The program leading to the BS in Systems Engineering prepares students for a professional career in systems engineering. The program reflects the systems engineer’s unique perspective, which considers all aspects of a system throughout its lifetime. Mason’s systems engineering program is interdisciplinary, drawing from engineering, computer science, operations research, psychology, and economics. The core systems engineering courses tie these diverse threads to provide a global understanding of how individual engineering disciplines fit into the development of complex, large-scale systems. Students gain depth in a technical area by selecting a sequence of technical electives that constitute an emphasis. Students choose their own emphasis with the help of their advisor. A year-long senior design project provides hands-on experience in applying various systems engineering methods and tools. In the first two years, students obtain a basic foundation in mathematics, natural sciences, computing, writing, humanities, arts, and social sciences. The systems engineering program builds on this foundation, teaching theoretical knowledge, practical skills, and the ability to apply systems thinking to problems. Teamwork, collaborative learning, analytical skills, practical problem solving, and oral and written communication are strongly stressed.

Mission
The mission of the undergraduate program is to equip students with the ability to participate productively in the many professional activities associated with engineering a trustworthy system that satisfies client needs. The term “system” is interpreted broadly to include information, telecommunication, defense, health delivery, transportation, energy or manufacturing systems, as well as corporate processes.

Objectives
The program educational objectives of the Systems Engineering program are what we expect our students to attain within three to five years of graduation. Graduates earning the Bachelor of Science degree in Systems Engineering at George Mason University will:

- Use critical thinking, quantitative methods, and systems thinking to contribute to solutions for global societal challenges.
- Apply systems engineering methods, processes, models and tools to the engineering of complex systems.
- Advance the objectives of their organizations, profession, and society in a rapidly changing world.

Accreditation
The bachelor’s program in Systems Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The requirements for the degree may be satisfied through part-time enrollment.

Admissions & Policies

Policies

Change of Major
See Change of Major (http://catalog.gmu.edu/colleges-schools/engineering/#requirements/policies#text) for more information.

Grade Requirements
Students in the Systems Engineering, BS program must complete all mathematics, science, and VSE courses with a grade of C or better. However, students may apply for a one-time grade waiver for no more than one mathematics, science, or VSE course with grade of C- or D.

Students must also complete any course required by the program that is a prerequisite to another course applicable to the degree with a grade of C or better.

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 be terminated from the school. 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.

Termination from the Major

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) (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 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.
Requirements

(Banner code updated on July 12, 2021. Formerly: VS-BS-SYST)

Degree Requirements
Total credits: 123

Mathematics and Statistics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 113</td>
<td>Analytic Geometry and Calculus I (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>4</td>
</tr>
<tr>
<td>MATH 114</td>
<td>Analytic Geometry and Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 203</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 213</td>
<td>Analytic Geometry and Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MATH 214</td>
<td>Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>STAT 344</td>
<td>Probability and Statistics for Engineers and Scientists I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 354</td>
<td>Probability and Statistics for Engineers and Scientists II</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 23

Natural Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 160 &amp; PHYS 161</td>
<td>University Physics I (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>) and University Physics I Laboratory (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 260 &amp; PHYS 261</td>
<td>University Physics II (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>) and University Physics II Laboratory (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>4</td>
</tr>
</tbody>
</table>

Select 4 credits from the following:

1. Students who select the Bioengineering technical emphasis area are strongly encouraged to take BIOL 213 Cell Structure and Function (Mason Core) (http://catalog.gmu.edu/mason-core/). Students who select the Environmental Engineering technical emphasis area are strongly encouraged to take Chemistry. Both lecture and laboratory must belong to the same natural science subject. Students are not permitted to take PHYS 262 University Physics III (Mason Core) (http://catalog.gmu.edu/mason-core/) and CHEM 213 General Chemistry Laboratory I (Mason Core) (http://catalog.gmu.edu/mason-core/) or CHEM 211 General Chemistry I (Mason Core) (http://catalog.gmu.edu/mason-core/) and PHYS 263 University Physics III Laboratory (Mason Core) (http://catalog.gmu.edu/mason-core/). Both lecture and laboratory must belong to the same natural science subject.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 262 &amp; PHYS 263</td>
<td>University Physics III (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>) and University Physics III Laboratory (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 213</td>
<td>Cell Structure and Function (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 211 &amp; CHEM 213</td>
<td>General Chemistry I (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>) and General Chemistry Laboratory I (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 271 &amp; CHEM 272</td>
<td>General Chemistry for Engineers Lecture (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>) and General Chemistry for Engineers Lab (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 6

