealth University, and Virginia Tech. Offerings include master's degrees and certificate programs.

While each program is offered by one of the five participating universities, the collaboration between universities allows students more flexibility and variety in course offerings. A substantial number of course requirements can be taken at any of the five participating universities to satisfy the degree or certificate program. Prospective students should apply directly to the university offering the degree of interest. Mason has a number of degree and certificate programs available through CGEP. These programs follow all policies stated in this catalog for the program, with the exception of allowing up to 50 percent of the required credits to be completed at other CGEP participating universities. Faculty advisor approval is needed.

Policies for other universities' programs are determined by those institutions. Please consult with the university offering the program of interest for details.

For more information including the Mason programs available through CGEP, visit their website (<http://cgep.virginia.gov>).

## Requirements & Policies

### Undergraduate Requirements

#### Degree Requirements

The following general requirements must be completed by all undergraduate students:

- At least 120 credits of academic work including at least 45 credits of upper-level courses (numbered 300 or above);
- At least 6 credits of English composition, 3 credits of literature, and 3 credits of oral communication (Mason Core courses);
- At least 3 credits of arts, 3 credits of Western civilization or world history, 3 credits of social and behavioral science, and 3 credits of global understanding issues (Mason Core courses);
- At least 24 credits of social science and humanities course work, which is normally satisfied by the 24 credits of Mason Core courses described above;

All requirements are listed in the sections for specific Volgenau School majors. These include university requirements for mathematics, natural science, information technology including ethics, and synthesis. Sample schedules that fulfill degree requirements for individual programs within the Volgenau School are available from the departments.

## Undergraduate Policies

### Academic Policies

Students should become familiar with the Academic Policies in the University Catalog in addition to policies specific to each academic unit. The Academic Policies also list additional university requirements for minor programs and double majors.

### Academic Appeal of Policies and Actions

A student's instructor, academic advisor and/or department can resolve most academic issues. If, however, an undergraduate student disagrees with a decision at the department level and feels that there may be reasonable grounds for appeal, the student should contact the Volgenau School Undergraduate Student Services Office at 703-993-1511 for guidance in preparing a request to the Associate Dean for Undergraduate Programs or other offices as appropriate. Information about grade appeals is found in AP.3.9 Grade Appeals.

### Academic Progression

Students majoring in Volgenau School programs are expected to have an acceptable plan of study on file, formulated with assistance from their departmental advisor. They are expected to make reasonable progress toward their degree during each semester in which they are enrolled.

Termination from a major—or from all majors in a college—may be imposed as a result of excessive repeating of required courses without achieving the minimum standard, and for other evidence of continued failure to make adequate progress toward declaration or completion of the major. For more information, see AP.5.2.4 Termination from the Major (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-2-4>)

### Sample Schedules

Sample schedules that fulfill degree requirements for individual programs within the Volgenau School are available from the departments.

### Change of Major

#### 1. Criteria for freshman students in their first semester at Mason

Freshman students who have been admitted to any VSE engineering or computer science program may change their major to any other engineering or computer science program before the final drop deadline of their first semester at Mason.

Freshman students who have been admitted to Information Technology, Statistics, VSE Undeclared, or any non-VSE major must have departmental approval to change their major to a VSE program before the final drop deadline of their first semester at Mason.

Any change of major requests made after this deadline are bound to the change of major criteria outlined in section 3 and require the completion of at least one semester at Mason.

#### 2. Criteria for transfer students in their first semester at Mason

Transfer students who have been admitted to any VSE engineering program may change their major to any other engineering program before the final drop deadline of their first semester at Mason.

Transfer students who have been admitted to Computer Science, Information Technology, Statistics, VSE Undeclared, or any non-VSE major must have department approval to change their major to a VSE program before the final drop deadline of their first semester at Mason.

Any change of major requests made after this deadline are bound to the change of major criteria outlined in section 3 and require the completion of at least one semester at Mason.

#### 3. Criteria for students who have completed at least one semester at Mason

Students who have completed at least one semester at Mason and who are considering changing their major to any VSE engineering program should consult with the Volgenau School of Engineering Coordinator of Undergraduate Advising, 2500 Nguyen Engineering Building. These students must have successfully completed MATH 114, PHYS 160 and PHYS 161 (with a grade of at least C) and should have a minimum Mason GPA of 2.75\* in all technical coursework. Technical coursework refers to any math, physics, engineering, statistics and computer sciences courses completed thus far at Mason and that are applicable to the intended engineering major. At least 6 credits of these technical courses should have been completed successfully at Mason.

