OPERATIONS RESEARCH, MS

Banner Code: EC-MS-OPRS

Academic Advising

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The Master of Science in Operations Research prepares students for research and professional practice associated with the formulation, analysis, and computer implementation of mathematical models for decision making. Major components include optimization, stochastic modeling, computer simulation, predictive data analytics, and application of these components to realistic and relevant operational analysis problems. Students focus their studies in a concentration area such as data analytics, financial engineering, military operations research, optimization, or stochastic modeling; students can also choose a self-defined concentration with approval of a faculty advisor.

To obtain the MS degree, students complete an approved plan of study that contains a minimum of 30 graduate credits. Appropriate courses may be transferred, with advisor approval, into this degree program. Students may also take courses through the Commonwealth Graduate Engineering Program. The program also prepares students for pursuing advanced graduate study leading to the PhD degree in Systems Engineering and Operations Research (https://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-operations-research-phd/).

Admissions & Policies

Admissions

To be admitted to the program, students must hold a baccalaureate degree from an accredited institution in engineering, mathematics, computer science, physical sciences, economics, or a related field. They also must have completed courses in:

Code	Title	Credits
Calculus		
MATH 113	Analytic Geometry and Calculus I (Mason Core) (http://catalog.gmu.edu/mason-core/)	4
MATH 114	Analytic Geometry and Calculus II	4
MATH 213	Analytic Geometry and Calculus III	3
Matrix Algebra		
MATH 203	Linear Algebra	3
Differential Equations		
MATH 214	Elementary Differential Equations	3
Applied Probability and Statistics		
STAT 346	Probability for Engineers	3
Scientific Programming Language		
CS 112	Introduction to Computer Programming (Mason Core) (http://catalog.gmu.edu/mason-core/)	4

Specific application deadlines and requirements (https://www2.gmu.edu/admissions-aid/apply-now/how-apply/graduate/) are available through the Office of Graduate Admissions.

Requirements

Degree Requirements

Total credits: 30

Students must complete four core courses and the project (15 credits). The remaining 15 credits are electives subject to the requirements below, and can be taken in one of five concentration areas or in an individual plan approved by the student's advisor.

Required Core Courses

Code	Title	Credits
OR 541	Operations Research: Deterministic Models	3
OR 542	Operations Research: Stochastic Models	3
OR 568	Applied Predictive Analytics	3
OR 635	Discrete System Simulation	3
Total Credits		12

Project or Thesis (Optional)

Students must complete three credit hours of OR 699 Masters Project. Students in this course work in teams on approved applied project. A project report is submitted at the end of the semester, and a final project presentation is made to the entire faculty of the SEOR Department.

Students with the consent of a faculty adviser and departmental approval, may be approved to complete a thesis.

Code	Title	Credits
OR 699	Masters Project	3
Total Credits		3

Methods Courses

Code	Title	Credits
Select at least one deterministic methods and one stochastic methods course:		6
Deterministic Methods Courses:		
OR 641	Linear Programming	
OR 642	Integer Programming	
OR 643	Network Modeling	
OR 644	Nonlinear Programming	
OR 670	Metaheuristics for Optimization	
Stochastic Methods Courses:		
OR 645	Stochastic Processes	
OR 646	Stochastic Optimization	
OR 647	Queuing Theory	

OR 674	Dynamic Programming	
OR 675	Reliability Analysis	
SYST 664	Bayesian Inference and Decision Theory	
Total Credits		6

Additional Electives

Code	Title	Credits
Select up to three additional electives from the list of allowable electives with written concurrence of the advisor [1]		9
Total Credits		9

[1]

At least two of these electives must be taken from SEOR course offerings, and one of these must be OR 600-level or higher. The remaining course should be taken in an area appropriate to the student's interests, such as operations research, systems engineering, computer science, information systems, statistics, data analytics, electrical and computer engineering, economics, mathematics or supply chain management.