Computing

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 130</td>
<td>Introduction to Computing for Digital Systems Engineering</td>
<td>7</td>
</tr>
<tr>
<td>or CDS 130</td>
<td>Computing for Scientists</td>
<td>7</td>
</tr>
<tr>
<td>or CS 112</td>
<td>Introduction to Computer Programming</td>
<td>7</td>
</tr>
<tr>
<td>or ENGR 125T</td>
<td>Introduction to Engineering Methods - Transfer</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 230</td>
<td>Object-oriented Modeling and Design</td>
<td>7</td>
</tr>
<tr>
<td>or CS 211</td>
<td>Object-Oriented Programming</td>
<td>7</td>
</tr>
</tbody>
</table>

Total Credits 7

Communication and Economics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 100</td>
<td>Public Speaking (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 101</td>
<td>Fundamentals of Communication (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 103</td>
<td>Contemporary Microeconomic Principles (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 6

Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 107</td>
<td>Introduction to Engineering (Mason Core) (<a href="http://catalog.gmu.edu/mason-core/">http://catalog.gmu.edu/mason-core/</a>)</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Credits 2

Systems Engineering

Students must complete each of these courses with a grade of C or better.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 101</td>
<td>Understanding Systems Engineering</td>
<td>3</td>
</tr>
<tr>
<td>SYST 210</td>
<td>Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>SYST 220</td>
<td>Dynamical Systems I</td>
<td>3</td>
</tr>
<tr>
<td>SYST 221</td>
<td>Systems Modeling Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>SYST 320</td>
<td>Dynamical Systems II</td>
<td>3</td>
</tr>
<tr>
<td>SYST 330</td>
<td>Systems Methods</td>
<td>3</td>
</tr>
</tbody>
</table>
SYST 335  Discrete Systems Modeling and Simulation  3
SYST 371  Systems Engineering Management  3
SYST 395  Applied Systems Engineering  3
SYST 470  Human Factors Engineering  3
SYST 473  Decision and Risk Analysis  3
SYST 489  Senior Seminar  3
SYST 490  Senior Design Project I  3
SYST 495  Senior Design Project II (Mason Core)  3
OR 441  Deterministic Operations Research  3
OR 442  Stochastic Operations Research  3
Select 3 approved technical electives selected from one of the Technical Emphasis Areas below  9

Total Credits  55

**Additional Mason Core**

Students must complete all Mason Core (http://catalog.gmu.edu/mason-core/) requirements not fulfilled by major requirements.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGH</td>
<td>Composition for Multilingual Writers (Mason Core)</td>
<td>3</td>
</tr>
<tr>
<td>ENGH</td>
<td>Composition (Mason Core)</td>
<td>3</td>
</tr>
<tr>
<td>ENGH</td>
<td>Advanced Composition (Mason Core)</td>
<td>3</td>
</tr>
</tbody>
</table>
| English (6 credits)                                                                                      6

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGH 100</td>
<td>Composition for Multilingual Writers (Mason Core)</td>
<td>3</td>
</tr>
<tr>
<td>ENGH 101</td>
<td>Composition (Mason Core)</td>
<td>3</td>
</tr>
<tr>
<td>ENGH 302</td>
<td>Advanced Composition (Mason Core)</td>
<td>3</td>
</tr>
</tbody>
</table>
| Literature (http://catalog.gmu.edu/mason-core/#literature)                                           3
| Arts (http://catalog.gmu.edu/mason-core/#arts)                                                     3
| Western Civilization/World History (http://catalog.gmu.edu/mason-core/western-civilization-world-history) | 3    |
| Global Understanding (http://catalog.gmu.edu/mason-core/#global)                                 3

Total Credits  18

1 Must complete either natural science and technology or multidisciplinary section.

**Technical Emphasis Areas**

The systems engineering program requires 9 credits of technical electives. Students must select one of the following technical emphases, each containing three courses. Students must complete each of these courses with a grade of C or better.

