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## Gmu cs course catalog

Computer science is an industry that deals with the analysis, design, application, maintenance and evolution of computer-based systems used in almost all walks of life. Computer science is at the center of the information revolution in the 21st century. Advanced computing tools and techniques revolutions and transforms the way we work, play, communicate, collaborate and conduct business. In addition, computational approaches are an integral part of many scientific and engineering fields, such as computational sciences, bioinformatics and health computing, to name a few. Computer scientists must be well founded not only on computer theory, but also on its application in various fields. Computer scientists should be able to work closely with members of other it-related professions. Students who follow this discipline will learn about programming languages, data structures, algorithms, operating systems, artificial intelligence, robotics, data mining, computer networking, cybersecurity, databases and software engineering. Aydin, Barbaroá, Brodsky, J. Chen, S. Chen, Katz, Kerschberg, Košecká, Luke, Menascá, Motro, Ofnutt, Rangwala (Chair), Setia, Shehu, Simon, Stavrou, Tecici, Wijesekera Associate Professors Ammann, Domeniconi, Durić, Gingold, Li, Lien, Lin, Maddox, Richards, Snyder (Deputy President), Wang, White (Deputy President), Zhong Assistant Professors Baldimtsi, Bell, Cheng, Deng, Dimitriadis, González Hernández, Gordon, Larson, LaToza, Mengistu, Osterweil, Pathak, Soundarajan, Yar, Ne aymy, Otten , Russell Assistant Professors Abu Jbara, Bailey, Batarseh, Curts, Dubey, Ellis, Fielding, Geldon, Greenwald, He, Kaznachey, King, Kodali, Kowalski, Kurtz, McDowall, Nidiffer, Nordstrom, Olimiew, Pettit, Reep, Seymer, Styx, Wheeler Emeritus School DeJong, Goma, Hamburger, Rine, Wechsler CS 100: Computer Principles. Three points. This course aims to help students learn to think in the way needed to fully understand the nature and power of the digital world around us. The early era of the Internet and personal computer led to the need for it knowledge. Now, the changing nature of our global society requires students to learn new ways to think about problems and how to solve them, regardless of the specific areas of student effort. Through this course, students will explore important issues related to the big ideas of computational thinking (i.e., (i) Creativity, (ii) Removal, (iii) Data, (iv) (v) Programming, (vi) Internet, and (vii) Social Impact), and how these issues will affect their future lives. It is offered by It. It's limited to two attempts. Mason Core: Info Tech & ComputingRegistration Restriction: Students with the great VSE feature may not register. Schedule Type: Lecture Shake: This lesson lesson are graded on an undergraduate regular scale. CS 101: Preview of Computer Science. Two units. It offers a broad overview of computer science designed to provide students with an introduction to computer science and an orientation to the Department of Informatics and the computer environment at the university. Includes a project to import problem solving by using computers. All major IT companies are required to take this course within their first year. Notes: All major IT companies are required to take this course within their first year. It is offered by It. It's limited to two attempts. Registration Restrictions: Prerequisite Required: CS 112\*C.\* Can be downloaded at the same time. C Requires a minimum C.Enrollment degree limited to students with an important in Applied Computer Science or Computer Science.Enrollment is limited to students in a Science degree. Students with the attribute terminated by the main VSE feature may not register. Program Type: Lecture Shake: This course is rated on the satisfactory/no credit scale. CS 105: Informatics Ethics and Society. 1 credit. Intensive introduction to legal, social and ethical issues related to software development and computer use. It emphasizes professional behavior, social responsibility and strict standards for software control and reliability. It examines issues such as liability, information ownership and computer crime. Note: Students who have received credit for CS 305 or 306 should not register for CS 105. No credit will be given for CS 105 if a student has already received credit for CS 305 or 306. It is offered by It. It's limited to two attempts. Registration restrictions: Students with the vse main attribute terminated by the VSE may not register. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 110: Basics of computer science. Three points. It offers a broad overview of computer science designed to provide computer science specialties with an introduction to their discipline. Fundamental computational concepts such as number representation, programming environments, communication tools, and basic network security measures are covered. Privacy and the ethical use of information technology are also discussed along with guest lectures to test current computer science research. Note: All major IT companies are required to take this course within their first year as a major computer science. from Informatics. It's limited to two attempts. Registration restrictions: Enrollment is limited to students in VS-BS-ACS or VS-BS-CS programs. Students with the attribute terminated by the main VSE feature may not register. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 112: Introduction to computer programming. Four points. Strict introduction to problem solving through the development of computer programs. Focuses on identifying patterns in problems that describe problematic solutions in a high-level pseudocode and then apply to a process programming language. Basic programming concepts are covered in detail, including expressions, control structures, simple data types, and I/O. Program checking and debugging are discussed to verify that problems are resolved correctly. Note: The department will drop students who do not qualify. Lectures and Workshops are offered in groups. Students MUST register for a lecture and workshop from the same group. It is offered by It. It's limited to two attempts. Mason Core: Info Tech & ComputingRegistration Restriction: Required Preactions: (minimum score of 65 in 'Math Placement Transcendentals', minimum score of 07 in 'Math Placement Transcendentals', MATH 105C, 