APPLIED INFORMATION TECHNOLOGY, MS

Banner Code: EC-MS-AIT

Academic Advising

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The MS in Applied Information Technology is the very best graduate education in IT for high-potential leaders, especially those working on IT solutions that affect the federal government, industry or non-profit. Its objective is to graduate individuals of competence and character who can lead multidisciplinary teams in the design, justification, development, management, and sustainment of mega-systems from data to decision in the private and federal sectors. The MS in AIT provides a high quality curricula for students seeking to pursue their careers in the leading IT areas including Cyber Security, Big Data Analytics, Knowledge Mining, Data Analytics in Social Media, and Cyber-Human Interaction.

The MS AIT program offers the Cyber Security, Data Analytics and Intelligence Methods, and Machine Learning Engineering concentration fully online. For the online program, courses are offered in a condensed 8-week format, with students taking one course at a time. Content of courses, objectives, evaluation methods, and outcomes are identical to those for the on-campus program. Only the delivery format is different. The online program is intended to be completed in about 2.5 years. Request additional information for the online program, learn more, or apply (https://masononline.gmu.edu/programs/ms-applied-information-technology/).

At the doctoral level, the department offers a concentration in the PhD in IT (http://catalog.gmu.edu/colleges-schools/engineering-computing/information-technology-phd/) program.

Admissions & Policies

Admissions

Applicants must have completed a baccalaureate degree from one of the Mason-recognized U.S. institutional accrediting agencies and earned a GPA of 3.00 or better in their 60 highest-level credits. They must be experienced in the fundamentals of IT and quantitative methods. In addition, applicants must:

- Provide two letters of recommendation, preferably from academic references or references in industry or government who are familiar with the applicant's professional accomplishments.
- Provide a resume and detailed statement of career goals and professional aspirations.
- Have achieved a satisfactory score on the TOEFL examination for non-native English speakers.

A high-achieving Mason Engineering alum who has shown exemplary work in an undergraduate degree may consider our Fast-Track graduate admission process which requires fewer supplementary admission materials.

Requirements

Degree Requirements

Total credits: 30

Completion of the MS program requires a minimum of 30 approved graduate credits (10 courses). To provide a common background in the fundamentals of information sciences and technology, all students are required to complete four core courses. In addition to the core courses, students must choose a concentration within the program by taking six courses from one of the concentration areas listed below.

Students interested in the PhD in IT program must pursue the Cyber Security, Data Analytics and Intelligence Methods, Cyber-Human Systems, or Machine Learning Engineering concentrations. They are required to meet with an advisor before applying to the program. In addition, students must take AIT 602 and one of the following courses: AIT 699, AIT 799, or AIT 796, while they are completing their MS AIT degree.

Students in all concentrations may take other CEC graduate-level courses not listed below as part of their MS technical electives subject to prior advisor approval.

Core Courses

Code	Title	Credits
Required Core Courses		**12**
For students in all concentrations except the IT Management concentration:		
AIT 512	Algorithms and Data Structures Essentials	
AIT 524	Database Management Systems	
AIT 542	Fundamentals of Computing Platforms	
AIT 664	Information: Representation, Processing and Visualization	
For students in the IT Management concentration:		
AIT 524	Database Management Systems	
AIT 542	Fundamentals of Computing Platforms	
AIT 580	Analytics: Big Data to Information	
AIT 664	Information: Representation, Processing and Visualization	
Total Credits		12

Concentrations

Available Concentrations

- Cyber Security (CYBR)
- Cyber-Human Systems (CBHS)
- Data Analytics and Intelligence Methods (DAIN)
- IT Management (ITMG)
- Machine Learning Engineering (MLE)

Cyber Security (CYBR)