**Aviation Systems**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 420</td>
<td>Network Analysis</td>
<td>3</td>
</tr>
<tr>
<td>SYST 460</td>
<td>Introduction to Air Traffic Control</td>
<td>3</td>
</tr>
<tr>
<td>SYST 461</td>
<td>Air Transportation System Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits  9

**Bioengineering**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BENG 230</td>
<td>Continuum Biomechanics and Transport I</td>
<td>3</td>
</tr>
<tr>
<td>BENG 320</td>
<td>Bioengineering Signals and Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

**BENG 330** Computational Methods in Bioengineering  3

Some of the courses listed above have additional prerequisites. Students should pay careful attention to prerequisites when selecting courses.

Total Credits  9

**Control Systems**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 201</td>
<td>Introduction to Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 321</td>
<td>Continuous-Time Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>SYST 421</td>
<td>Classical Systems and Control Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits  9

**Computer Network Systems**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 420</td>
<td>Network Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECE 465</td>
<td>Computer Networking Protocols</td>
<td>3</td>
</tr>
<tr>
<td>TCOM 500</td>
<td>Modern Telecommunications</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits  9

**Cyber Security Engineering**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CYSE 211</td>
<td>Operating Systems and Lab</td>
<td>3</td>
</tr>
<tr>
<td>CYSE 430</td>
<td>Critical Infrastructure Protection</td>
<td>3</td>
</tr>
</tbody>
</table>
| And choose one of the following:                                         3
| CYSE 460 | Power Systems and Smart Grid Security    | 3       |
| CYSE 465 | Transportation Systems Design            | 3       |
| CYSE 470 | Human Factors and Cyber Security         | 3       |
| CYSE 477 | Intrusion Detection                      | 3       |

Total Credits  9

**Data Analytics**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 468</td>
<td>Applied Predictive Analytics</td>
<td>3</td>
</tr>
<tr>
<td>IT 214</td>
<td>Database Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>STAT 463</td>
<td>Introduction to Exploratory Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or SYST 438</td>
<td>Analytics for Financial Engineering and Econometrics</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits  9

**Environmental Engineering**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 240</td>
<td>Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 355</td>
<td>Environmental Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 450</td>
<td>Environmental Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>or CEIE 453</td>
<td>Water and Wastewater Treatment Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits  9

**Financial Engineering**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 438</td>
<td>Analytics for Financial Engineering and Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>SYST 488</td>
<td>Financial Systems Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>
| And choose one of the following:                                         3

Total Credits  9
Systems Engineering, BS

<table>
<thead>
<tr>
<th>STAT 463</th>
<th>Introduction to Exploratory Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 455</td>
<td>Experimental Design</td>
</tr>
<tr>
<td>SYST 468</td>
<td>Applied Predictive Analytics</td>
</tr>
<tr>
<td>MBUS 304</td>
<td>Entrepreneurship: Starting and Managing a New Enterprise</td>
</tr>
</tbody>
</table>

Total Credits 9

### Mechanical Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 211</td>
<td>Statics</td>
<td></td>
</tr>
<tr>
<td>or CEIE 210</td>
<td>Statics</td>
<td></td>
</tr>
<tr>
<td>ME 212</td>
<td>Solid Mechanics</td>
<td></td>
</tr>
<tr>
<td>or CEIE 310</td>
<td>Mechanics of Materials</td>
<td></td>
</tr>
<tr>
<td>ME 341</td>
<td>Design of Mechanical Elements</td>
<td></td>
</tr>
<tr>
<td>or ME 231</td>
<td>Dynamics</td>
<td></td>
</tr>
</tbody>
</table>

#### Option 1: Mechanical Design

Option 2: Thermal Fluids

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 221</td>
<td>Thermodynamics</td>
<td></td>
</tr>
<tr>
<td>ME 322</td>
<td>Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>ME 323</td>
<td>Heat Transfer</td>
<td></td>
</tr>
<tr>
<td>or ME 342</td>
<td>Design of Thermal Systems</td>
<td></td>
</tr>
</tbody>
</table>

Some of the courses listed above have additional prerequisites. Students should pay careful attention to prerequisites when selecting courses.