105T, 104C, 104T, 113C or 123C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: Workshop, LectureSeed: This course is graded on the Undergraduate Special Scale. CS 211: Object-oriented programming. Three points. In-depth processing of programming according to object-oriented principles. It introduces interconnections, heritage, polymorphism and a single mission as a means of decomposing problems. It covers intermediate programming techniques, including handling errors through exceptions, layout of source code in packets, and simple data structures. Intermediate debugging techniques and unit testing are covered. Note: Lectures and workshops are offered in groups. Students MUST register for a lecture and workshop from the same group. It is offered by It. It's limited to two attempts. Registration restrictions: Prerequisite required: (CS 112C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: Workshop, LectureSeed: This course is graded on the Undergraduate Special Scale. CS 222: Computer programming for engineers. Three points. Introduction to C as a second programming language with emphasis on engineering-related problems and language characteristics. Topics include basic data types, indicators, elementary data structures, file/output, bit-level operations, and Unix commands for compiling and debugging. It is intended as a terminal course in computer programming. Notes: Intended as a terminal course in computer programming. It is offered by It. It's limited to two attempts. Registration restrictions: Prerequisite required: (CS 112C). C Requires a minimum degree of C.Students with the by VSE important feature can not be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 262: Introduction to low-level programming. Three points. Introduction to language C, as well as concepts of the operating system, in UNIX, to prepare students for topics in system programming. It is offered by It. It is limited to Efforts. Registration restrictions: Required conditions: (CS 110\*C or 101\*) and (CS 211C or 222C).\* They can be taken at the same time. C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: Workshop, LectureSeed: This course is graded on the undergraduate normal scale. CS 306: Composition of Ethics and Law for the Informatics Professional. Three points. Practical course to become an effective IT professional. It examines legal and ethical issues surrounding computer technology and its use, as well as the foundation building necessary to address these challenges. It applies philosophical foundations for ethical decision-making to modern concerns arising from computers and technology. It deals with issues covered by CS 105 and CS 110 in a more intensive way and focuses on emerging legal and ethical issues related to e-commerce and the widespread use of the Internet. Notes: Large computer science companies can use this course to meet mason core synthesis requirement, as long as they have not previously taken CS 305 for credit. It is offered by It. It's limited to two attempts. Specialized designation: Writing intensively in MajorRecom modified Prerequisite: Junior standing (at least 60 hours of credit). Recommended Corequisite: All required Mason Core courses. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 310: Data structures. Three points. It focuses on object-oriented programming with an emphasis on tools and techniques for developing moderate to large programmes. Topics include the use and application of linear and nonlinear data structures and the design and analysis of elementary algorithms. It is offered by It. It's limited to two attempts. Recommended co-location: CS 105 or CS 110 Registration restrictions: Required conditions: (CS 211C and (MATH 113C or 124C)). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 321: Software Engineering. Three points. An introduction to concepts, methods, and tools for creating large-scale software systems. Methods, tools, notes and validation techniques for analyzing, defining, prototype and maintaining software requirements. Introduction to the modelling of object-oriented requirements, including the use of case modeling, static modelling and dynamic modelling using notation modeling language (UML). Concepts and methods for designing large-scale software systems. Fundamental design concepts and design notes are introduced. A study of object-oriented analysis and modeling of design using UML notation. Students participate in a group project on software requirements, specifications and object-oriented software design. It is offered by It. It's limited to two attempts. Efforts. In SWE 321.Specialized Determination: Writing intensive in the main registration restrictions: Required conditions: CS 310C and (ENGH 302C or (HNRS 110C and 122C) or (HNRS 110C and 130C) or (HNRS 131C, 240C, 260C, 261C, 360C or 361C)). C Requires a minimum degree of C.Enrollment limited to students with a significant, minor, or concentration in Applied Computer Science, Informatics, Software Engineering or Systems Engineering.Students with the expired vse important feature cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 325: Introduction to game design. Three points. Game design, in various electronic entertainment technologies, includes a diverse set of skills and backgrounds from storytelling and art to computer programming. It investigates the technical aspects of the sector, with an emphasis on programming. It is offered by It. It's limited to two attempts. Registration restrictions: Condition required: (CS 211C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 330: Official methods and models. Three points. Abstract concepts that form the basis of very advanced work in computer science, with a strong emphasis on official languages, models of calculation, logic and proof strategies. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 211C and MATH 125C). C Requires a minimum C.Enrollment degree limited to students with a significant, minor, or concentration in Applied Computer Science, Computer Science or Software Engineering.Enrollment is limited to students in a Science degree or Post-Baccalaureate Certificate degrees. Students with the attribute terminated by the main VSE feature may not register. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 332: Object-oriented design and software application. Three points. In-depth study of software design and application using a modern, object-oriented language with support for graphical user interfaces and complex data structures. Topics covered will be specifications; design patterns; and removal techniques; including typing, access control, heritage and polymorphism. Students will learn the correct mechanical use of techniques such as hiding information, classes, objects, inheritance, handling exceptions, event-based systems, and matching. It is offered by It. It's limited to two attempts. Equivalent to 332.Registration restrictions: Condition required: (CS 310C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 351: Visual Informatics. Three points. Focuses on programming mathematical and geometric concepts on which computer graphics are based. It covers fundamental issues in computational geometry, 3D modeling, graphics algorithms, and graphical user interfaces using 2D and 3D implementations. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 262C and 310C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 367: Computer Systems and Programming. Four points. Introduces students to computer systems from a programmer's perspective. Topics include data representation, computer-level assembly and representation of high-level language programs, memory hierarchy, connection, exceptions, interruptions, processes and signals, virtual memory, and system-level I/O Foundation for compiler courses. networks; operating systems; and computer architecture, where a deeper understanding of system-level issues is required. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 262C or 222C) and MATH 125C and CS 110C.C Requires minimum grade C.Students with the VSE-terminated important attribute cannot be registered. Program Type: Lecture, RecitationY: This course is graded on the undergraduate normal scale. CS 390: Principles of Research and Design of Projects in Informatics. Three points. This course introduces students to the process of research and design of projects within the it sector. Students will learn about the tools of commerce, work through the design principles that begin with articulating a question, reviewing exploration methods, collecting evidence, sharing results, and evaluating and evaluating research or project results. It is offered by It. It's limited to two attempts. Specialized designation: Mason Impact.Re recommended Condition: CS 310 and CS 321.Registration Restrictions: Required Condition: CS 262C.C Requires minimum grade C.Students with the vse terminated important feature cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 391: Advanced Programming Laboratory. Program-intensive laboratory course. Students improve problem-solving and programming skills while gaining experience in teamwork. Focuses on data structures, flashback, regression, potential and debugging. The central focus is the application of known and new data algorithms and structures in new circumstances. It is offered by It. It can be repeated within the grade for a maximum of 3 units. Registration Restrictions: Required condition: CS 310C.C Requires minimum degree of C.Students with the vse-terminated important attribute cannot be registered. Schedule type: schedule: This course is graded on the undergraduate regular scale. CS 395: Student started special topics. 1 credit. Special and emerging topics of interest to undergraduate computer science students. Lectures are taught by groups of students/teachers. Notes: It can be repeated if the issues are substantially different. It is offered by It. It can be repeated within the condition for a maximum of 3 units. Specialized designation: Subject VariesInacisation Condition: Additional conditions will vary depending on subject registration restrictions: Condition required: CS 211C. C Requires minimum grade C.Inclusion limited to students with an important in Applied Computer Science or Computer Science.Inclusion is limited to students in a Science degree. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 399: Special Topics. Three points. Special and emerging topics in computer science or closely related specialties. Notes: It can be repeated if the issues are substantially different. It is offered by It. It can be repeated within the condition for a maximum of 6 appropriations. Specific Identification: Theme VariesEnasity: Additional conditions will vary depending on the topic. Registration Restrictions: Prerequisite Required: CS 211C. C Requires Minimum Grade C.Schedule Type: LectureSes: This course is graded on the undergraduate regular scale. CS 425: Programming Game I. 3 credits. Introduction to the technologies and techniques used in modern computer games. Teams will explore the various aspects of a complete design using sophisticated tools. Includes a project in which a game is original; this prototype and original design will serve as a starting point for the project in CS 426. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C and 351C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 426: Game Programming II. Three points. Project-oriented continuation of CS 425 with an emphasis on implementing a complete game. It is offered by It. It's limited to two attempts. Registration Restrictions: Required conditions: CS 325C and 425C.C Requires minimum degree of C.Students with the VSE-terminated important feature cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 440: Language editors and programming environments. Three points. Research of key programming language processors and software development, such as assemblers, interpreters and compilers. Topics include the design and manufacture of language processors, formal editorial definition methods, analysis techniques and code production techniques. It is offered by It. It's limited to two attempts. Register Subscribe Required conditions: (CS 310C) and (CS 330C) and (CS 367C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 444: Introduction to Computational Biology. Three points. It introduces computational methods into molecular biology. It covers a wide range of topics in bioinformatics and computational biology. Organized as 3-week modules intended to record the current classification of bioinformatics and computational biology methods, thus providing students with a broad view of the field. It is offered by It. It's limited to two attempts. Recommended Condition: C or better in CS 310.Registration restrictions: Students with the VSE-terminated important attribute cannot register. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 445: Computational Methods of Genomics. Three points. Fundamental principles and techniques for the application of computational algorithms to solve problems in biology arising from the need to process large volumes of genomic information. Topics include sequence analysis, alignment, and assembly, gene prediction, and knowledge-based protein structure prediction. Projects include the design and planning of basic alignment and forecasting methods. It is offered by It. It's limited to two attempts. Recommended Condition: C or better in CS 310 and STAT 344.Registration restrictions: Students with the VSE-terminated important feature cannot register. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 450: Database concepts. Three points. It covers basic to intermediate knowledge of the design, implementation and use of relational database systems. Topics include TheEntity-Relationship (ER) and Entity-Enhanced Relationship (EER) models for database design, relational algebra (RA), structured query language (SQL), SQL programming techniques, functional dependencies and normalization, databases related to objects and objects, and security. Students will practice designing, developing, and implementing an ORACLE relational database and using the database for queries, transaction processing, and reporting. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 330C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program type: This course is graded on the undergraduate normal scale. CS 451: Computer graphics. Three points. Basic principles of graphics and programming. Topics include scanning conversion, transformation, viewing, lighting, blending, texture mapping, and some advanced graphics techniques. It is offered by It. It's limited to two attempts. Registration restrictions: registration: Conditions: (MATH 203C) and (CS 310C) and (CS 367C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 455: Computer communications and networking. Three points. Data communication and networking protocols, with the study organized to monitor Internet Protocol Suite (TCP/IP family) levels. Topics include the role of various media and software components, local and wide-area network protocols, network performance, and emerging advanced commercial technologies. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 367C) and (STAT 344C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 463: Comparative programming languages. Three points. Basic programming mechanisms described independently of specific machines or languages, including control, binding, process removal, types and matching. It includes basic programming skills in many different types of programming languages, including a language that provides matching. Notes: Students who have received CS 363 cannot receive credit for CS 463. It is offered by It. It's limited to two attempts. Registration Restrictions: Required conditions: CS 330C, 367C and 310C.C Requires minimum grade C.Students with the VSE-terminated important feature cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 465: Computer Systems Architecture. Three points. Computer subsystems and instruction set architectures. Architectures of a circle, multiple cycles and conductors. Memory hierarchy, cache, and virtual memory input-output processing. It is offered by It. It's limited to two attempts. Recording restrictions: Condition required: (CS 367C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 468: Secure programming and systems. Three points. Fundamental principles and techniques for the implementation of secure IT systems. Topics include security and encryption basics, vulnerability analysis, secure software development, and distributed system security. Projects include the design and programming of key security tools, programmes and distributed systems. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 367C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureDeline: This course is graded Normal scale. CS 469: Safety Engineering. Three points. It covers software subsystems involved in computer system defense. It studies threats and architecture solutions against them, including but not limited to access control and identity management, network and system security, intrusion detection and recovery systems, monitoring systems and criminology. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 330C) and (CS 367C) and (STAT 344C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 471: Operating systems. Three points. Topics in multiprogramming. Covers simultaneous synchronization processes and mechanisms. processor programming; memory, file, I/O, and deadlock management. performance of operating systems; and projects involved in synchronization on a multiprogrammed operating system and virtual memory management. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 367C) and (STAT 344C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 475: Simultaneous and Distributed Systems. Three points. Practical issues in the design and application of simultaneous and distributed software. Topics include simultaneous programming, synchronization, polythematics, local area and wide area network protocols, distributed calculation, system integration, and techniques for expressing coarse parallelism at the application level. Projects include application-level network programming. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 367C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This course is graded on the undergraduate normal scale. CS 477: Development of mobile applications. Three points. This lesson-based project will teach fundamental principles of software development for the mobile environment, emphasizing the application of many academic concepts and the new design and programming standards resulting from the use of mobile devices. Topics include user interfaces, event-based scheduling, process-to-process communications, networking, features, and mobile-specific performance in limited resource consumption. It is offered by It. It's limited to two attempts. Registration Restrictions: Required conditions: CS 310C and 367C.C Requires minimum degree of C.Students with the VSE-terminated important feature cannot be registered. Program Type: LectureDeline: This course is graded Normal scale. CS 480: Introduction to Artificial Intelligence. Three points.





