

TELECOMMUNICATIONS, MS

Banner Code: VS-MS-TCOM

Academic Advising

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The Master of Science in Telecommunications offers a blend of cutting-edge practice-oriented courses in cloud computing, network engineering, wireless communications and network security. This industry-oriented program is designed for students who wish to enter the field of telecommunications or are working in the field and want to advance their knowledge of telecommunications. The program concentrates on practical applications of telecommunications, rather than on a theoretical approach, while providing a thorough education in the necessary engineering principles. Hands-on laboratory courses provide students with practical skills and knowledge needed to hit the ground running after graduation. This program also offers two certificate programs that may be incorporated into, and taken concurrently with, the MS in Telecommunications.

Admissions & Policies

Admissions Requirements

Specific application deadlines and requirements (https://admissions.gmu.edu/grad/application-deadlines-and-requirements/?academicUnit=VS&_ga=1.107632321.273102085.1480697294/) are available through the Office of Graduate Admissions.

The program is open to students who hold a BS or BA degree from an accredited college or university in engineering, math, science, computer science, business (with a quantitative background), economics, or other analytical disciplines, and students who have equivalent work experience indicating analytical aptitude. Depending on their background, some applicants may be required to complete 3 to 6 credits of preliminary coursework before they are allowed to enroll in any of the core courses or elective courses in the program. A minimum undergraduate GPA of 3.00 is usually required.

Students may be admitted to the MS program as degree seeking students, or they may be admitted for non-degree study within the program, which allows them to take individual courses. Students in the non-degree program may apply to the degree program, provided their GPA within the MS in Telecommunications Program is 3.00 or above. Up to 12 credits earned in non-degree study may be transferred into the degree program, provided each of the courses to be transferred in was passed with a grade of B or above.

Policies

GPA Requirements

A maximum of 6 credits of courses with grades of C or B- may be applied toward the degree. The student must present a GPA of at least 3.00 for all courses submitted for the degree.

Plan of Study

Before completing 9 credit hours of coursework, each student must submit to the TCOM office a plan of study that has been approved by the academic advisor. This plan should be kept up to date by regular consultation with the academic advisor. A final, signed version of the plan must be turned in when the student submits a graduation application.

Telecommunications Certificates

Two 15-credit Telecommunications certificates are offered by the department. Students may pursue these certificates as stand-alone programs through the normal admissions process or as a secondary certificate to their MS degree. Certificate courses are drawn directly from the MS in TCOM curriculum. If a student has successfully completed and conferred one of these certificates prior to acceptance to the MS, it is possible to transfer up to 12 credits (B or better) into the MS. Please note that no more than 12 credits of coursework can be brought in to the MS.

- Advanced Networking Protocols for Telecommunications Graduate Certificate (<http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/advanced-networking-protocols-telecommunications-graduate-certificate/>)
- Telecommunications Forensics and Security Graduate Certificate (<http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/telecommunications-forensics-security-graduate-certificate/>)

Requirements

Degree Requirements

Total credits: 30

Students must complete a minimum of 30 graduate credits beyond the bachelor's degree. The plan of study includes a 21-credit required core component and a 9-credit elective component. Electives should be chosen either from the list of elective courses or from one of the two concentration options.

Core Courses

Code	Title	Credits
TCOM 500	Modern Telecommunications	3
TCOM 514	Basic Switching: Lecture and Laboratory Course	3
TCOM 515	Internet Protocol Routing: Lecture and Laboratory Course	3
TCOM 535	The TCP/IP Suite of Internet Protocols ^{1,2}	3
TCOM 570	Network Automation	3
TCOM 610	Border Gateway Protocol (BGP) Routing ¹	3