Code	Title	Credits
Foundation		
Select four courses from the following:		12
AIT 660	Cyber Security Fundamentals	
AIT 670	Cloud Computing Security	
AIT 681	Secure Software Development	
AIT 682	Network and Systems Security	
AIT 702	Incident Handling and Penetration Testing	
Electives		
Select two courses from the following:		6
AIT 590	Topics in Applied Information Technology	
AIT 602	Introduction to Research in Applied Information Technology	
AIT 636	Interpretable Machine Learning	
AIT 672	Identity and Access Management	
AIT 690	Advanced Topics in Applied Information Technology	
AIT 699	Research Project	
AIT 701	Cyber Security: Emerging Threats and Countermeasures	
AIT 712	Applied Biometric Technologies	
AIT 736	Applied Machine Learning	
AIT 746	Applied Deep Learning	
AIT 790	Advanced Special Topics in Applied Information Technology	
AIT 799	Master's Thesis	
Total Credits		18

Cyber-Human Systems (CBHS)

Code	Title	Credits
Foundation		
AIT 582	Metadata Analytics for Big Data	3
AIT 602	Introduction to Research in Applied Information Technology	3
AIT 716	Human Computer Interaction	3
AIT 724	Data Analytics in Social Media	3
Electives		
Select two courses from the following:		6
AIT 526	Introduction to Natural Language Processing	
AIT 590	Topics in Applied Information Technology	
AIT 614	Big Data Essentials	
AIT 624	Knowledge Mining from Big-Data	
AIT 636	Interpretable Machine Learning	
AIT 684	Interactive Visualization and Data Analytics	
AIT 690	Advanced Topics in Applied Information Technology	
AIT 699	Research Project	
AIT 711	Rapid Development of Scalable Applications	
AIT 722	Theories and Models in Geo-Social Data Analytics	
AIT 726	Natural Language Processing with Deep Learning	
AIT 734	Advanced Web Analytics Using Semantics	
AIT 736	Applied Machine Learning	
AIT 746	Applied Deep Learning	
AIT 790	Advanced Special Topics in Applied Information Technology	
AIT 799	Master's Thesis	
Total Credits		18

Data Analytics and Intelligence Methods (DAIN)

Code	Title	Credits
Foundation		
Select four courses from the following:		12
AIT 580	Analytics: Big Data to Information	
AIT 582	Metadata Analytics for Big Data	
AIT 614	Big Data Essentials	
AIT 677	Intelligence Analysis Methods	
AIT 724	Data Analytics in Social Media	
Electives		
Select two courses from the following:		6
AIT 526	Introduction to Natural Language Processing	
AIT 590	Topics in Applied Information Technology	
AIT 602	Introduction to Research in Applied Information Technology	
AIT 624	Knowledge Mining from Big-Data	
AIT 636	Interpretable Machine Learning	
AIT 684	Interactive Visualization and Data Analytics	
AIT 690	Advanced Topics in Applied Information Technology	
AIT 699	Research Project	
AIT 711	Rapid Development of Scalable Applications	
AIT 716	Human Computer Interaction	
AIT 722	Theories and Models in Geo-Social Data Analytics	
AIT 726	Natural Language Processing with Deep Learning	
AIT 734	Advanced Web Analytics Using Semantics	
AIT 736	Applied Machine Learning	
AIT 746	Applied Deep Learning	
AIT 790	Advanced Special Topics in Applied Information Technology	
AIT 799	Master's Thesis	
Total Credits		18

IT Management (ITMG)

Code	Title	Credits
Select six courses from the following:		18
AIT 582	Metadata Analytics for Big Data	
AIT 590	Topics in Applied Information Technology	

AIT 614	Big Data Essentials	
AIT 622	Determining Needs for Complex Big Data Systems	
AIT 655	Project Management Concepts and Methods	
AIT 660	Cyber Security Fundamentals	
AIT 665	Managing Information Technology Programs in the Federal Sector	
AIT 670	Cloud Computing Security	
AIT 672	Identity and Access Management	
AIT 677	Intelligence Analysis Methods	
AIT 678	National Security Challenges	
AIT 679	Law and Ethics of Big Data	
AIT 685	Capstone Seminar	
AIT 690	Advanced Topics in Applied Information Technology	
AIT 697	Leading Organizations Through Change	
AIT 701	Cyber Security: Emerging Threats and Countermeasures	
Total Credits		18