The allowable elective for MS students includes:

A. Within CEC:

  o Any OR course ≥600 (http://catalog.gmu.edu/courses/or/)

  o Any SYST course > 500 (http://catalog.gmu.edu/courses/syst/)

  o Any STAT course ≥ 554 (http://catalog.gmu.edu/courses/stat/)

  o Any CS course ≥ 500 (http://catalog.gmu.edu/courses/cs/)

  o Any ECE course≥ 500 but not 528 (http://catalog.gmu.edu/courses/ece/)

  o Any CEIE course > 500 but not 601 (http://catalog.gmu.edu/courses/ceie/)

B. External to CEC (subject to approval by the Department Chair):

  o Any MATH course > 601 and permitted for Math majors (http://catalog.gmu.edu/courses/math/);

  o Any CSI course > 610 (http://catalog.gmu.edu/courses/csi/)

  o Any ECON course ≥ 611 (http://catalog.gmu.edu/courses/econ/)

Concentrations

Students may construct concentration areas by choosing electives from among special groupings. The six concentrations available are data analytics, decision analysis, financial engineering, military operations research, optimization, and stochastic modeling. In addition to the required core courses (12 credits) and project course (3 credits), the remaining 15 credit hours consist of methods and elective courses associated with the concentration areas as outlined below. Students can also devise their own grouping of electives subject to prior approval of their advisor.

Available Concentrations

- Concentration in Data Analytics (DNIC)
- Concentration in Financial Engineering (FNNE)
- Concentration in Military Operations Research (MOR)
- Concentration in Optimization (OPT)
- Concentration in Stochastic Models (STM)

Concentration in Data Analytics (DNIC)

Code	Title	Credits
Students concentrating in data analytics must complete the following:		
CS 504	Principles of Data Management and Mining	3

One deterministic methods course		3
One stochastics methods course		3
and two courses from the following list:		6
OR 604	Practical Optimization	
OR 610	Deep Learning for Predictive Analytics	
OR 670	Metaheuristics for Optimization	
STAT 663	Statistical Graphics and Data Visualization	
SYST 664	Bayesian Inference and Decision Theory	
Total Credits		15

Concentration in Financial Engineering (FNNE)

Code	Title	Credits
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	3
OR 688	Financial Systems Engineering II: Derivative Products and Risk Management	3
Select one from the following:		3
OR 538	Analytics for Financial Engineering and Econometrics	
SYST 548	Technologies and Security for Cryptocurrencies and Financial Transactions	
OR 645	Stochastic Processes	
OR 671	Judgment and Choice Processing and Decision Making	
OR 681	Decision and Risk Analysis	
OR 682	Computational Methods in Engineering and Statistics	
Students must also complete:		6
One deterministic methods course		
One stochastics methods course [1]		
Total Credits		15

[1]

If the student has already taken OR 645 Stochastic Processes this can be substituted for an elective course with written concurrence of the student's advisor

Concentration in Military Operations Research (MOR)

Code	Title	Credits
OR 651	Military Operations Research I: Cost Analysis	3
OR 652	Military Operations Research Modeling II: Effectiveness Analysis	3
SYST 683	Modeling, Simulation, and Gaming	3
One deterministic methods course		3
One stochastics methods course		3
Total Credits		15

Concentration in Optimization (OPT)

Code	Title	Credits
Select three courses from the following:		9
OR 604	Practical Optimization	

Code	Title	Credits
OR 641	Linear Programming	
OR 642	Integer Programming	
OR 643	Network Modeling	
OR 644	Nonlinear Programming	
OR 646	Stochastic Optimization	
OR 670	Metaheuristics for Optimization	
OR 682	Computational Methods in Engineering and Statistics	
Students must also complete:		6
One stochastic methods course		
One elective course with written concurrence of the student's advisor		
Total Credits		15

Concentration in Stochastic Models (STM)

Code	Title	Credits
Select three courses from the following:		9
OR 645	Stochastic Processes	
OR 647	Queuing Theory	
OR 674	Dynamic Programming	
OR 719	Graphical Models for Inference and Decision Making	
SYST 664	Bayesian Inference and Decision Theory	
STAT 554	Applied Statistics I	
or STAT 663	Statistical Graphics and Data Visualization	
Select must also complete:		6
One deterministic methods course		
One elective course with written concurrence of the student's advisor		
Total Credits		15

Dual Degree Options

Operations Research and Statistical Science Dual-Degree MS

This program allows students to earn an MS in Operations Research and an MS in Statistical Science (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/) by completing 48 credits of coursework in both areas instead of the 60 that would be required if the degrees were sought independently.

Admission Requirements

Applicants must satisfy admission requirements for the MS in Operations Research Program and the MS in Statistical Science (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/) Program. A joint faculty committee from the Statistics and Systems Engineering and Operations Research Departments make final admission decisions into the dual-degree program.

