INFORMATION TECHNOLOGY (IT)

100 Level Courses

IT 102: *Discrete Structures.* 3 credits.
Introduces ideas of high-level program design and discrete structures. This course focuses on problem-solving and includes an introduction to programming, Boolean algebra, symbolic logic, digital circuits, set theory, combinatorics, discrete probability, mathematical induction, recursion and a basic introduction to trigonometry. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (MATH 108[*C], 108[XS], 113[*C], 113[XS], HNRT 225[C] or 225[XS] or ((MATH 123[C] or 123[XS]) and (MATH 124[*C] or 124[XS]))).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 104: *Introduction to Computing.* 3 credits.
This course, using both lecture and laboratory practice, introduces students to basic computer concepts in hardware, software, networking, computer security, programming, database, e-commerce, decision support systems, and current developments in 3-D printing, virtualization, and Siri-like systems. Additional lectures examine social, legal, ethical issues including privacy, intellectual property, health concerns, green computing, and accessibility. Students learn techniques to search, evaluate, validate, and cite information found online. Hands-on lab includes spreadsheets, databases, presentation, HTML 5, CSS, cybersecurity, blogs, wiki, and mobile app development. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Mason Core: Mason Core, Info Tech & Computing (https://catalog.gmu.edu/mason-core/)

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 105: *IT Architecture Fundamentals.* 3 credits.
Introduces students to fundamental hardware and software concepts of information technology (IT) to understand the basics of modern computing environments. Students acquire a comprehensive understanding of a computer system's essential components, component interdependence, and binary functions, factoring in performance, data communication models, telecommunication basics, and information security. Recent trends and advancements in mobile computing, telecommunications, and IT infrastructures are discussed. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 106: *Introduction to IT Problem Solving Using Computer Programming.* 3 credits.
Introduces techniques for developing solutions to business problems using procedural programming as an IT resource/tool. Students apply problem solving concepts by analyzing problems and constructing, testing, and implementing algorithms using pseudocode, desk checking, and procedural programming. Topics include: program flow, control structures, programming fundamentals, and integrating program modules into a cohesive solution. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (MATH 112[*C], 125[*C], 125[XS], IT 102[*C] or 102[XS]).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 109: *Introduction to Computer Programming.* 3 credits.
This foundation course is designed to teach students problem-solving skills using procedural programming that is required for the Information Technology degree program. The course accomplishes the goals through hands-on experience in the lecture class as well as through computer laboratory work. Topics to be discussed include, but are not limited to: variables, conditionals, functions, strings, iteration, testing, storage types and files. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (MATH 112[*C], 125[*C], 125[XS], IT 102[*C] or 102[XS]).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 191: *Review of Computing Fundamentals.* 1 credit.
Provides an extensive understanding of computing fundamentals. Topics include: hardware, software, networking, computer security, programming, database, e-commerce, decision support systems, and other emerging

technologies. Open only to students with transfer credit comparable to IT 103 or IT 104 who have not attempted IT 191 or IT 104. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 193: *Review of Multimedia and Web Design.* 1 credit.
Provides an extensive understanding of concepts and techniques for designing and developing attractive and accessible websites with multimedia components. Introduces and discusses technological, aesthetic, and human factors. Open only to students with transfer credit comparable to IT 213 who have not attempted IT 193 or IT 213. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to three attempts.
Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 194: *Review of Database Fundamentals.* 1 credit.
Provides an extensive understanding of database fundamentals. Topics include: database classifications, data models with extensive coverage of the relational model, entity-relationship and extended entity relationship models, normalization, advanced data modeling, and Structured Query Language (SQL) programming. Open only to students with transfer credit comparable to IT 214 who have not attempted IT 194 or IT 214. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 196: *Review of IT Problem Solving Using Computer Programming.* 1 credit.
Provides an extensive understanding of techniques for developing solutions to business problems through an iterative design and implementation approach. Open only to students with transfer credit comparable to IT 106 who have not attempted IT 106 or IT 196. (MATH 112 prior completion or co-registration is strongly recommended.) Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