Machine Learning Engineering (MLE)

Code	Title	Credits
Foundation		
Select four courses from the following:		12
AIT 526	Introduction to Natural Language Processing	
AIT 614	Big Data Essentials	
AIT 636	Interpretable Machine Learning	
AIT 736	Applied Machine Learning	
Electives		
Select two courses from the following:		6
AIT 722	Theories and Models in Geo-Social Data Analytics	
AIT 724	Data Analytics in Social Media	
AIT 726	Natural Language Processing with Deep Learning	
AIT 746	Applied Deep Learning	
AIT 690	Advanced Topics in Applied Information Technology	
AIT 790	Advanced Special Topics in Applied Information Technology	
AIT 799	Master's Thesis	
Total Credits		18

Accelerated Master's

Applied Science, BAS (Cyber Security Concentration)/Applied Information Technology, Accelerated MS

Overview

Highly-qualified students in the Applied Science, BAS, Cyber Security Concentration (http://catalog.gmu.edu/colleges-schools/interdisciplinary-programs-courses/applied-science-bas/#cybs) have the option of obtaining an accelerated Applied Information Technology, MS (http://catalog.gmu.edu/colleges-schools/engineering/information-sciences-technology/applied-information-technology-ms/).

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Applied Science, BAS, Cyber Security Concentration program may apply to this option if they have earned 60 undergraduate credits with an overall GPA of at least 3.30. They may begin taking graduate-level courses once they have earned 75 undergraduate credits. Criteria for admission are identical to criteria for admission to the Applied Information Technology, MS program.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BAS and MS programs, with up to 12 credits overlapping from the following courses:

Code	Title	Credits
AIT 512	Algorithms and Data Structures Essentials	3
or AIT 580	Analytics: Big Data to Information	
AIT 524	Database Management Systems	3
AIT 542	Fundamentals of Computing Platforms	3
AIT 660	Cyber Security Fundamentals [1]	3
AIT 664	Information: Representation, Processing and Visualization	3

[1] This course is only applicable to the CYBR and ITMG concentrations in the MSAIT. Students planning to pursue CBHS or DAIN should select a different course.

Note: When selecting between AIT 512 and AIT 580, students should select the course that aligns with the MSAIT concentration they intend to pursue.

Degree Conferral

Students must apply the semester before they expect to complete the BAS requirements to have the BAS 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.

Applied Science, BAS (Data Analytics Concentration)/Applied Information Technology, Accelerated MS

Overview

Highly-qualified students in the Applied Science, BAS, Data Analytics Concentration (http://catalog.gmu.edu/colleges-schools/interdisciplinary-programs-courses/applied-science-bas/) have the option of obtaining an accelerated Applied Information Technology, MS (http://

catalog.gmu.edu/colleges-schools/engineering/information-sciences-technology/applied-information-technology-ms/).

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Applied Science, BAS Data Analytics concentration may apply to this option if they have earned 60 undergraduate credits with an overall GPA of at least 3.30. Students may begin taking the master's level courses once they have earned 75 undergraduate credits.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BAS and MS programs. Students may select up to 12 credits to overlap from the following options. Students should consult with both the BAS and MSAIT advisors.

Code	Title	Credits
AIT 512	Algorithms and Data Structures Essentials [1]	3
or AIT 580	Analytics: Big Data to Information	
AIT 524	Database Management Systems	3
AIT 542	Fundamentals of Computing Platforms	3
AIT 664	Information: Representation, Processing and Visualization	3

[1] When selecting between AIT 512 and AIT 580, students should select the course that aligns with the MSAIT concentration they intend to pursue.

Individualized Study, BIS/Applied Information Technology, Accelerated MS

Overview

Highly-qualified students in the Individualized Study, BIS (http://catalog.gmu.edu/colleges-schools/humanities-social-sciences/integrative-studies/individualized-study-bis/) have the option of obtaining an accelerated Applied Information Technology, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Application 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 (http://catalog.gmu.edu/admissions/graduate-policies/). Mason undergraduate students in the BIS Program can apply in the semester in which they will have completed 90 or more credits (including 15 Mason resident credits) applicable toward the BIS. Students must have an overall GPA of at least 3.30 to apply to the program.