MS-OPRS/STAT Dual Degree Requirements

Total credits: 48

Required Courses

Code	Title	Credits
OR 541	Operations Research: Deterministic Models	3
OR 542	Operations Research: Stochastic Models	3
OR 635	Discrete System Simulation	3
OR 699	Masters Project	3
STAT 544	Applied Probability	3
STAT 554	Applied Statistics I	3
STAT 634	Case Studies in Data Analysis	3
STAT 652	Statistical Inference	3
STAT 654	Applied Statistics II	3
Total Credits		27

Elective Credits in OR Courses

Code	Title	Credits
Select 12 elective credits in OR courses at the 600 level, including at least one deterministic methods course and at least one stochastic methods course:		12
Deterministic Methods Courses:		
OR 641	Linear Programming	
OR 642	Integer Programming	
OR 643	Network Modeling	
OR 644	Nonlinear Programming	
OR 670	Metaheuristics for Optimization	
Stochastic Methods Courses:		
OR 645	Stochastic Processes	
OR 646	Stochastic Optimization	
OR 647	Queuing Theory	
OR 674	Dynamic Programming	
OR 675	Reliability Analysis	
SYST 664	Bayesian Inference and Decision Theory	
Total Credits		12

Elective Credits in STAT Courses

Code	Title	Credits
Select 9 elective credits from any STAT courses numbered 540-775		9
Total Credits		9

Notes

- Students currently enrolled in one of the MS programs must declare pursuit of the dual MS within one year of matriculation into the first MS program.
- A maximum of 6 credits across the two disciplines may be in independent research (thesis). The requirements for independent research are the same as detailed for the associated MS program.
- Students in either the BS (selected)/Operations Research, Accelerated MS program or the BS (selected)/Statistical Science, Accelerated MS program (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/#acceleratedmasterstext) cannot get a reduction of 6 credits toward this dual degree. Students who want to proceed to a PhD degree will only be able to waive the number of credits specified in the associated PhD degree requirements, even though they will have 48 credits at the MS level.

- If a student decides not to complete the required 48 credits, a single MS degree will not be granted unless the student fulfills the requirements for the MS in Operations Research or the MS in Statistical Science (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistical-science-ms/).
- Once a student receives one of the MS degrees from either department, the student will no longer be eligible for the reduction in credit (i.e., will need to complete 30 credits) if the student later decides to earn the other MS degree.

Accelerated Master's

Bioengineering, BS/Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Bioengineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/bioengineering/bioengineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 140 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.

Bioengineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/bioengineering/bioengineering-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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the Bioengineering courses given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Bioengineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select from the following Bioengineering courses:

Code	Title	Credits
Required course:		
BENG 575	Intellectual Property, Regulatory Concepts and Product Development	
Select at most one from the following Bioengineering courses:		
BENG 501	Bioengineering Research Methods	
BENG 514	Pathophysiology and the Role of New Technologies in Human Diseases	
BENG 520	Biomedical Data Analytics	
BENG 521	Cell and Tissue Engineering	
or BENG 541	Biomaterials	
BENG 526	Neural Engineering	

BENG 537   Medical Image Processing
   or BENG 538   Medical Imaging

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Civil and Infrastructure Engineering, BS/ Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/ accelerated master's program and obtain a Civil and Infrastructure Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/civil-environmental-infrastructure/civil-infrastructure-engineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 139 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.

Civil and Infrastructure Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/civil-environmental-infrastructure/civil-infrastructure-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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the Civil and Infrastructure Engineering courses given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Civil and Infrastructure Engineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.

- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Civil and Infrastructure Engineering courses:

Code	Title	Credits
CEIE 501	Sustainable Development	
CEIE 512	Structural Steel Design	
CEIE 532	Foundation Design	
CEIE 535	Engineering Geology	
CEIE 540	Water Supply and Distribution	
CEIE 542	Open Channel Flow	
CEIE 550	Environmental Engineering Systems	
CEIE 553	Water and Wastewater Treatment Processes	
CEIE 557	Remote Monitoring Techniques for Civil Engineering Applications	
CEIE 561	Traffic Engineering	
CEIE 562	Urban Transportation Planning	
CEIE 571	Construction Administration	
CEIE 572	Building Information Modeling	
CEIE 573	Legal Aspects of the Construction Process	
CEIE 574	Construction Computer Application and Informatics	
CEIE 576	Construction Cost Estimating	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Computer Engineering, BS/Operations Research, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Computer Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/computer-engineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 144 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.