200 Level Courses

IT 206: *Object Oriented Techniques for IT Problem Solving.* 3 credits.
Introduces techniques for developing solutions to business problems using object-oriented programming as an IT resource/tool. Students apply problem solving concepts by analyzing problems and constructing, testing, and implementing object-oriented solutions using object-oriented analysis and design, data modeling, and object-oriented programming fundamentals. Topics include: Unified Modeling Language (UML), classes, inheritance, polymorphism, and exception handling. Notes: Students cannot receive credit for both IT 108 and IT 206. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 106[C], 106[XS] or 196[C]) and (IT 102[C], 102[XS], MATH 112[C], 125[C] or 125[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 207: *Applied IT Programming.* 3 credits.
Building on fundamentals of problem solving, logic and algorithm development, and procedural programming, this course further develops these skills while covering server-side scripting languages and relational database connectivity, and integrated systems. Students will use recent server-side technologies and open-source software tools to manage data on the server side. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 106[C], 106[XS], 109[C], 109[XS], 196[C], CS 112[C] or 112[XS]) and (IT 102[C], 102[XS], MATH 112[C], 125[C] or 125[XS]) and (IT 214[C], 214[XS] or 194[C]) and (IT 369[*C]).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 209: *Introduction to Object Oriented Programming.* 3 credits.
Introduction to Object Oriented Programming (OOP) is intended for students who want to advance their basic programming skill to the next level by learning the OO programming paradigm. This course is designed to teach the benefits of OOP, including faster development, code reusability and less code maintenance. The course accomplishes the goals through hands-on experience with a number of coding assignments. Topics include, but are not limited to: OOP design, objects,

class, methods, inheritance, testing, debugging, graphical user interfaces (GUIs). Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: ((IT 109[C], 109[XS], CS 112[C] or 112[XS]) and (IT 102[C], 102[XS], MATH 112[C], 125[C] or 125[XS])).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 213: *Multimedia and Web Design.* 3 credits.
Through lecture, class demonstration, class discussion, and hands-on lab experience, introduces multimedia and web computer graphics. Focuses on development of web-enabled multimedia applications from practical business perspective. Introduces and discusses technological, aesthetic, and human factors. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 103[C], 103T, 103X, 104[C], 104[XS] or 104T).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Laboratory, Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 214: *Database Fundamentals.* 3 credits.
Covers fundamentals of relational database management systems and their use in business environments. Topics include: database classifications, data models with extensive coverage of the relational model, entity-relationship and extended entity-relationship models, normalization, advanced data modeling, and Structured Query Language (SQL) programming. Students design and implement a real-world relational database and create complex SQL queries to retrieve data from the database. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 103[C], 103X, 103T, 104[C], 104[XS], 104T, CS 112[C] or 112[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 216: *Systems Analysis and Design.* 3 credits.
Students survey and apply techniques in analyzing and modeling information systems. Requirements are derived in various domains and abstracted at conceptual, logical, and physical levels. Process, data, and state modeling are applied through a project that follows a systems development lifecycle. Object modeling is explored and contrasted with data and process modeling. Individual and group modeling assignments are required. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 106[C], 106[XS], 109[C], 109[XS], 196[C], CS 112[C] or 112[XS]) and (IT 206[C], 206[XS], 209[C], 209[XS], CS 211[C] or 211[XS]) and (IT 194[C], 214[C] or 214[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 223: *Information Security Fundamentals.* 3 credits.
Introduces concept of information security. Discusses need for organizational policy to define required services such as confidentiality, authentication, integrity, nonrepudiation, access control, and availability, and mechanisms to implement those services. Covers different types of security including physical security, computer security, and network security; common threats to and attacks against information systems, including accidental damage, identity theft, malicious software, and "spam"; and defensive measures. Notes: Students cannot receive credit for both IT 221 and IT 223. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 103[C], 103T, 103X, 104[C], 104[XS] or 104T) and (IT 101[C], 105[C] or 105[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 293: *Applied IT: Junior Transition.* 1 credit.
Focuses on transition issues for sophomores and transfer students in Information Sciences and Technology programs. Assists sophomore and transfer students with choice of concentration, course selection, and career readiness. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 300[C], 304[C] or 342[C]).
[C] Requires minimum grade of C.

Students with a class of Freshman may **not** enroll.

Enrollment is limited to students with a major in Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Seminar