\*Students considering changing their major to Bioengineering with a Pre-Health concentration need to meet the above VSE engineering program requirements furthermore with a minimum Mason GPA of 3.00.

Students considering changing their major to Applied Computer Science, Computer Science, Information Technology, or Statistics should consult with the Volgenau School of Engineering Coordinator of Undergraduate Advising, 2500 Nguyen Engineering Building. These students need to meet the criteria for that program as defined in the change of major section for that program in the catalog. Minimum GPA requirements stated for those programs are based on courses taken at Mason.

Exceptions to the policy may only be granted at the discretion of the chair or associate chair of the department.

### Undeclared Students in the Volgenau School of Engineering

Students who are undecided about their specific major may select Volgenau School Undeclared as their major. This should be done as soon as possible after a student enrolls at Mason. Students will be advised to follow an initial semester or two of courses that could be applicable to majors that are of interest to them. This may involve taking courses that help the student better understand different engineering and computing areas, but which may not contribute to the total credits needed for the major they eventually choose.

Students who apply to a VSE major but do not meet major admissions criteria may also be accepted into VSE Undeclared, and become eligible to declare a VSE major after meeting specific requirements as determined by that particular major.

VSE Undeclared students are advised by the Coordinator of Undergraduate Academic Advising in the Student Services Office. Students should seek advising at least once each semester.

### Writing-Intensive Requirement

The university requires all undergraduate students to successfully complete a course, or a combination of courses, designated "writing intensive" in their majors at the 300 level or above. To determine the

writing-intensive course requirements for specific degrees, refer to the major program descriptions in the following department sections.

## Restricted Courses

Students are encouraged to take advantage of the many excellent courses available to broaden their educational experience or strengthen their background; however, some credits earned may not satisfy any degree requirements. Degree requirements for Volgenau School undergraduate programs may not include credits earned in military science. At most 3 credits of 100-level RECR coursework may be taken to satisfy the degree requirements of those VSE programs that allow general electives. Whenever there is uncertainty, students must consult with an academic advisor in their department.

## Online Education Programs

In order to increase access to Volgenau School education while meeting the needs of the School's student population, select degree programs and courses may be completed via online education. All academic policies and procedures apply to online education programs and courses as referred to in the appropriate sections of this catalog. Some instructors may require exams and/or other meetings to take place in a proctored or on-campus environment. Students should contact the instructor concerning these requirements if not explicitly stated on Patriot Web. Space permitting and if desired, students enrolled in the online sections are also permitted to attend the instructor's campus-based classroom section if offered during the same semester.

For more information about the Volgenau School programs available online, visit Mason Online (<http://masononline.gmu.edu>).

## Termination from the Major

No math, science, or Volgenau School of Engineering course that is required for the major may be attempted more than three times. Those students who do not successfully complete such a course within three attempts will be terminated from the major. Undeclared students in the Volgenau School who do not successfully complete a course required for a Volgenau School major within three attempts will also be terminated.

In addition, students in the Volgenau School with evidence of continued failure to make adequate progress toward declaring or completing a Volgenau School major will also be terminated. Adequate progress is determined by the major program. For more information, see AP5.2.4 Termination from the Major (<https://catalog.gmu.edu/policies/academic/undergraduate-policies/#ap-5-2-4>).

Once a student has attempted one of these courses twice unsuccessfully, the third attempt must be no later than the next semester of enrollment, excluding summers. Failure to take the course at that time will result in termination from the major. A third attempt of a Volgenau School of Engineering course requires support by the student's major department as well as permission by the department offering the course. This permission is not guaranteed. If the student is unable to take the course when required, the student may request an extension to a future semester; extensions require approval of the student's advisor, their department, and the Associate Dean for Undergraduate Programs. The deadline for extension requests is the add deadline for the semester in which the course is required.

Students who have been terminated from a Volgenau School of Engineering major may not register for a Volgenau School course without permission of the department offering the course. This applies to all undergraduate courses offered by the Volgenau School except IT 104

Introduction to Computing (Mason Core) and STAT 250 Introductory Statistics I (Mason Core).

A student may not declare any major in the Volgenau School of Engineering if the student has previously met the termination criteria for that major at any time, regardless of what the student's major was at the time the courses were taken.

## Graduate Policies

### Admission

Admission decisions are made by the faculty committee or graduate coordinator of the respective graduate program. Denial of admission is not subject to appeal. Applicants denied admission to a program are not permitted to enroll in courses in that graduate program, though they may apply for either non-degree enrollment or admission to another program.

