SOFTWARE ENGINEERING (SWE)

200 Level Courses

SWE 205: *Software Usability Analysis and Design.* 3 credits.
Principles of user interface design. Concepts for objectively and quantitatively assessing the usability of software user interfaces. Outcomes include knowledge of quantitative engineering principles for designing usable software interfaces and an understanding that usability is more important than efficiency for almost all modern software projects, and often the primary factor that leads to product success. Major topics include cognitive models for human perceptions and needs, which are used as a basis for analytical and critical thinking about user interfaces; specific engineering principles for designing usable menus, forms, command languages, web sites, graphical user interfaces and web-based user interfaces. Assessments will include written analytical evaluations of existing user interfaces, exams, and HTML-based design projects. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (ENGH 100[C] or 100[XS]) or (ENGH 101[C] or 101[XS]) or HNRS 110[C].
[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/)

300 Level Courses

SWE 301: *Internship Preparation.* 0 credits.
Preparation for Internship Educational Experience. Intended for, but not limited to, students planning internships in the Applied Computer Science Software Engineering Program. Internship employment opportunities. Basic interview skills. Techniques for applying academic knowledge to practical software development. Techniques for extracting knowledge from practical experience. Peer presentation from students who have completed internships. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Recommended Prerequisite: Limited to ACS or CS majors with junior standing or permission of instructor.

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

Schedule Type: Lecture

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

400 Level Courses

SWE 401: *Internship Reflection.* 1 credit.
Reflection on Internship Educational Experience. Intended for, but not limited to, students completing internships in the Applied Computer Science Software Engineering Program. Analysis of techniques for applying academic knowledge to practical software development. Analysis of techniques for extracting knowledge from practical experience. Student presentations summarizing internships relating them to academic program goals. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Recommended Prerequisite: Completion of internship.

Registration Restrictions:
Required Prerequisites: SWE 301 or 301[XS].
[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 Satisfactory/No Credit scale. (https://catalog.gmu.edu/policies/academic/grading/)

SWE 419: *Object-Oriented Software Design and Implementation.* 3 credits.
In-depth study of software design and implementation using a modern, object-oriented language with support for graphical user interfaces and complex data structures. Topics covered are specifications, design patterns, and abstraction techniques, including typing, access control, inheritance, and polymorphism. Students will learn the proper engineering use of techniques such as information hiding, classes, objects, inheritance, exception handling, event-based systems, and concurrency. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: ((CS 310[C] or 310[XS]) and (MATH 125[C] or 125[XS])).
[C] Requires minimum grade of C.
[XS] Requires minimum grade of XS.

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

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/)

SWE 432: *Web Application Development.* 3 credits.
A comprehensive introduction to the design and implementation of applications for the web, including client and server-side development. Exploration of principles for the design of web applications that are robust, scalable, and secure, that enable change and reuse, and that are usable for their intended purpose. Topics include client-server communication, asynchronous programming, persistence, security, web development tools, the document object model, templates and data-binding, interaction techniques, and site design for the web. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (MATH 125[C] or 125[XS]) and (CS 321[C] or 321[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/)

SWE 437: *Software Testing and Maintenance.* 3 credits.
Concepts and techniques for testing and modifying software in evolving environments. Topics include software testing at the unit, module, subsystem, and system levels; developer testing; automatic and manual techniques for generating test data; testing concurrent and distributed software; designing and implementing software to increase maintainability and reuse; evaluating software for change; and validating software changes. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (MATH 125[C] or 125[XS]) and (CS 310[C] or 310[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/)

SWE 443: *Software Architectures.* 3 credits.
Teaches how to design, understand, and evaluate software systems at an architectural level of abstraction. By end of course, students will be able to recognize major architectural styles in existing software systems, describe a system's architecture accurately, generate architectural alternatives to address a problem and choose from among them, design a medium-size software system that satisfies a specification of requirements, use existing tools to expedite software design, and evaluate the suitability of a given architecture in meeting a set of system requirements. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). Limited to two attempts.
Registration Restrictions:
Required Prerequisites: (CS 321[C] or 321[XS]) or CS 421[C], SWE 321[C] or 421[C].
[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/)

500 Level Courses

SWE 510: *Object-Oriented Programming in Java.* 3 credits.
Introduces students to programming in the Java language. Topics include problem-solving methods and algorithm development, program structures, abstract data types, simple data and file structures and program development in a modular, object-oriented manner. Introductory use of OO language features, including data hiding, inheritance, polymorphism, and exception handling. Goals include design and development of Java classes and class type hierarchies. An introduction to Java servlets and applets is included. Emphasis on program development is reinforced through several programming projects. Notes: Credit cannot be applied to a graduate degree in the Volgenau School or the BS degree in computer science. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: Undergraduate courses or equivalent knowledge in programming in a high-level language.