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

300 Level Courses

IT 300: *Modern Telecommunications.* 3 credits.
Comprehensive overview of the fundamental principles of telecommunications, including current status and future directions of the public switched telephone network, cellular networks, satellite networks, and computer networks. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (((IT 101[C] and 212[C]) or IT 105[C] or 105[XS]) and (MATH 108[C], 108[XS], 113[C], 113[XS], HNRT 225[C] or 225[XS] or ((MATH 123[C] or 123[XS]) and (MATH 124[C] or 124[XS]))) and (IT 102[C], 102[XS], MATH 112[C], 125[C] or 125[XS]) and (IT 293[*C])).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 304: *IT in the Global Economy.* 3 credits.
Explores how IT changed nature of society and contributed to evolution of global economy. Examines changing nature of work, education, and communication, and ethical issues such as intellectual property rights, computer-related crime, privacy concerns, and public policy issues. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts. Equivalent to CS 306.
Registration Restrictions:
Required Prerequisites: (IT 103[C], 103T, 103X, 104[C], 104T or 104[XS]) and (IT 293[*C]).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 306: *Data Structures and Algorithms in Java.* 3 credits.
Fundamentals of data structures and analysis of algorithms, including the definition, implementation, and use of linear and nonlinear data structures and the design and analysis of elementary algorithms. Topics include sorting, searching, abstract data types, recursion, stacks, queues, lists, trees, heaps, priority queues, maps and hash tables, graphs, and the analysis of algorithm performance. Focus is on concepts and implementation of data structures using object-oriented programming tools and techniques. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B], 206[XS], CS 211[B] or 211[XS]) and (IT 102[C], 102[XS], MATH 112[C], 112[XS], 125[C] or 125[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.
[C] Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 309: *Data Structures and Algorithms in Python.* 3 credits.
Fundamentals of data structures and analysis of algorithms, including the definition, implementation, and use of linear and nonlinear data structures and the design and analysis of elementary algorithms. Topics include sorting, searching, abstract data types, recursion, stacks, queues, lists, trees, heaps, priority queues, maps and hash tables, graphs, and the analysis of algorithm performance. Focus is on concepts, but some programming in Python is required. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 209[B], 209[XS], CS 211[B] or 211[XS]) and (IT 102[C], 102[XS], MATH 112[C], 112[XS], 125[C] or 125[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.
[C] Requires minimum grade of C.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 314: *Database Programming.* 3 credits.
The course introduces students to the Oracle Developer application development utilities and tools and describes how to create and manipulate databases in Oracle database management system. The course provides an extensive overview of SQL and introduction to

PL/SQL. Topics include data definition and manipulation languages, stored procedures, triggers, indexing techniques, and elementary query optimization. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 106[C], 106[XS], 109[C], 109[XS], 196[C], CS 112[C] or 112[XS]) and (IT 214[B] or 194[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 315: *Mobile Development.* 3 credits.
Introduces students to Mobile Development on the iOS and Android Platforms. Provides an overview of mobile platforms and devices including evaluation, uses, design and development of applications. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[C], 206[XS], 209[C], 209[XS], CS 211[C] or 211[XS]) and (IT 213[B] or 193[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 322: *Health Data Challenges.* 3 credits.
Covers methodology and tools used to work with health data structures supporting organizations' needs for reliable data that are captured, stored, processed, integrated, and prepared for further querying, decision making, data mining and knowledge discovery for a variety of clinical and organizational purposes. Data security and privacy, data standards, data interoperability, health information exchange, and big data analytics are discussed. Tools like R and R Studio are used to work with data sets at a statistical level, analyze, visualize and predict outcomes. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts. Equivalent to BENG 322.
Registration Restrictions:
Required Prerequisites: (IT 214[B] or 194[B]) and (STAT 250[C], 250[XS], 344[C] or 344[XS]).
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 331: *Front-End Web Development.* 3 credits.
Explores the fundamental principles and methodologies crucial for successful front-end web development, harnessing the power of modern frameworks and cutting-edge technologies. Throughout the course, students will acquire the essential skills to develop visually captivating and interactive web pages and applications and employ style sheets, markup and scripting languages, and frameworks to address real-world challenges. Furthermore, students will gain hands-on experience with a diverse array of web development tools, enriching their practical knowledge in the field. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 106[C], 106[XS], 109[C], 109[XS], CS 112[C], 112[XS] or IT 196[C]) or IT 196[XS] and (IT 213[B] or 193[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 332: *Web Server Administration.* 3 credits.
Covers the installation, configuration, and administration of Web servers, FTP servers, and DNS servers. Additional topics include security setups, administration, and associated performance issues. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 213[B] or 193[B].
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 335: *Web Development using Content Management Systems.* 3 credits.
Through lectures and hands-on lab experience, presents web development techniques using content management systems (e.g. Joomla, Dot net nuke). Introduces characteristics of various types of websites (corporate portals, intranets and extranets; online magazines, newspapers, and publications; e-commerce and online reservations, government applications, small business websites). Presents methods, languages, tools related to web content management systems from an applied perspective. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 213[B] or 193[B].
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 341: *Data Communications and Network Principles.* 3 credits.
Focuses on primary aspects of data communications and networking. Open Systems Interconnection (OSI) and Internet models; Layer 1 interfaces and cabling configurations; IP network addressing, network design, router and port configurations; security protocols; static routing, RIPv2, and OSPF configurations; TCP, UDP, data reliability, and error correction methods; Telnet, FTP, TFTP, HTTP, SMTP, POP, and DNS protocols. Notes: This course is 50 percent lab work of configuration of routers and network design, implementation, and testing. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (((IT 101[C] and 212[C]) or (IT 105[C] or 105[XS])) and (IT 106[C], 106[XS], 109[C], 109[XS], 196[C], CS 112[C] or 112[XS]) and (MATH 108[C], 108[XS], 113[C], 113[XS], HNRT 225[C] or 225[XS] or ((MATH 123[C] or 123[XS]) and (MATH 124[C] or 124[XS]))) and (IT 300[*C] or 300[XS])).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 342: *Operating Systems Fundamentals.* 3 credits.
Practices and procedures for installing and configuring modern operating systems, including user accounts, file, print, and terminal servers, mobile computing, and disaster recovery. Through practical lab sessions, students receive real-world experiences with multiple operating systems. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (((IT 101[C] and 212[C]) or (IT 105[C] or 105[XS])) and (IT 106[C], 106[XS], 109[C], 109[XS], 196[C], CS 112[C] or 112[XS]) and (IT 293[*C]).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 343: *IT Project Management.* 3 credits.
Provides essential strategies and procedures for planning, organizing, staffing, monitoring, and controlling design, development, and production of system to meet stated IT-related need in effective and efficient manner. Fulfills writing-intensive requirement for BS in information technology. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Mason Core: Mason Core, Writing Intensive in Major (https://catalog.gmu.edu/mason-core/)