Total Credits 9

### Operations Research

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR 481</td>
<td>Numerical Methods in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>SYST 420</td>
<td>Network Analysis</td>
<td>3</td>
</tr>
<tr>
<td>SYST 468</td>
<td>Applied Predictive Analytics</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 9

### Software-Intensive Systems

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 310</td>
<td>Data Structures</td>
<td>3</td>
</tr>
<tr>
<td>CS 321</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CS 332</td>
<td>Object-Oriented Software Design and Implementation</td>
<td>3</td>
</tr>
</tbody>
</table>

CS 310 listed above requires CS 112 and CS 211 computing sequence. Students should pay careful attention to prerequisites when selecting courses.

Total Credits 9

### Writing-Intensive Requirement

Mason's writing-intensive requirement for systems engineering majors is satisfied by successful completion of SYST 489 Senior Seminar.

### Advising and Plan of Study

All systems engineering students are assigned a faculty advisor. With the advisor's help and approval, each student is required to complete a plan of study. This plan of study, which is available from the SEOR office, constitutes a learning plan for the degree program and must be signed by the student's advisor and the Department Chair. The plan of study must be updated and signed by the advisor at least once per year.

#### 4-Year Plan

### Bachelor of Science in Systems Engineering Sample Plan of Study

Detailed four year plans and degree planning checklists can be found at [https://advising.gmu.edu/current-student/majors-at-mason/](https://advising.gmu.edu/current-student/majors-at-mason/).

### Accelerated Master's

#### BS (any)/Statistical Science, Accelerated MS

**Overview**

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program (BAM) and obtain an undergraduate BS degree and the Statistical Science, MS ([http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/](http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/)) in an accelerated time-frame after satisfactory completion of a minimum of 138 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP6 Graduate Policies ([http://catalog.gmu.edu/policies/academic/graduate-policies/](http://catalog.gmu.edu/policies/academic/graduate-policies/)).

See AP6.7 Bachelor's/Accelerated Master's Degrees ([http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7](http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7)) for policies related to this program.

### BAM Pathway Admission Requirements

No specific undergraduate BS degree is required. Students enrolled in any BS degree may apply to the accelerated Statistical Science, MS ([http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/](http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/)) program if such an accelerated Statistical Science, MS ([http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/](http://catalog.gmu.edu/colleges-schools/engineering/statistics/statistical-science-ms/)) pathway is allowable from the student's BS program, which will be determined by the academic advisors of both the BS and MS programs.

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate
study as specified in Graduate Admissions Policies and Bachelor's/ Accelerated Master's Degree policies.

Students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of 3.0.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific prerequisites.

Accelerated Master's Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the Statistical Science, MS program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

• Completion of Mason's requirements for undergraduate degree conferral (graduation) and completion of application for graduation.
• An overall GPA of 3.00.
• Completion of the following Mason courses each with a grade of C or better:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 213</td>
<td>Analytic Geometry and Calculus III</td>
<td>3</td>
</tr>
<tr>
<td>MATH 203</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 321</td>
<td>Abstract Algebra</td>
<td></td>
</tr>
<tr>
<td>STAT 250</td>
<td>Introductory Statistics I (Mason Core)</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 344</td>
<td>Probability and Statistics for Engineers and Scientists I</td>
<td></td>
</tr>
<tr>
<td>STAT 346</td>
<td>Probability for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 351</td>
<td>Probability</td>
<td></td>
</tr>
<tr>
<td>STAT 362</td>
<td>Introduction to Computer Statistical Packages</td>
<td>3</td>
</tr>
</tbody>
</table>

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, students complete all credits satisfying degree requirements for the BS and MS programs, with up to twelve credits overlap chosen from the following graduate courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 544</td>
<td>Applied Probability</td>
<td>3</td>
</tr>
<tr>
<td>STAT 554</td>
<td>Applied Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 560</td>
<td>Biostatistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>STAT 574</td>
<td>Survey Sampling I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 663</td>
<td>Statistical Graphics and Data Exploration I</td>
<td>3</td>
</tr>
</tbody>
</table>

All graduate course prerequisites must be completed prior to enrollment. Each graduate course must be completed with a grade of B or better to apply toward the MS degree.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master’s program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) policies.