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

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

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

Schedule Type: Lecture

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

600 Level Courses

SWE 619: *Object-Oriented Software Specification and Construction.* 3 credits.
In-depth study of software construction using modern, object-oriented language with support for graphical user interfaces and complex data structures. Specifications, design patterns, and abstraction techniques, including procedural, data, iteration, type, and polymorphic. Information hiding, classes, objects, and inheritance. Exception handling, event-based systems, and concurrency. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE foundation courses or equivalent.

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

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

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

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/)

SWE 620: *Software Requirements Analysis and Specification.* 3 credits.
In-depth study of object-oriented requirements modeling, including use case modeling, static modeling and dynamic modeling with Unified Modeling Language (UML) notation. Students participate in group project on software requirements and specification using modern method. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.

Recommended Prerequisite: SWE foundation courses or equivalent.

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

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

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

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/)

SWE 621: *Software Design and Architecture.* 3 credits.
An examination of the methods, processes, and notations for working with architecture and design in software. Exploration of design as the enumeration, evaluation, and selection of design alternatives to achieve quality attributes. Surveys perspectives on design from risk minimization, domain modeling, abstraction, architectural styles, design patterns, and reuse. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE foundation courses or equivalent.

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

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

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

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/)

SWE 622: *Distributed Software Engineering.* 3 credits.
Hands-on introduction to techniques and programming interfaces for distributed software engineering. Networking protocols at several layers. Construction of distributed and concurrent software using network protocol services. Applications of Internet and web-based software. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE foundation courses or equivalent.

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

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

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

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/)

SWE 625: *Software Project Management.* 3 credits.
Lifecycle and process models; process metrics; planning for a software project; mechanisms for monitoring and controlling schedule, budget, quality, and productivity; and leadership, motivation, and team building. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE foundation courses or equivalent.

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

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

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

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/)

SWE 626: *Software Project Laboratory.* 3 credits.
Covers requirements analysis, design, implementation, and management of software development project. Students work in teams to develop or modify software product, applying sound principles of software engineering. Uses both industrial and academic standards to assess quality of work products. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 619,620, and 621; or permission of instructor.

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

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

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

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/)

SWE 631: *Software Design Patterns.* 3 credits.
Principles of software design patterns. Design patterns as solutions to recurring design problems. Categories of software design patterns; structure patterns, communication patterns. Design patterns in software

architectures. Designing software applications using design patterns. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 621.

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

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

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

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/)

SWE 632: *User Interface Design and Development.* 3 credits.
Principles of user interface design, development, and programming. Includes user psychology and cognitive science, menu system design, command language design, icon and window design, graphical user interfaces, web-based user interfaces. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 621 or CS 531, or permission of instructor.

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

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

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

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/)

SWE 637: *Software Testing.* 3 credits.
Students learn to test software effectively. Programmers learn practical ways to design high quality tests during all phases of software development. Students learn the theory behind criteria-based test design and to apply that theory in practice. Topics include test design, test automation, test coverage criteria, and how to test software in cutting-edge software development environments. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 619 or CS 530, or permission of instructor.

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

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

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

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/)

SWE 642: *Software Engineering for the World Wide Web.* 3 credits.
Detailed study of engineering methods and technologies for building highly interactive web sites for e-commerce and other web-based applications. Presents engineering principles for building web sites that exhibit high reliability, usability, security, availability, scalability, and maintainability. Teaches methods such as client-server programming, component-based software development, middleware, and reusable components. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 619 or CS 531, or permission of instructor.

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

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

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

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/)

SWE 645: *Component-Based Software Development.* 3 credits.
Introduces concepts and foundations of software component and component-based software. Detailed study of engineering principles of modeling, designing, implementing, testing, and deploying component-based software. Also explores state-of-the-art component technologies. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 619 or CS 531, or permission of instructor.

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

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

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

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/)

SWE 660: *Software Engineering for Real-Time Embedded Systems.* 3 credits.
This course teaches software engineering for real-time, embedded, and cyber-physical systems. Students will develop real-time, concurrent software applications on embedded hardware. Topics include development environments, embedded computer architectures, real-time and embedded operating systems, real-time scheduling, and multi-tasking development with priority preemption. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Registration Restrictions:
Required Prerequisites: (SWE 619[B-], CS 531[B-], COMP 513[B-] or CS 571[B-]).
[B-] Requires minimum grade of B-.

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

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

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

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/)

SWE 681: *Secure Software Design and Programming.* 3 credits.
Theory and practice of software security, focusing in particular on some common software security risks, including buffer overflows, race conditions and random number generation, and the identification of potential threats and vulnerabilities early in the design cycle. Emphasis is on methodologies and tools for identifying and eliminating security vulnerabilities, techniques to prove the absence of vulnerabilities, and ways to avoid security holes in new software and on essential guidelines for building secure software. Explores how to design software with security in mind from the ground up and integrate analysis and risk management throughout the software life cycle. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit. Equivalent to ISA 681.
Recommended Prerequisite: SWE 619 or CS 531

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

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

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

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/)

SWE 699: *Special Topics in Software Engineering.* 3 credits.
Special topics not occurring in regular SWE sequence. Notes: May be repeated for credit when semester topic is different. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the term.
Specialized Designation: Topic Varies

Recommended Prerequisite: Completion of at least two core courses and permission of the instructor.