Registration Restrictions:
Required Prerequisites: IT 293[C] or 293[XS].
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment limited to students with a class of Junior Plus, Junior, Senior Plus or Senior.

Enrollment is limited to students with a major in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Enrollment limited to students in a Bach of Individualized Study, Bachelor of Applied Science or Bachelor of Science degrees.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 352: *Security Administration of Linux Systems.* 3 credits.
Provides theoretical foundation and practical experience installing, configuring, and maintaining Linux systems with an emphasis on best practices for security. Students develop a heterogeneous suite of clients and servers with firewalls and other networking components. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[B] or 223[XS]) and (IT 342[C] or 342[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.
[C] Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 353: *Information Defense Technologies.* 3 credits.
This course will examine and assess the role of information technology as a tool of warfare and civil defense. Topics will be discussed from both defensive and offensive perspectives and will include asset tracking, asymmetric warfare, network centric warfare, physical attacks, cyberterrorism, espionage, psyops, reconnaissance and surveillance, space assets, and applications of GPS and cryptographic technology. Students will research and write about the social, ethical, and political effects of such technology. Notes: For INFT and AIT majors, minors and certificates, and BAS cybersecurity concentration only. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisite: IT 223[B].
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 357: *Computer Crime, Forensics, and Auditing.* 3 credits.
Covers computer crime, relevant laws, agencies, and standards. Presents auditing, logging, forensics, and related software. Explores legal principles such as chain of evidence, electronic document discovery, eavesdropping, and entrapment. Students get hands-on experience with forensics tools. Notes: For INFT and AIT majors, minors and certificates, and BAS cybersecurity concentration only. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[B] or 223[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 366: *Network Security.* 3 credits.
Examines information security services and mechanisms in network context. Topics include symmetric and asymmetric cryptography; message authentication codes, hash functions and digital signatures; digital certificates and public key infrastructure; access control including hardware and biometrics; intrusion detection; and securing network-enabled applications including e-mail and web browsing. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[C], 206[XS], 209[C], 209[XS], CS 211[C] or 211[XS]) and (IT 223[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 369: *Cyber Security of Data and Software.* 3 credits.
The course offers a holistic and hands-on application of tools and frameworks to secure the entire lifecycle of software and data. Through hands-on lab assignments and real-world projects students will learn and apply methods of ensuring software security, application resiliency, and data integrity by building, testing, and evaluating a web-based, data-driven software application and using tools including a full-stack web application and penetration testing tools. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B], 206[XS], 209[B] or 209[XS]) and (IT 207[*C] or 207[XS]) and (IT 223[B] or 223[XS]).
[*] May be taken concurrently.
[B] Requires minimum grade of B.