Reserve Graduate Credit

Students may take up to 6 additional graduate credits as reserve graduate credit. These credits do not apply to the undergraduate degree. The ability to take courses for reserve graduate credit is available to all high achieving undergraduates with the permission of the department. Permission to take a graduate course for reserve graduate credit is normally granted only to Mason seniors within 15 hours of graduation.

To apply these credits to the master's degree, students must request that the credits be moved from the undergraduate degree to the graduate degree using the Bachelor's/Accelerated Master's Transition Form (http://registrar.gmu.edu/forms/).

Accelerated Option Requirements

Students in the accelerated master's option must maintain a minimum 3.30 GPA in the undergraduate segment until they have satisfied all requirements for the BIS degree. On completion and conferral of the undergraduate degree they submit the Bachelor's/Accelerated Master's Transition Form (http://registrar.gmu.edu/forms/) and are admitted to graduate status.

As graduate students, accelerated master's students have an advanced standing. Students must complete all credits that satisfy requirements of the BIS program and those of the MSAIT program, with two courses overlapping from the courses necessary to earn the BIS with a concentration IND (individualized), applied information technology emphasis as listed below.

Code	Title	Credits
AIT 524	Database Management Systems	3
AIT 542	Fundamentals of Computing Platforms	3
Total Credits		6

Information Technology, BS/Applied Information Technology, Accelerated MS

Overview

Highly-qualified students in the Information Technology, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/information-technology-bs/) have the option of obtaining an accelerated Applied Information Technology, MS.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7). For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements

Students in the Information Technology, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/information-technology-bs/) program may apply to this option if they have earned 60 undergraduate credits and take graduate level courses after completion with an overall GPA of 75 credits with an overall GPA of at least 3.30. Criteria for admission are identical to criteria for admission to the Applied Information Technology, MS program.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BS and MS programs, with a minimum of 3 credits (maximum 12 credits) overlapping from the following courses:

Code	Title	Credits
AIT 512	Algorithms and Data Structures Essentials (satisfies the IT 306 requirement in the BS INFT program)	3
AIT 524	Database Management Systems (satisfies the IT 314 requirement in the BS INFT program)	3
AIT 542	Fundamentals of Computing Platforms (satisfies the IT 342 requirement in the BS INFT program)	3
AIT 580	Analytics: Big Data to Information (satisfies the IT 322 requirement in the BS INFT program)	3
AIT 664	Information: Representation, Processing and Visualization (satisfies the IT 415 requirement in the BS INFT program)	3
AIT 682	Network and Systems Security (satisfies the IT 366 requirement in the BS INFT program)	3

Students also have the option to take up to 6 additional credits of graduate coursework *on reserve*, which can be used for the MS degree only. See AP.1.4.4 Graduate Course Enrollment by Undergraduates (http://catalog.gmu.edu/policies/academic/registration-attendance/#ap-1-4-4).

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.

Mechanical Engineering, BS/Applied Information Technology, 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 Applied Information Technology, MS in an accelerated time-frame after satisfactory completion of a minimum of 139 credits.

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.

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, and additional unit-specific criteria.

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.

The criteria for admission are identical to criteria for admission to the Applied Information Technology, MS program.

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 Courses

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.

Code	Title	Credits
AIT 524	Database Management Systems	3
AIT 542	Fundamentals of Computing Platforms	3
AIT 664	Information: Representation, Processing and Visualization	3
AIT 512	Algorithms and Data Structures Essentials [1]	3
AIT 580	Analytics: Big Data to Information [2]	3

1 This course should be selected for all concentrations except for the IT Management concentration

2 This course should be selected for the IT Management concentration

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. Students are strongly encouraged to meet with a graduate advisor to select reserve graduate credits. Reserve graduate credits do not apply to the undergraduate degree.

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.