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student’s final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition form that is submitted to the Office of the University Registrar and Graduate Recruitment and Enrollment Services. At the completion of MS requirements, a master’s degree is conferred.

Systems Engineering, BS/Data Analytics Engineering, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor’s/accelerated master’s program and obtain a Systems Engineering, BS and a Data Analytics Engineering, MS (https://catalog.gmu.edu/colleges-schools/engineering/data-analytics-engineering-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 141 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor’s degree and with satisfactory performance (grade of ‘B’ or better) in each of the graduate courses, students are given advanced standing in the master’s program.

See AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master’s degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor’s/ Accelerated Master’s Degree policies.

Systems Engineering, BS students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.0.

For the predictive analytics and financial engineering concentrations, students must submit evidence of:

• Satisfactory completion of courses in calculus, applied probability and statistics, and a scientific programming language.
• Familiarity with analytical modeling software, such as spreadsheets or math packages.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Master’s Admission Requirements

Students already admitted in the BAM Pathway will be admitted to the Data Analytics Engineering, MS program, if they have met the following criteria, as verified on the Bachelor’s/Accelerated Master’s Transition form:

• Familiarity with analytical modeling software, such as spreadsheets or math packages.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) policies.
• An overall GPA of at least 3.0
• Successfully meeting Mason’s requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements
To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master’s level courses taken as part of the undergraduate degree may be applied to the graduate degree.

These courses may be chosen from the list of graduate courses in the following table. For Systems Engineering, BS students, these graduate courses replace the corresponding undergraduate courses listed in the table. The undergraduate version of these courses may not be applied toward the Systems Engineering, MS.

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 473</td>
<td>SYST 573</td>
</tr>
<tr>
<td>This course applies to only certain concentrations; Credit may not be received for both courses.</td>
<td></td>
</tr>
<tr>
<td>OR 441</td>
<td>OR 541</td>
</tr>
<tr>
<td>Satisfies OR 531 core requirement in the graduate program. Credit may not be received for both courses.</td>
<td></td>
</tr>
<tr>
<td>SYST 438</td>
<td>SYST 538</td>
</tr>
<tr>
<td>This course applies to only certain concentrations; Credit may not be received for both courses.</td>
<td></td>
</tr>
<tr>
<td>SYST 468</td>
<td>SYST 568</td>
</tr>
<tr>
<td>This course applies to only certain concentrations; Credit may not be received for both courses.</td>
<td></td>
</tr>
<tr>
<td>SYST 488</td>
<td>SYST 588</td>
</tr>
<tr>
<td>This course applies to only certain concentrations; Credit may not be received for both courses.</td>
<td></td>
</tr>
</tbody>
</table>

For the predictive analytics and financial engineering concentration, any other 500-level course may be applied to both the undergraduate and graduate degrees with approval of the advisor and SEOR department chair.

OR 541 Operations Research: Deterministic Models will substitute for the OR 531 Analytics and Decision Analysis core requirement in the MS DAE program. Students Bachelor of Science in Systems Engineering program are not permitted to take OR 531 Analytics and Decision Analysis.

Students must pay attention to the prerequisites required for a course, and the master’s degree concentration that the course may satisfy.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master’s program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text).

Degree Conferral
Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student’s final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master’s degree is conferred.

Systems Engineering BS/Operations Research, Accelerated MS
Overview
Highly-qualified undergraduates may be admitted to the bachelor’s/accelerated master’s program and obtain a Systems Engineering, BS and an Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/operations-research-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 141 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor’s degree and with satisfactory performance (grade of ‘B’ or better) in each of the graduate courses, students are given advanced standing in the master’s program.

See AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master’s degree. For policies governing all graduate degrees, see AP6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements
Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor’s/Accelerated Master’s Degree policies.