XS Requires minimum grade of XS.
C Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 371: *Applied AI for IT.* 3 credits.
This course provides a broad overview of applied artificial intelligence (AI), with a strong emphasis on real-world applications in IT industries, including healthcare, finance, retail, and manufacturing. Key topics include search algorithms, intelligent agent, machine learning, artificial neural network, reinforcement learning, computer vision and generative adversarial networks. Students will gain practical AI skills and learn to apply them effectively to solve real-world problems. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B] or 209[B]) and (STAT 250[C] or 344[C]).
B Requires minimum grade of B.
C Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 372: *Applied Generative AI.* 3 credits.
This course provides an introduction to the field of generative artificial intelligence (AI), focusing on its practical applications and ethical implications. Students will explore various generative AI models and tools, including those used for text generation, data analysis, image and video creation, audio and music synthesis, and decision-making. The course will cover various prompt engineering techniques, and delve into the ethical considerations surrounding generative AI, including bias, privacy, and security. Students will also apply their knowledge through hands-on projects and discussions on the future of AI. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 105[C]) and (IT 106[C], 109[C], 196[C] or CS 112[C]) and (IT 343[C]).
C Requires minimum grade of C.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 373: *Data Visualization and Analytics.* 3 credits.
Data visualization and analytics, are a crucial aid in communication, exploration, inspiration, discovery, and decision-making. Representing a large dataset in its entirety in textual or tabular format will not immediately convey any information or insight to the user. Alternatively, we can use data analytics to highlight certain aspects/dimensions of the raw data and use visualizations to do so in a visual (maps and graphs) and meaningful way. Data analytics and visualization make it easier to digest, comprehend, and identify trends, patterns, and outliers amongst large datasets. This is the purpose of data visualization and analytics and the focus of this course, in addition to applying different software and programming to do so. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B] or 209[B]).
B Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 374: *Big Data Analytics with AI.* 3 credits.
This course introduces students to the fundamentals of Big Data Analytics (BDA) and Artificial Intelligence (AI). It covers key big data technologies, cloud computing platforms, and applications using AI-enabled data analytics. Students gain practical experience using tools such as Python, SQL, Spark, and cloud services (e.g., AWS, Azure, etc.) Students will explore hands-on lab assignments, case studies, and projects related to data engineering, machine learning, data visualization, and related ethical and legal topics. The course provides a practical, hands-on approach to learning Big Data Analytics with AI. Real-world use cases, cloud-based implementations, and industry solutions prepare students for careers in data science, analytics, and AI engineering. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B] or 209[B]) and (STAT 250[C]).
B Requires minimum grade of B.
C Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 390: *Rapid Development of Scalable Cloud Applications.* 3 credits.
Presents software engineering, programming techniques, platforms and tools necessary for rapid development of scalable applications including: cloud platforms; scalable data storage solutions; web applications development environments. The course will provide a general overview of such techniques but will concentrate on selected ones in each term. The students will work in small teams and must develop scalable prototypes during the course. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 206[B], 209[B] or CS 211[B]) and (IT 213[C], 213[XS] or 193[C]) and (IT 214[C], 214[XS] or 194[C]).
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

400 Level Courses

IT 414: *Database Administration.* 3 credits.
Explores advanced concepts of database administration using enterprise-level database management system. Topics include: backup, recovery, corruption, automatic management, resource management, job scheduling, space management, memory management, storage management, diagnosis and corresponding tools. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 314[C] or 314[XS]) and (IT 214[B] or 194[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 415: *Information Visualization.* 3 credits.
Provides an overview of information visualization applications in intelligence analysis, decision support systems, and network monitoring. Covers human factors, human interface with information, and current and future trends in information visualization. Students also learn to develop a rudimentary visualization application. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 213[B] or 213[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 416: *Machine Learning for Information Sciences.* 3 credits.
One of the most common tasks performed by data scientists and data analysts is prediction and machine learning. Machine learning entails mathematical models that learn from data or experience to solve new problems. This course introduces students to both the concepts and algorithms of machine learning models, and uses Python to implement machine learning algorithms on real-world datasets to make accurate predictions. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (STAT 250[C] or 250[XS]) and (IT 206[B], 206[XS], 209[B], 209[XS], CS 211[B] or 211[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major in Applied Information Technology or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 425: *Election Security.* 3 credits.
Fair and secure elections are essential to democracy. Voting systems are as much a part of our nation's critical infrastructure as are transportation, energy, and water systems. Thus, the importance of securing state and local voting systems that support both national and local elections cannot be underestimated. This course provides an overview of the historical, cultural, and political significance of voting, the technical issues of securing election processes, and careers in service for public good. The course covers typical election system infrastructures, their operation, and the voting systems security guidelines and locality election security standards set by the Commonwealth of Virginia. Topics include risk assessment of registrar information systems, analysis of system and network documentation for accuracy, software patches, systems updates, configuring and deploying appropriate security software, and ensuring compliance with best practices in securing systems. Offered by Info Sciences & Technology (https://

catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[C] or 223[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 426: *Information Security Risk Management.* 3 credits.
This course is intended to introduce students to the concept and principles of information security risk management, with application to organizational operations (including mission, functions, image, reputation), organizational assets, and individuals. As an introductory risk management course, it will cover technical concepts as well as foundational managerial and policy topics. The purpose of the course lectures, assignments, reading, in-class presentations, and examinations are to ensure students have sufficient technical awareness and operational knowledge that will enable them to apply information security policy and risk management in real-life situations. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[B]) and ((IT 353[C], 357[C], 366[C] or 369[C])).
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 429: *Security Accreditation of Information Systems.* 3 credits.
This course explains basic principles of performing FISMA certification and accreditation (C&A) of an IT System. The course covers methodology for completing C&A, explains the role of the Certifier and the Information System Security Officer (ISSO), and gives students real world experience with IT Systems in the Federal Government. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[B] or 223[XS]).
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 431: *Advanced Web Development.* 3 credits.
Introduces students to the cutting-edge practices of scalable, data-driven web application development. Students will be exposed to modern web development frameworks, such as ReactJS and ExpressJS, and explore key areas such as security/authentication, RESTful services, and database integration. The course also provides exposure to essential cloud services, equipping students with the comprehensive toolkit required for contemporary web development. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 207[C] or 207[XS]) and (IT 213[B], 213[XS], 193[B] or 193[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 432: *Introduction to Network Forensics and Analysis.* 3 credits.
Introduces the collection, preservation, and analysis of network-based evidence using a consistent, repeatable, and well documented approach, also known as a forensically sound approach. A forensically sound process ensures that evidence is admissible in a court of law as part of a legal process. Industry standard tools used for forensic artifact collection will be discussed and the process of in-house tool building will be demonstrated. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 223[B] and (IT 341[C], 341[XS], 357[C] or 357[XS]).
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major in Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 442: *Cloud Infrastructure.* 3 credits.
This course covers the fundamentals of building IT infrastructure on a cloud platform. A broad overview of the cloud platform will be discussed and then individual elements of cloud services will be covered deeply. Students learn how to optimize different services by understanding cloud-based solutions. In addition, students explore best practices

and design patterns for architecting optimal IT solutions on cloud. A combination of lectures and hands-on lab assignments expose students to the leading cloud computing paradigms and services. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 341[B] or L341).
[B] Requires minimum grade of B.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 445: *Advanced Networking Principles.* 3 credits.
This course focuses on Layer 2 and 3 of the OSI model and WAN technologies. Frame Relay and ISDN, complex router configurations of Variable Length Subnet Masking (VLSM), Classless Inter-Domain Routing (CIDR), Network Address Translation (NAT), Dynamic Host Configuration Protocol (DHCP), and study of Network Management Systems available for Data Communications Networks. Layer 2 involves Ethernet-switching components, including detailed hands-on configuration covering all aspects of switches using the command-line interface method. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 341[B] or L341).
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 451: *Cloud Services Management.* 3 credits.
The course offers a top-down view of cloud services management including the techniques for building, deploying and maintaining various cloud models. Through hands-on lab assignments and real-world standard projects students will learn how to deal with cloud architecture challenges, such as load balancing, auto scaling, configuration management, caching, adaptive virtualization, on-demand resources provisioning, monitoring, and access control. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 442[C] or 442[XS].
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 461: *Application Development in Cloud.* 3 credits.
Introduces techniques for developing applications to take advantage of availability, security, performance, and scalability of the cloud. Students will learn the serverless framework and deploy and test serverless applications on a cloud platform. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: ((IT 106[C], 106[XS], CS 112[C], 112[XS], IT 196[C], 196[XS], 109[C] or 109[XS]) and (IT 214[C], 214[XS], 194[C] or 194[XS])).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 462: *Applied Cyber Threat Analysis.* 3 credits.
Studies security policies, models, and mechanisms for secrecy, integrity, availability, and usage controls. Topics include models and mechanisms for mandatory, discretionary, and role-based access controls; authentication technologies; control and prevention of viruses and other rogue programs; common system vulnerabilities and countermeasures; privacy and security policies and risk analysis; intellectual property protection; and legal and social issues. Notes: For INFT and AIT majors, minors and certificates, and BAS cybersecurity concentration only. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 223[B] or 223[XS]) and (IT 369[*C] or 369[XS]).
[*] May be taken concurrently.
[B] Requires minimum grade of B.
[XS] Requires minimum grade of XS.
[C] Requires minimum grade of C.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 467: *Network Defense.* 3 credits.
Practices and procedures for defending business-class, heterogeneous networks against threats (including system failure, environmental events, human error) and attacks (including intrusion, malicious software, denial of service). Through practical lab sessions, students receive real-world experience designing networks, installing and configuring system

components, detecting and recovering from problems and attacks, and gathering data to support prosecution of offenders and refinement of countermeasures. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 366[C] or 366[XS]) and (IT 223[B]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.
[B] Requires minimum grade of B.

Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 471: *Big Data on Cloud Systems.* 3 credits.
This course focuses on cloud-based big data solutions. Students learn to create and use big data analytical environments using cloud data services and tools. Also covered is employing best practices for designing big data cloud environments for performance, security, and cost effectiveness. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: ((STAT 250[C] or 250[XS]) and (IT 442[C] or 442[XS])).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 479: *Digital Media and Web Design Capstone.* 3 credits.
Student team-based experience grounded in the work of the preceding courses in the digital media and web design minor. Each individual student will produce a portfolio of digital media and web-design related products and features that demonstrate core competencies in coding, design, content, and accessibility. Students will work in cross-disciplinary teams to carry out a client-based web design project, the process and outcomes of which will also be represented in the individual portfolio. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts. Equivalent to AVT 479, COMM 479, ENGH 479.
Recommended Prerequisite: Before enrolling in the Capstone seminar, students need to have completed all required courses for the Digital Media and Web Design Minor.

Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 481: *Cloud Security.* 3 credits.
This course covers the fundamentals of building security into cloud platforms and how to securely manage and access cloud environments using hands-on lab environments. Students will learn how to access cloud environments using IPSec utilizing the respective cloud VPN gateways. Students will also be exposed to identity and access management in the various platforms, how to create and assign roles to users and groups, how to audit actions taken, and how most commonly utilized security services in the cloud environments operate. Students will learn to separate out environments using virtual networks for project and system segmentation and learn how to apply virtual firewall rules and network access control lists. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 223[C] or 223[XS].
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 482: *AWS Cloud Operations.* 3 credits.
AWS Cloud Operations is a course designed to provide students with a comprehensive understanding of DevOps, cloud support, and operations. Through a combination of lectures, and hands-on activities, students will learn best practices for designing and implementing scalable, repeatable deployments on the AWS Cloud. The course will also cover specific AWS tools and features related to configuration and deployment and will teach students how to troubleshoot common problems and scenarios. Upon completion, students will be well-prepared to take the AWS SysOps Administrator – Associate exam and will have the skills to build a variety of real-world infrastructures. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (IT 341[B] and 442[C]).
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 485: *Cloud Operations.* 3 credits.
Cloud Operations is a course designed to provide students with a comprehensive understanding of DevOps, cloud support, and operations. Through a combination of lectures, and hands-on activities, students will learn best practices for designing and implementing scalable, repeatable deployments on the Cloud. The course will also cover specific tools and features related to configuration and deployment and will teach

students how to troubleshoot common problems and scenarios. Upon completion, students will be well-prepared to take the AWS SysOps Administrator – Associate exam and will have the skills to build a variety of real-world infrastructures. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: IT 341[B] and 442[C].
[B] Requires minimum grade of B.
[C] Requires minimum grade of C.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 492: *Senior Design Project I.* 3 credits.
Students use information technology as a tool to redesign business processes so the enterprise can achieve its objectives. Student teams analyze the business processes of real organizations, quantify the negative impact caused by current process challenges, then develop and present a compelling Business Case for Change. Students develop skills critical for preparing and delivering effective verbal briefings and presentations. Notes: Restricted to AIT/INFT majors. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Mason Core: Mason Core, Mason Apex (https://catalog.gmu.edu/mason-core/)

Registration Restrictions:
Required Prerequisites: ((IT 206[C], 206[XS], 209[C], 209[XS], CS 211[C], 211[XS] or 211) and (IT 207[C] or 207[XS]) and (IT 213[C], 213[XS] or 193[C]) and (IT 214[C], 214[XS] or 194[C]) and (IT 216[*C] or 216[XS]) and (IT 223[C], 223[XS] or 223) and (IT 300[C] or 300[XS]) and (IT 341[C], L341, 341[XS] or 341) and (IT 343[C], 343[XS], CS 321[C] or 321[XS]) and (MBUS 300[C], 300[XS], MSOM 300[C], ACCT 203[C], 203[XS] or 203)).
[*] May be taken concurrently.
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment limited to students with a class of Senior Plus or Senior.

Enrollment is limited to students with a major in Applied Information Technology or Information Technology.

Enrollment limited to students in a Bachelor of Science degree.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 493: *Senior Design Project II.* 4 credits.
Students, in teams, complete projects demonstrating preparedness as an IT professional. This work includes ethical challenges, status reports and engineering notebooks evaluated during class. Teams members develop detailed designs, build solutions up to Beta, present final written reports and final verbal presentations before review panels of business leaders. Students must register for the section that continues their IT 492 section. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). Limited to two attempts.
Mason Core: Mason Core, Mason Apex (https://catalog.gmu.edu/mason-core/)

Registration Restrictions:
Required Prerequisites: (IT 492[C] or 492[XS]).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

Enrollment is limited to students with a major in Applied Information Technology or Information Technology.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture, Recitation

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 498: *Independent Study in Information Technology.* 1-3 credits.
Directed self-study of special topics of current interest in IT. Notes: Topics must be arranged with instructor and approved by department chair before registering. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the term for a maximum 6 credits.
Specialized Designation: Topic Varies

Recommended Prerequisite: 60 credits.