Computer Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/computer-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 160/161, and PHYS 260/261 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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the Electrical and Computer Engineering courses given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Electrical and Computer Engineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Note that ECE 542 can be used to meet the ECE 465 requirement for the Computer Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/computer-engineering-bs/) program. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Electrical and Computer Engineering courses:

Code	Title	Credits
ECE 505	Hardware Security	
ECE 508	Internet of Things	
ECE 511	Computer Architecture	
ECE 512	Computer Architecture Security	
ECE 516	Mobile Systems and Applications	
ECE 521	Linear Systems and Control	
ECE 527	Learning From Data	
ECE 528	Introduction to Random Processes in Electrical and Computer Engineering	
ECE 530	Sensor Engineering	
ECE 531	Introduction to Wireless Communications and Networks	
ECE 535	Digital Signal Processing	
ECE 542	Computer Network Architectures and Protocols	
ECE 545	Digital System Design with VHDL	
ECE 554	Machine Learning for Embedded Systems	
ECE 555	GPU Architecture and Programming	
ECE 556	Neuromorphic Computing	
ECE 567	Optical Fiber Communications	
ECE 580	Small Spacecraft Engineering	
ECE 590	Selected Topics in Engineering	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Computer Science, BS/Operations Research, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Computer Science, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/computer-science-bs/) and an Operations Research, 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.

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.

Computer Science, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/computer-science-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 Science 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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Computer Science course list and Systems Engineering and Operations Research course list given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Computer Science course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Computer Science courses:

Code	Title	Credits
CS 540	Language Processors	
CS 550	Database Systems	
CS 551	Computer Graphics	
CS 555	Computer Communications and Networking	
CS 571	Operating Systems	
CS 580	Introduction to Artificial Intelligence	
CS 583	Analysis of Algorithms	
CS 584	Theory and Applications of Data Mining	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	

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. At the completion of MS requirements, a master's degree is conferred.

Cyber Security Engineering, BS/Operations Research, Accelerated MS
Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Cyber Security Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/cyber-security-engineering/cyber-security-engineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 144 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.

Cyber Security Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/cyber-security-engineering/cyber-security-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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Cyber Security Engineering course list and Systems Engineering and Operations Research course list given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Cyber Security Engineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Cyber Security Engineering courses:

Code	Title	Credits
CYSE 570	Fundamentals of Operating Systems	
CYSE 580	Hardware and Cyber Physical Systems	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
SYST 548	Technologies and Security for Cryptocurrencies and Financial Transactions	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Electrical Engineering, BS/Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain an Electrical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/electrical-engineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 139 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.

Electrical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/electrical-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, PHYS 160/161, and PHYS 260/261 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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the Electrical and Computer Engineering courses given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Electrical and Computer Engineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Note that ECE 587 can be used to meet the ECE 433 requirement for the Electrical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/electrical-computer/electrical-engineering-bs/) program. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Electrical and Computer Engineering courses:

Code	Title	Credits
ECE 505	Hardware Security	
ECE 508	Internet of Things	
ECE 511	Computer Architecture	
ECE 513	Applied Electromagnetic Theory	
ECE 514	Grid Digitization and Automation	
ECE 516	Mobile Systems and Applications	
ECE 517	Cyber Infrastructure of the Smart Grid	
ECE 518	Power System Protection and Control	
ECE 519	Power Electronics for Modern Power Systems	
ECE 521	Linear Systems and Control	
ECE 527	Learning From Data	
ECE 528	Introduction to Random Processes in Electrical and Computer Engineering	
ECE 530	Sensor Engineering	
ECE 531	Introduction to Wireless Communications and Networks	

ECE 532	Secure Wireless Communications and Networks	
ECE 535	Digital Signal Processing	
ECE 538	Medical Imaging	
ECE 539	Neural Engineering	
ECE 542	Computer Network Architectures and Protocols	
ECE 550	System Engineering Design	
ECE 552	Big Data Technologies	
ECE 565	Introduction to Optical Electronics	
ECE 567	Optical Fiber Communications	
ECE 580	Small Spacecraft Engineering	
ECE 584	Semiconductor Device Fundamentals	
ECE 586	Digital Integrated Circuits	
ECE 587	Design of Analog Integrated Circuits	
ECE 590	Selected Topics in Engineering	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Mechanical Engineering, BS/Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Mechanical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/mechanical/mechanical-engineering-bs/) and an Operations Research, MS in an accelerated time-frame after satisfactory completion of a minimum of 139 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.

