

COLLEGE OF ENGINEERING AND COMPUTING

Graduate
2400 Nguyen Engineering Building
703-993-1504
cecgs@gmu.edu

Undergraduate
2500 Nguyen Engineering Building
703-993-1511
cecugrad@gmu.edu

Website: cec.gmu.edu

Administration

- Kenneth S. Ball, P.E. (Texas), Dean
- Christopher Carr, Associate Dean and Chief Diversity Officer
- Liza Wilson Durant, Associate Dean for Strategic Initiatives and Community Engagement
- Deborah Goodings, Associate Dean for Graduate Programs
- Kim Goodwin-Slater, Chief Business Officer
- Jill Nelson, Associate Dean for Undergraduate Programs
- Art Pyster, Associate Dean for Research
- Gurdip Singh, Divisional Dean for School of Computing
- Ariela Sofer, Associate Dean for Administration and Faculty Affairs

College Code: EC

The College of Engineering and Computing 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, artificial intelligence and machine learning, Next-G and wireless communication, 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 College of Engineering and Computing 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 College of Engineering and Computing 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
- Applied Science, BAS Cyber Security Concentration/Applied Information Technology, Accelerated MS
- Applied Science, BAS Cyber Security Concentration/Digital Forensics, Accelerated MS
- Applied Science, BAS Data Analytics Concentration/Applied Information Technology, Accelerated MS
- Applied Science, BAS Data Analytics Concentration/Data Analytics 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 Engineering, BS/Computer Engineering, Accelerated MS
- Computer Engineering, BS/Electrical Engineering, Accelerated MS
- Computer Engineering, BS/Operations Research, Accelerated MS
- Computer Engineering, BS/Systems Engineering, Accelerated MS
- Computer Science, BS/Computer Engineering, Accelerated MS
- Computer Science, BS/Computer Science, Accelerated MS
- Computer Science, BS/Curriculum and Instruction, Accelerated MEd (Secondary Education Computer Science Concentration)
- 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/Operations Research, Accelerated MS
- Computer Science, BS/Software Engineering, Accelerated MS
- Computer Science, BS/Systems Engineering, Accelerated MS
- Cyber Security Engineering, BS/Computer Engineering, Accelerated MS
- Cyber Security Engineering, BS/Cyber Security Engineering, Accelerated MS
- Cyber Security Engineering, BS/Digital Forensics, Accelerated MS
- Cyber Security Engineering, BS/Operations Research, Accelerated MS
- Cyber Security Engineering, BS/Systems Engineering, Accelerated MS
- Electrical Engineering, BS/Computer Engineering, Accelerated MS
- Electrical Engineering, BS/Electrical Engineering, Accelerated MS
- Electrical Engineering, BS/Operations Research, Accelerated MS
- Electrical Engineering, BS/Systems 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, 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
- Mechanical Engineering, BS/Applied and Engineering Physics, Accelerated MS
- Mechanical Engineering, BS/Applied Information Technology, Accelerated MS
- Mechanical Engineering, BS/Civil and Infrastructure Engineering, Accelerated MS
- Mechanical Engineering, BS/Computational Science, Accelerated MS
- Mechanical Engineering, BS/Data Analytics Engineering, Accelerated MS
- Mechanical Engineering, BS/Electrical Engineering, Accelerated MS
- Mechanical Engineering, BS/Operations Research, Accelerated MS
- Mechanical Engineering, BS/Systems Engineering, Accelerated MS

- Statistics, BS/Biostatistics, Accelerated MS
- Statistics, BS/Data Analytics Engineering, Accelerated MS
- Statistics, BS/Operations Research, Accelerated MS
- Statistics, BS/Statistical Science, 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 College of Engineering and Computing offers the following master's programs:

- Applied Information Technology
- Bioengineering
- Biostatistics
- Civil and Infrastructure Engineering
- Computer Engineering
- Computer Science
- Cyber Security Engineering
- Data Analytics Engineering
- Digital Forensics
- Electrical Engineering
- Information Security and Assurance
- 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 College of Engineering and Computing offers seven doctoral programs:

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

Cardinal Education

Cardinal Education (formerly the Commonwealth Graduate Engineering Program/CGEP) is the premier provider of high-quality post-baccalaureate online engineering education in the Commonwealth of Virginia. It is designed for practicing engineers, computing, and information scientists interested in maintaining and enhancing their skills through the pursuit of an online degree or certificate. Participating universities are: George Mason University, Old Dominion University, University of Virginia, Virginia Commonwealth University, Virginia State University, and Virginia Tech. Offerings include master's degrees and certificate programs.

While each program is based at one of the six participating universities, the collaboration between universities allows students more flexibility, potential shorter time to completion, and greater variety in course offerings. A substantial number of course requirements can be taken at any of the six participating universities to satisfy the degree or certificate program.

Students interested should begin by applying directly to the university offering the degree of interest. Mason has a number of degree and certificate programs available through Cardinal Education. These programs follow all policies stated in this catalog for the program, while also allowing up to 50 percent of non-core required credits to be completed at other Cardinal Education participating universities. Faculty advisor approval is needed when taking courses at a partner university.