Registration Restrictions:
Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Independent Study

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 499: *Special Topics in Information Technology.* 3 credits.
Topics of special interest to undergraduates. Notes: May be repeated if topics are substantially different. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the term for a maximum 6 credits.
Specialized Designation: Topic Varies

Recommended Prerequisite: 60 credits.

Registration Restrictions:
Enrollment is limited to students with a major, minor, or concentration in Applied Information Technology, Applied Science, Individualized Study, Information Technology or Infmtn Tchngy Entrepreneurship.

Washington Consortium level students may **not** enroll.

Students with the terminated from CEC major attribute may **not** enroll.

Schedule Type: Lecture

Grading:
This course is graded on the Undergraduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

700 Level Courses

IT 700: *Doctoral Seminar I: Intro to Research.* 3 credits.
Provides orientations on doctoral research to early-stage PhD Information Technology (INFT) students. The course discusses research methodologies used in the broader field of IT, academic life, and key research topics in IT through lectures, class activities, and seminars. Through the course, students will orient themselves in the IT field by learning research processes, diverse approaches, and computational thinking. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May not be repeated for credit.
Recommended Prerequisite: Admission to the PhD in Information Technology.

Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Non-Degree.

Enrollment is limited to students with a major in Computer Science or Information Technology.

Enrollment limited to students in a Doctor of Philosophy degree.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Lecture

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 701: *Doctoral Seminar II: Research Experience.* 3 credits.
Provides research experience for early-stage PhD Information Technology (INFT) students under the direction of a CEC graduate faculty member within the program concentrations. The research is conducted on a specific research problem. Research findings must be reported in a professionally prepared document and presented in a public meeting at the end of the semester. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May not be repeated for credit.
Specialized Designation: Topic Varies

Recommended Prerequisite: IT 700

Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate or Non-Degree.

Enrollment is limited to students with a major in Computer Science or Information Technology.

Enrollment limited to students in a Doctor of Philosophy degree.

Schedule Type: Research

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 796: *Directed Reading and Research.* 1-6 credits.
Reading and research on specific topic in information technology under direction of faculty member. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the degree for a maximum 12 credits.
Registration Restrictions:
Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Independent Study

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 797: *Directed Reading and Research.* 1-3 credits.
Reading and research on specific topic in information technology under direction of faculty member. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May not be repeated for credit.
Registration Restrictions:
Enrollment is limited to Graduate or Non-Degree level students.

Students in a Non-Degree Undergraduate degree may **not** enroll.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Independent Study

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

800 Level Courses

IT 896: *Directed Readings and Research in IT.* 1-6 credits.
Students pursue research on a specific topic under direction of faculty Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the degree for a maximum 6 credits.
Recommended Prerequisite: Completed qualifying exams, or permission of instructor.

Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy, Graduate, Non-Degree or Senior Plus.

Enrollment is limited to Graduate, Non-Degree or Undergraduate level students.

Schedule Type: Independent Study

Grading:
This course is graded on the Graduate Regular scale. (https://catalog.gmu.edu/policies/academic/grading/)

900 Level Courses

IT 998: *Doctoral Dissertation Proposal.* 1-12 credits.
Work on research proposal that forms basis for doctoral dissertation. Notes: No more than 24 credits of IT 998 and 999 may be applied to doctoral degree requirements. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the degree.

Registration Restrictions:
Enrollment is limited to Graduate level students.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Dissertation

Grading:
This course is graded on the Satisfactory/No Credit scale. (https://catalog.gmu.edu/policies/academic/grading/)

IT 999: *Doctoral Dissertation.* 1-12 credits.
Formal record of commitment to doctoral dissertation research under direction of faculty member in information technology. Note: Students must be advanced to candidacy before registering for this course. Students may not take IT 998 and 999 at the same time. Offered by Info Sciences & Technology (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/information-sciences-technology/). May be repeated within the degree.
Recommended Prerequisite: Admission to Doctoral candidacy; students must submit the Doctoral proposal and have it approved prior to registering for this course.

Registration Restrictions:
Enrollment limited to students with a class of Advanced to Candidacy.

Enrollment is limited to Graduate level students.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Dissertation

Grading:
This course is graded on the Satisfactory/No Credit scale. (https://catalog.gmu.edu/policies/academic/grading/)