Mechanical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/mechanical/mechanical-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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students

may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Mechanical Engineering course list and Systems Engineering and Operations Research course list given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Mechanical Engineering course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select at most two from the following Mechanical Engineering courses:

Code	Title	Credits
ME 521	Energy Transfer	
ME 531	Energy Transmission	
ME 541	Power Generation	
ME 542	Energy Utilization	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

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. At the completion of MS requirements, a master's degree is conferred.

Statistics, BS/Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a Statistics, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistics-bs/) and an Operations Research, 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.

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.

Statistics, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/statistics/statistics-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 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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students selecting up to two courses (6 credits) of approved master's level courses may select from the combined Statistics course list and Systems Engineering and Operations Research course list given below.
- Students selecting up to three or four courses (9 or 12 credits) of approved master's level courses may select at most two courses from the Statistics course list and select the remaining courses from the Systems Engineering and Operations Research course list given below. Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

Select from the following Statistics courses:

Code	Title	Credits
STAT 544	Applied Probability	
STAT 554	Applied Statistics I	

Select the remaining from the following Systems Engineering and Operations Research courses:

Code	Title	Credits
SYST 573	Decision and Risk Analysis	
SYST 538	Analytics for Financial Engineering and Econometrics	
SYST/OR 568	Applied Predictive Analytics (Core)	
SYST 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	

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. At the completion of MS requirements, a master's degree is conferred.

Systems and Industrial 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 and Industrial Engineering, BS and an 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 credits of approved advanced standing graduate courses 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 advanced standing graduate courses, the courses are applied to partial satisfaction of requirements for the master's program.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (http://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 (http://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 and Industrial 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 program. Students already admitted in the BAM Pathway will be admitted to the 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 and Industrial 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.

Undergraduate	Graduate	
OR 441	OR 541	Core course in the graduate program. Credit may not be received for both courses.
OR 442	OR 542	Core course in the graduate program. Credit may not be received for both courses.
SYST 414	SYST 514	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.
SYST 420	SYST 521/OR 643	Credit may not be received for both courses.
SYST 438	SYST 538	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.
SYST 448	SYST 548	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.
SYST 460	SYST 560	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.
SYST 461	SYST 660	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.
SYST 468	OR/SYST 568	Core course in the graduate program. Credit may not be received for both courses.
SYST 473	SYST 573	Credit may not be received for both courses.
SYST 488	SYST 588	The course applies only to certain concentrations in the graduate program; credit may not be received for both courses.

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 (http://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. At the completion of MS requirements, a master's degree is conferred.

BS (selected)/Operations Research, Accelerated MS

Overview

Highly-qualified undergraduates may be admitted to the bachelor's/accelerated master's program and obtain a BS in their major and an Operations Research, 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.

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.

Mason undergraduate students majoring in both engineering and non-engineering disciplines will be considered for admission into the BAM Pathway if 1) such an accelerated Operations Research, 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 and by the SEOR department chair, 2) they have completed of a minimum of 60 credits with an overall GPA of at least 3.3, and 3) they have completed 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 program. Students already admitted in the BAM Pathway will be admitted to the 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. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs and by the SEOR department chair. For the BS programs that allow undergraduate electives from the department of system engineering and operations research, the students may choose the graduate version of such elective courses to replace the corresponding undergraduate courses.

- Students are highly recommended to select courses marked as core courses because it applies to the master's degree regardless of the graduate-level concentration chosen in the Operations Research, MS program. The undergraduate version of these courses, if any, may *not* be applied toward the Operations Research, MS. Credit may not be received for both the undergraduate and graduate version of these courses.
- Some of the courses in the Systems Engineering and Operations Research course list applies only to certain concentrations in the Operations Research, MS program.
- Students must pay attention to the prerequisites required for a course, and the master's degree concentration that the course may satisfy.

The courses may be chosen from the list of Systems Engineering and Operations Research graduate courses in the following table.

Code	Title	Credits
SYST 521	Network Analysis	
OR 538	Analytics for Financial Engineering and Econometrics	
OR 541	Operations Research: Deterministic Models (Core)	
OR 542	Operations Research: Stochastic Models (Core)	
OR 568	Applied Predictive Analytics (Core)	
OR 588	Financial Systems Engineering I: Introduction to Options, Futures, and Derivatives	

Any other 500-level course may be applied to both the undergraduate and graduate degrees with approval of the advisor and SEOR department chair.

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. At the completion of MS requirements, a master's degree is conferred.