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

For more information including the Mason programs available through this partnership, visit the Cardinal Education website.

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);

All requirements are listed in the sections for specific College of Engineering and Computing (CEC) majors. These include university requirements for mathematics, natural science, information technology and computing, and synthesis. Sample schedules that fulfill degree requirements for individual programs within the CEC are available from the departments.

Undergraduate Policies

Academic Policies

Students should become familiar with the Academic Policies (<http://catalog.gmu.edu/policies/academic/>) in the University Catalog in addition to policies specific to each academic unit. The Academic

Policies (<http://catalog.gmu.edu/policies/academic/>) 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 CEC 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 (<http://catalog.gmu.edu/policies/academic/grading/#ap-3-9>).

Academic Progression

Students majoring in CEC 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 CEC 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 CEC 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, CEC Undeclared, CEC Undecided, or any non-CEC major must have departmental approval to change their major to a CEC 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 CEC 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, CEC Undeclared, or any non-CEC major must have department approval to change their major to a CEC 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 CEC engineering program should consult with the College of Engineering and Computing Undeclared and Undecided Academic Advisors in 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 CEC 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 College of Engineering and Computing Undeclared and Undecided Academic Advisors in 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.

Undecided Students in the College of Engineering and Computing

Students who are undecided about their specific major may select CEC Undecided Engineering 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.

CEC Undecided students are advised by the CEC Undeclared & Undecided Academic Advisors. Students should seek advising at least once each semester.

Undeclared Students in the College of Engineering and Computing

Students who apply to a CEC major but do not meet major admissions criteria will be accepted into CEC Undeclared. These students will become eligible to declare a CEC major after meeting specific requirements as determined by that particular major. Students will be advised to follow an initial semester or two of courses that would be applicable to the major they plan to declare.

CEC Undeclared students are advised by the CEC Undeclared & Undecided Academic Advisors. 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 CEC undergraduate programs may not include credits earned below the 400 level in military science; military science credits at the 400 level may be used to meet degree requirements. At most 3 credits of 100-level RECR coursework may be taken to satisfy the degree requirements of those CEC 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 College of Engineering and Computing 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 CEC programs available online, visit Mason Online (<http://masononline.gmu.edu/>).

Termination from the Major

No math, science, or College of Engineering and Computing 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 CEC who do not successfully complete a course required for a CEC major within three attempts will also be terminated.

In addition, students in the CEC with evidence of continued failure to make adequate progress toward declaring or completing a CEC major will be terminated from the school. Adequate progress is determined by the major program. For more information, see AP.5.2.4 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 College of Engineering and Computing 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 College of Engineering and Computing major may not register for a CEC course without permission

of the department offering the course. This applies to all undergraduate courses offered by the CEC except IT 104 Introduction to Computing (Mason Core) (<http://catalog.gmu.edu/mason-core/>) and STAT 250 Introductory Statistics I (Mason Core) (<http://catalog.gmu.edu/mason-core/>).

A student may not declare any major in the College of Engineering and Computing 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 status or admission to another degree 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 in the degree required for completion prior to admission to VSE graduate studies, 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 "B" 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 and complying with the Academic Policies (<https://catalog.gmu.edu/policies/academic/>) in the University Catalog in addition to policies specific to the School. A handbook for CEC Graduate Students is maintained online (<https://cec.gmu.edu/academics/current-student-resources/graduate-student-handbook/>) with graduate-specific information.

Concentration

Students electing a degree concentration, post-admission, must do so in consultation with the graduate program advisor, via formal paperwork approved by the department/school, submitted and processed by the Registrar. It is the student's responsibility to ensure that their intended concentration is reflected on their transcript prior to graduation.

Doctoral Change of Program

Students in the College of Engineering and Computing 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

Students may decide to apply for Non-Degree status for a number of reasons, including for life-long learning, to take pre-requisite courses, to reacclimate to the environment of higher education or to begin taking classes while they apply to a specific degree program.

University Policy on Non-Degree Student Status can be found in AP6.4.1. (<https://catalog.gmu.edu/policies/academic/graduate-policies/>)

Readmission

Graduate students who have been terminated or have resigned from a program in the College of Engineering and Computing 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. Subject to the policy on Transfer of Credit, (<https://catalog.gmu.edu/policies/academic/graduate-policies/#text>) graduate credit earned prior to termination may be applied to the degree program.

Online Education Programs

In order to increase access to the College of Engineering and Computing 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 even 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 CEC programs available online, visit Mason Online (<http://masononline.gmu.edu/>).

Termination

University policy on Academic Termination can be found in AP6.6.2 (<https://catalog.gmu.edu/policies/academic/graduate-policies/>). School specific process and criteria can be found in the CEC Graduate Student Handbook. (<https://cec.gmu.edu/academics/current-student-resources/graduate-student-handbook/>)

Academic Units

- School of Computing
- Volgenau School of Engineering

Interdisciplinary Programs

- Computing Foundations Graduate Certificate
- Data Analytics Engineering, MS
- Data Analytics Graduate Certificate

- Information Technology, PhD
- STEM in Society Minor (CEC)