TCOM 750	Coordinating Seminar	3
Total Credits		21

¹ Required for the Concentration in Network Technologies

² Required for the Concentration in Network Forensics and Security

Electives

Code	Title	Credits
Select three courses from the following:		
TCOM 552	Introduction to Mobile Communications Systems	9
TCOM 608	Optical Communications Systems	
TCOM 611	Multi-Protocol Label Switching (MPLS) ¹	
TCOM 614	Advanced Routing Lab ¹	
TCOM 616	Scalable Network Architecture ¹	
TCOM 617	Enterprise Network Architecture ¹	
TCOM 631	Voice Over IP ¹	
TCOM 652	5G Service, Technology and Network	
TCOM 660	Network Forensics ²	
TCOM 661	Digital Media Forensics ²	
TCOM 663	Operations of Intrusion Detection for Forensics ²	
TCOM 664	Incident Response Forensics ²	
TCOM 590	Selected Topics in Telecommunications	
TCOM 690	Advanced Topics in Telecommunications	
ECE 542	Computer Network Architectures and Protocols	
ECE 643	Network Switching and Routing	
ECE 646	Applied Cryptography	
Total Credits		9

¹ Applicable to the Concentration in Network Technologies

² Applicable to the Concentration in Network Forensics and Security

Concentration in Network Technologies (NTEC)

Code	Title	Credits
Required Core Courses		
TCOM 535	The TCP/IP Suite of Internet Protocols	3
TCOM 610	Border Gateway Protocol (BGP) Routing	3
Electives		
Select at least two courses from the following:		
TCOM 611	Multi-Protocol Label Switching (MPLS)	6
TCOM 614	Advanced Routing Lab	
TCOM 616	Scalable Network Architecture	
TCOM 617	Enterprise Network Architecture	
TCOM 631	Voice Over IP	
Total Credits		12

Concentration in Network Forensics and Security (NFSC)

Code	Title	Credits
Required Core Courses		
TCOM 535	The TCP/IP Suite of Internet Protocols	3
Electives		

Select at least three courses from the following:		9
TCOM 660	Network Forensics	
TCOM 661	Digital Media Forensics	
TCOM 663	Operations of Intrusion Detection for Forensics	
TCOM 664	Incident Response Forensics	
Total Credits		12

Accelerated Master's

Electrical Engineering, BS/ Telecommunications, Accelerated MS

Overview

Highly-qualified students in the Electrical Engineering, BS (<http://catalog.gmu.edu/colleges-schools/engineering/electrical-computer/electrical-engineering-bs/>) have the option of obtaining an accelerated Telecommunications, 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 can apply for the program during the semester in which they expect to complete 75 undergraduate credits applicable toward the BS degree. An overall GPA of at least 3.00 at the time of application is required. Criteria for admission are identical to criteria for admission to the MS in Telecommunications Program. Application is made using the accelerated graduate program application forms, and all usual requirements must be met. The accelerated program application form specifies the overlapping courses and details the 3.00 undergraduate GPA.

Accelerated Option Requirements

Students must complete 145 credits that satisfy all the requirements for the BS and MS degrees, with 6 credits overlap. Students take 6 credits of 500-level courses as part of their technical electives or substitutes for required courses as part of their 121-credit undergraduate program. Students may take additional graduate-level courses as part of their BS technical electives with advisor approval. These additional graduate-level courses will not count toward the MS degree.

Code	Title	Credits
Select 6 credits from the following:		
TCOM 514	Basic Switching: Lecture and Laboratory Course	3
TCOM 515	Internet Protocol Routing: Lecture and Laboratory Course	3
TCOM 535	The TCP/IP Suite of Internet Protocols	3
TCOM 570	Network Automation	3
TCOM 610	Border Gateway Protocol (BGP) Routing	3
Or approved substitutes		
Total Credits		21

Degree Conferral

Students must apply to have the BS conferred the semester before they expect to complete the BS requirements. At the completion of the MS requirements, the MS degree will be awarded.

Individualized Study, BIS/ Telecommunications, 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 Telecommunications, 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 Individualized Study, BIS (<http://catalog.gmu.edu/colleges-schools/humanities-social-sciences/integrative-studies/individualized-study-bis/>) program may apply for this option if they have earned 90 undergraduate credits (including 15 Mason resident credits) with an overall GPA of at least 3.25. Criteria for admission are identical to criteria for admission to the Telecommunications, MS program.

Accelerated Option Requirements

Students must complete all requirements for the BIS and MS programs, with 6 credits overlap.