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

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

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

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/)

700 Level Courses

SWE 721: *Reusable Software Architectures.* 3 credits.
Investigates software concepts that promote reuse of software architectures. Studies influence of object technology on software design and reuse. Investigates domain modeling methods, which model the application domain as a software product family from which target systems can be configured. Covers reusable software patterns including architecture patterns and design patterns, software components, and object-oriented frameworks. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 621.

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: Lecture

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

SWE 724: *Program Analysis for Software Testing.* 3 credits.
Different methods for analyzing software, primarily for purpose of testing. Analysis techniques, algorithms, tools, and applications. Goals are to explore current research issues, learn how to build analysis tools, and understand how these techniques can be applied to software-related activities such as maintenance, reuse and optimization. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.

Recommended Prerequisite: A compiler class (e.g. CS 540) OR a testing class (e.g. SWE 637) or permission of the instructor.

Schedule Type: Lecture

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

SWE 737: *Advanced Software Testing.* 3 credits.
Cutting edge concepts and techniques in software testing. An in-depth study of existing approaches to testing software as well as development of new approaches. Applications of existing concepts and techniques to new technologies. Advanced MS students learn in-depth knowledge for how to apply testing in difficult and challenging real-world scenarios. PhD students learn current research trends, both theoretical and practical. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 637.

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: Lecture

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

SWE 760: *Software Analysis and Design of Real-Time Systems.* 3 credits.
Background for students who want to conduct research in software engineering of real-time systems. Provides understanding of key real-time software system analysis, design concepts and methods, and how they are used in developing large-scale, real-time software systems. Also explores potential impact of emerging technologies. Includes term project in design and analysis of complex, real-time software system. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 621.

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: Lecture

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

SWE 763: *Software Engineering Experimentation.* 3 credits.
Detailed study of scientific process, particularly using experimental method. Examines how empirical studies are carried out in software engineering. Reviews distinction between analytical techniques and empirical techniques. Other topics include experimentation required in software engineering, problems that can be solved using experimentation, methods used to control variables and eliminate bias in experimentation, and analysis and presentation of empirical data for decision making. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May not be repeated for credit.
Recommended Prerequisite: SWE 621, or permission of instructor.

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: Lecture

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

SWE 795: *Advanced Topics in Software Engineering.* 3 credits.
Advanced topics not occurring in existing courses. Topics normally assume knowledge in one or more existing MS SWE courses. Notes: Repeatable within degree for credit when subject differs. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the degree for a maximum 6 credits.
Specialized Designation: Topic Varies

Recommended Prerequisite: 12 credits applicable toward MS.

Registration Restrictions:
Enrollment is limited to Graduate or Non-Degree level students.

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

Schedule Type: Lecture

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

SWE 796: *Directed Readings in Software Engineering.* 3 credits.
Analysis and investigation of a contemporary problem in software engineering. Must be supervised by a fulltime faculty member or affiliate faculty member of the Computer Science department. To register, students must complete an individualized section form available on the department's website. The form must include course outcomes, course content, and a reading list. A written report is required. Must be approved by the faculty member, MS-SWE program director, and chair or associate chair. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the degree for a maximum 6 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: Research

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

SWE 798: *Research Project.* 3 credits.
Master's student undertake a project using knowledge gained in prior MS courses. Topic chosen under the guidance of a member of the Graduate Faculty of the department, resulting in written technical report. Prior approval is required by the faculty sponsor. To register, student must complete a Master's Project form available from the department. It must be signed by the faculty sponsor and approved by the department chair or delegate. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the degree for a maximum 6 credits.
Recommended Prerequisite: 18 credits applicable towards MS degree.

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: Thesis

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

SWE 799: *MS Thesis.* 1-6 credits.
Research project completed under supervision of a member of the Graduate Faculty of the department, resulting in a technical report accepted by three-member faculty committee. Thesis must be defended in an oral presentation. To register, students must complete thesis form available from the department. It must be signed by all committee members and the department chair or delegate. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the degree for a maximum 6 credits.
Recommended Prerequisite: 18 hours of credit applicable toward the MS degree.

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: Thesis

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

800 Level Courses

SWE 821: *Software Engineering Seminar.* 3 credits.
Study of application of software engineering principles, design methods, and support tools through real-life problems extracted from faculty and industry projects. Notes: May be repeated with change in topic. Offered by Computer Science (https://catalog.gmu.edu/colleges-schools/engineering-computing/school-computing/computer-science/). May be repeated within the degree for a maximum 6 credits.
Recommended Prerequisite: SWE 621

Registration Restrictions:
Enrollment is limited to Graduate level students.

Enrollment limited to students in the Engineering Computing college.

Schedule Type: Seminar

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