Systems Engineering, BS students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.3, and completion of all MATH and PHYS requirements. Students must additionally complete MATH 203 Linear Algebra prior to applying for the graduate program.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.
Accelerated Master’s Admission Requirements

The criteria for admission are identical to criteria for admission to the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/operations-research-ms/) program. Students already admitted in the BAM Pathway will be admitted to the Operations Research, MS (http://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/operations-research-ms/) program, if they have met the following criteria, as verified on the Bachelor’s/Accelerated Master’s Transition form:

- An overall GPA of at least 3.3
- Successfully meeting Mason’s requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

Accelerated Pathway Requirements

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master’s level courses taken as part of the undergraduate degree may be applied to the graduate degree.

These courses may be chosen from the list of graduate courses in the following table. For Systems Engineering, BS students, these graduate courses replace the corresponding undergraduate courses listed in the table. The undergraduate version of these courses may not be applied toward the Operations Research, MS.

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
<th>Credit may not be received for both courses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 420</td>
<td>SYST 521/OR 643</td>
<td></td>
</tr>
<tr>
<td>SYST 473</td>
<td>SYST 573</td>
<td></td>
</tr>
<tr>
<td>OR 441</td>
<td>OR 541</td>
<td>Core course in the graduate program. Credit may not be received for both courses.</td>
</tr>
<tr>
<td>OR 442</td>
<td>OR 542</td>
<td>Core course in the graduate program. Credit may not be received for both courses.</td>
</tr>
<tr>
<td>SYST 438</td>
<td>SYST 538</td>
<td>The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.</td>
</tr>
<tr>
<td>SYST 468</td>
<td>OR/SYST 568</td>
<td>Core course in the graduate program. Credit may not be received for both courses.</td>
</tr>
</tbody>
</table>

Any other 500-level course may be applied to both the undergraduate and graduate degrees with approval of the advisor and SEOR department chair. Students must pay attention to the prerequisites required for a course, and the master’s degree concentration that the course may satisfy.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master’s program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text).

Degree Conferral

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition form that is submitted to the Office of the University Registrar and Graduate Recruitment and Enrollment Services. At the completion of MS requirements, a master’s degree is conferred.

Systems Engineering BS/Systems Engineering, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor’s/accelerated master’s program and obtain a Systems Engineering, BS and a Systems Engineering, MS (https://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 141 credits.

Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor’s degree and with satisfactory performance (grade of ‘B’ or better) in each of the graduate courses, students are given advanced standing in the master’s program.

See AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master’s degree. For policies governing all graduate degrees, see AP6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

BAM Pathway Admission Requirements

Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate
study as specified in Graduate Admissions Policies and Bachelor’s/Accelerated Master’s Degree policies.

Systems Engineering, BS students will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.3, and completion of all MATH and PHYS requirements.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

**Accelerated Master’s Admission Requirements**

The criteria for admission are identical to criteria for admission to the Systems Engineering, MS (https://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-ms/) program. Students already admitted in the BAM Pathway will be admitted to the Systems Engineering, MS (https://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-ms/) program, if they have met the following criteria, as verified on the Bachelor’s/Accelerated Master’s Transition form:

- An overall GPA of at least 3.3
- Successfully meeting Mason’s requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

**Accelerated Pathway Requirements**

To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master’s level courses taken as part of the undergraduate degree may be applied to the graduate degree.

These courses may be chosen from the list of graduate courses in the following table. For Systems Engineering, BS students, these graduate courses replace the corresponding undergraduate courses listed in the table. The undergraduate version of these courses may not be applied toward the Systems Engineering, MS.