Students select TCOM courses from the list below to meet the requirements of the accelerated program. Six credits of TCOM courses will be applied to meet the requirements of both the BIS and MS TCOM programs. An additional three credits of TCOM courses is required for the BIS Individualized Concentration (IND) with emphasis on telecommunication. Note that accelerated students can only take the courses in the list below if they passed the listed prerequisite course with a B or higher.

BIS Concentration

Total credits: 34-46

Students who are pursuing the Individualized Study, BIS (<http://catalog.gmu.edu/colleges-schools/humanities-social-sciences/integrative-studies/individualized-study-bis/>), Individualized concentration (IND) with an emphasis on telecommunications must take:

Code	Title	Credits
	Select an additional 500-level TCOM course(s) from the list below	3
BIS 300	Understanding Interdisciplinary Studies	3
BIS 390	The Research Process	3
BIS 490	RS: Senior Project (Mason Core) (http://catalog.gmu.edu/mason-core/)	3
BIS 491		1
ECE 301	Digital Electronics	3
IT 341	Data Communications and Network Principles	3

TCOM 500	Modern Telecommunications	3
Select additional courses related to telecommunication ¹		9-21
Total Credits		31-43

¹ Required to reach the necessary number of credits for the BIS Individualized concentration.

Telecommunications Courses

Code	Title	Credits
TCOM 500	Modern Telecommunications	3
TCOM 530	Data Communications Fundamentals	3
TCOM 535	The TCP/IP Suite of Internet Protocols	3
TCOM 551	Digital Communication Systems	3
TCOM 607	Satellite Communications	3
TCOM 608	Optical Communications Systems	3
TCOM 631	Voice Over IP	3

Note:

Accelerated students who have passed IT 341 Data Communications and Network Principles with a grade of B or higher will not be required to take TCOM 530 in the Telecommunications, MS core. Other TCOM courses may be approved on a case-by-case basis.

See each course for individual prerequisite requirements.

Degree Conferral

Students must apply the semester before they expect to complete the BIS 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.

Information Technology, BS/ Telecommunications, Accelerated MS

Overview

Highly-qualified students in the Information Technology, BS (<http://catalog.gmu.edu/colleges-schools/engineering/information-sciences-technology/information-technology-bs/>) have the option of obtaining an accelerated Telecommunications, 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/information-sciences-technology/information-technology-bs/>) program may apply for this option if they have earned 75 undergraduate credits with an overall GPA of at least 3.00. Criteria for admission are identical to criteria for admission to the Telecommunications, MS program.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BS and MS programs.

Code	Title	Credits
Select six credits from the following:		6
TCOM 500	Modern Telecommunications (To satisfy the IT 300 BS, AIT requirement)	
TCOM 535	The TCP/IP Suite of Internet Protocols (To satisfy the IT 441 BS, AIT requirement)	
TCOM 631	Voice Over IP (To satisfy the IT 484 BS, AIT requirement)	
Total Credits		6

Note:

Students in the accelerated option who have passed IT 341 Data Communications and Network Principles with a grade of B or higher will not be required to take TCOM 535 The TCP/IP Suite of Internet Protocols, which is listed in the MS TCOM core. Alternative sections of TCOM courses to satisfy requirements in the AIT undergraduate program may be made with the approval of the undergraduate academic advisor.

Degree Conferral

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

Systems Engineering, BS/ Telecommunications, Accelerated MS

Overview

Highly-qualified students in the Systems Engineering, BS (<http://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-bs/>) have the option of obtaining an accelerated Telecommunications, 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 Systems Engineering, BS (<http://catalog.gmu.edu/colleges-schools/engineering/systems-operations-research/systems-engineering-bs/>) program who preferably have chosen to take the systems engineering of telecommunications elective sequence may apply to this option if they have earned 75 undergraduate credits with an overall GPA of at least 3.00 and completed all MATH and PHYS requirements. Other students will be considered on their individual merit. Criteria for admission are identical to criteria for admission to the Telecommunications, MS program.

Accelerated Option Requirements

Students must complete all credits that satisfy requirements for the BS and MS programs, with 6 credits overlap selected from the following courses:

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

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.