If an applicant is offered graduate admission, the college reserves the right to withdraw that offer of admission if:

- During his or her academic studies, the admitted applicant has a significant drop in academic performance or fails to graduate with a degree prior to the first day of classes for the term admitted.
- There has been a misrepresentation in the application process.
- Prior to the first day of classes for the term admitted, the school learns that the admitted applicant has engaged in behavior that indicates a serious lack of judgment or integrity, irrespective of the outcome of any disciplinary process related to such behavior.
- Students admitted to an accelerated master's program do not maintain satisfactory progress in his or her undergraduate program, do not receive a minimum grade of 3.00 in the graduate classes taken as an undergraduate, or otherwise does not meet the conditions specified on the application and admission letter.

The university further reserves the right to require the applicant to provide additional information (and/or authorization for the release of information) about any such matter.

### Academic Policies

Students are responsible for becoming familiar with the Academic Policies (<https://catalog.gmu.edu/policies/academic>) in the University Catalog in addition to policies specific to the School. A resource for Mason Engineering Graduate Students is maintained online ([https://mymasonportal.gmu.edu/webapps/blackboard/content/listContent.jsp?course\\_id=\\_336120\\_1&content\\_id=\\_7639878\\_1&mode=reset](https://mymasonportal.gmu.edu/webapps/blackboard/content/listContent.jsp?course_id=_336120_1&content_id=_7639878_1&mode=reset)) with graduate-specific Volgenau information.

### Academic Progression

Graduate students must make satisfactory progress toward a degree.

At a minimum, this requires maintaining enrollment in at least one term per academic year and a GPA of 3.0 or higher. Inability to make satisfactory progress toward a degree may result in termination (<https://catalog.gmu.edu/policies/academic/graduate-policies>). Academic programs of study are entitled to enforce more stringent criteria which may include specific grade requirements in courses, successful completion of doctoral qualifying exams, etc. Please refer to your program for additional information.

### Doctoral Change of Program

Students in Volgenau School of Engineering doctoral programs are not permitted to change doctoral programs without a new, formal PhD

admission application submitted in accordance with the established requirements and deadlines.

## Non-degree

Non-degree graduate students taking courses in the Volgenau School may not register for classes numbered 700 or higher. All MS degree programs require at least 18 credits to be completed in degree status at Mason to be considered for graduation; as a result, a maximum of 12 credits of non-degree coursework can be transferred to a degree program.

## Readmission

Graduate students who have been terminated or have resigned from a program in the Volgenau School and want to reapply to the same program must wait five (5) semesters (Fall/Spring) before submitting a new application for admission. A full application for admission as well as all application materials required of that program must be submitted (or resubmitted). GRE scores, if required, cannot be older than five years. Previous admission to a program does not guarantee readmission to the same program. The circumstances of the prior termination or resignation will be a factor in the decision-making process. Graduate credit earned prior to termination may be applied to the degree program as long as the requirements are satisfied for Transfer of Credit (<https://catalog.gmu.edu/policies/academic/graduate-policies/#text>).

## Online Education Programs

In order to increase access to Volgenau School education while meeting the needs of the School's student population, select degree programs and courses may be completed via online education. All academic policies and procedures apply to online education programs and courses as referred to in the appropriate sections of this catalog. Some instructors may require exams and/or other meetings to take place in a proctored or on-campus environment. Students should contact the instructor concerning these requirements if not explicitly stated on Patriot Web. Space permitting and if desired, students enrolled in the online sections are also permitted to attend the instructor's campus-based classroom section if offered during the same semester.

For more information about the Volgenau School programs available online, visit Mason Online (<http://masononline.gmu.edu>).

## Termination

University policy on Academic Termination can be found in AP.6.6.2 (<https://catalog.gmu.edu/policies/academic/graduate-policies>). School specific process and criteria can be found on the Mason Engineering Graduate Student Resource page ([https://mymasonportal.gmu.edu/webapps/blackboard/content/listContent.jsp?course\\_id=\\_336120\\_1&content\\_id=\\_7639878\\_1&mode=reset](https://mymasonportal.gmu.edu/webapps/blackboard/content/listContent.jsp?course_id=_336120_1&content_id=_7639878_1&mode=reset)).

## Academic Units

- Department of Bioengineering
- Department of Computer Science
- Department of Electrical and Computer Engineering
- Department of Information Sciences and Technology
- Department of Mechanical Engineering
- Department of Statistics
- Department of Systems Engineering and Operations Research
- Sid and Reva Dewberry Department of Civil, Environmental, and Infrastructure Engineering

## Interdisciplinary Programs

- Cyber Security Engineering, BS
- Data Analytics Engineering, MS
- Data Analytics Graduate Certificate
- Information Technology, PhD
- Management of Secure Information Systems, MS (VSE)