<table>
<thead>
<tr>
<th>Undergraduate</th>
<th>Graduate</th>
<th>Credit may not be received for both courses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYST 420</td>
<td>SYST 521/OR 643</td>
<td></td>
</tr>
<tr>
<td>SYST 473</td>
<td>SYST 573</td>
<td></td>
</tr>
<tr>
<td>OR 441</td>
<td>OR 541</td>
<td></td>
</tr>
<tr>
<td>OR 442</td>
<td>OR 542</td>
<td></td>
</tr>
</tbody>
</table>

Any course chosen from the above course list may be used to satisfy SYST 505 Systems Engineering Principles core requirement in the Systems Engineering, MS (https://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-ms/) program. Any other 500-level course may be applied to both the undergraduate and graduate degrees with approval of the advisor and SEOR department chair. Students must pay attention to the prerequisites required for a course, and the master’s degree concentration that the course may satisfy.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master’s program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP.6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text).

**Degree Conferral**

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student’s final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition form that is submitted to the Office of the University Registrar and Graduate Recruitment and Enrollment Services. At the completion of MS requirements, a master’s degree is conferred.

**Systems Engineering, BS/Telecommunications, Accelerated MS Overview**

Highly-qualified undergraduates may be admitted to the bachelor’s/accelerated master’s program and obtain a Systems Engineering, BS and a Telecommunications, MS (http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/telecommunications-ms/) in an accelerated time-frame after satisfactory completion of a minimum of 141 credits.
Admitted students are able to use up to 12 graduate credits in partial satisfaction of requirements for the undergraduate degree. Upon completion and conferral of the bachelor's degree and with satisfactory performance (grade of 'B' or better) in each of the graduate courses, students are given advanced standing in the master's program.

See AP6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP6 Graduate Policies (https://catalog.gmu.edu/policies/academic/graduate-policies/).

**BAM Pathway Admission Requirements**
Applicants to all graduate programs at George Mason University must meet the admission standards and application requirements for graduate study as specified in Graduate Admissions Policies and Bachelor's/Accelerated Master's Degree policies.

Students in the Systems Engineering, BS program who preferably have chosen to take the systems engineering of telecommunications elective sequence will be considered for admission into the BAM Pathway after completion of a minimum of 60 credits with an overall GPA of at least 3.0, and completed all MATH and PHYS requirements. Other students will be considered on their individual merit.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

**Accelerated Master's Admission Requirements**
The criteria for admission are identical to criteria for admission to the Telecommunications, MS (http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/telecommunications-ms/) program. Students already admitted in the BAM Pathway will be admitted to the Telecommunications, MS (http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/telecommunications-ms/) program, if they have met the following criteria, as verified on the Bachelor's/Accelerated Master's Transition form:

- An overall GPA of at least 3.0
- Successfully meeting Mason's requirements for undergraduate degree conferral (graduation) and completing the application for graduation.

**Accelerated Pathway Requirements**
To maintain the integrity and quality of both the undergraduate and graduate degree programs, undergraduate students interested in taking graduate courses must choose from the following:

Advanced Standing course: Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master's level courses taken as part of the undergraduate degree may be applied to the graduate degree.

These courses may be chosen from the list of graduate courses in the following table. For Systems Engineering, BS students, these graduate courses replace the corresponding undergraduate courses listed in the BS program. The undergraduate version of these courses, if any, may not be applied toward the Telecommunications, MS (http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/telecommunications-ms/).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCOM 500</td>
<td>Modern Telecommunications</td>
<td>3</td>
</tr>
<tr>
<td>TCOM 535</td>
<td>The TCP/IP Suite of Internet Protocols</td>
<td>3</td>
</tr>
<tr>
<td>OR 541</td>
<td>Operations Research: Deterministic Models</td>
<td>3</td>
</tr>
<tr>
<td>SYST 530</td>
<td>Systems Engineering Management I</td>
<td>3</td>
</tr>
<tr>
<td>SYST 573</td>
<td>Decision and Risk Analysis (if taken, replaces TCOM 521 in the telecommunications core requirements)</td>
<td>3</td>
</tr>
</tbody>
</table>

Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program. Reserve graduate credits do not apply to the undergraduate degree.

For more detailed information on coursework and timeline requirements, see AP6.7 Bachelor's/Accelerated Master's Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#text).

**Degree Conferral**
Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student's final undergraduate semester, students must complete a Bachelor's/Accelerated Master's Transition form that is submitted to the Office of the University Registrar and the VSE Graduate Admissions Office. At the completion of MS requirements, a master's degree is conferred.