integrated language modeling (UML) notation. Students participate in a group program on software requirements and specifications using a modern method. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE foundation courses or equivalents. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 621: Software Design and Architecture. Three points. An examination of methods, procedures, and notes for working with architecture and design in software. Explore design as enumeration, evaluation, and selection of design alternatives to achieve quality characteristics. Research perspectives on design by risk minimization, field modeling, abstraction, architectural styles, design patterns, and reuse. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE foundation courses or equivalents. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded in normal of graduates. SWE 622: Distributed software engineering. Three points. Practical introduction to programming techniques and interfaces for distributed software engineering. Networking protocols at various levels. Build distributed and simultaneous software using network protocol services. Applications of the Internet and Software. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE foundation courses or equivalents. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 625: Software project management. Three points. Lifecycle and process models; process measurements; planning for a software project; mechanisms for monitoring and monitoring the timing, budget, quality and productivity; and leadership, motivation, and team building. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE foundation courses or equivalents. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 626: Software Program Laboratory. Three points. It covers the analysis of requirements, the design, implementation and management of the software development project. Students work in teams to develop or modify the software product, applying sound principles of software engineering. It uses both industrial and academic standards to assess the quality of labour products. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 619,620, and 621; or the instructor's permission. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 631: Software design standards. Three points. Principles of software design standards. Design patterns as solutions to recurring design problems. Categories of software design standards; structure patterns, communication patterns. Draw patterns in software architectures. Design software applications design patterns. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 621.Registration restrictions: Enrollment is limited to students with an advanced class in the nomination, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Graduate, or undergraduate students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 632: Ui design and deployment. Three points. 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. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 619, or CS 540 and 571, or instructor's license. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 637: Software testing. Three points. Students learn to test the software effectively. Developers learn practical ways to design high-quality tests during all phases of software development. Students learn the theory behind test design based on criteria and apply this theory in practice. Topics include test design, test automation, test coverage criteria, and how to test software in cutting-edge software development environments. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 619, or instructor's license. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 642: Software engineering for the World Wide Web. Three points. Detailed study of engineering methods and technologies for the creation of highly interactive web pages for e-commerce and other web applications. Introduces engineering principles for building websites that show high reliability, usability, security, availability, scalability, and maintenance capability. Teaches methods such as clientserver programming, deployment data-based, intermediate software and reusable components. It is offered by It. It can't be repeated for credit. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students in one Undergraduate degree cannot be enrolled. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 645: Development of data-based software. Three points. Introduces concepts and foundations of component-based software components and software. Detailed study of the engineering principles of data-based modeling, design, application, testing and software development. It also explores state-of-the-art data technologies. It is offered by It. It can't be repeated for credit. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 681: Secure software design and programming. Three points. Software security theory and practice, focusing in particular on certain common software security risks, including buffer overflows, race conditions and random numbering, as well as identifying potential threats and vulnerabilities early in the design cycle. Emphasizes methodologies and tools for identifying and eliminating security vulnerabilities, techniques for proving the absence of vulnerabilities, ways to avoid security holes in new software, and basic guidelines for building secure software: how to design security-minded software from scratch and integrate analysis and risk management throughout the software's lifecycle. It is offered by It. It can't be repeated for credit. Equivalent to ISA 681.Recommended Condition: SWE 619.Registration restrictions: Enrollment limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 699: Special issues in software engineering. Three points. Special issues that do not occur in the normal SWE sequence. Notes: It can be repeated for credit when the semester issue is different. It is offered by It. It can be repeated within the term. Specialized Identification: Theme Varies Registration: Enrollment is limited to students with an advanced category in the application, Graduate, Non-Degree or Senior Plus.Registration is limited to Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Registration is limited to students of the Volgenau School of College. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 721: Reusable software architectures. Three points. Investigates software concepts that promote the reuse of software architectures. Studies influence object technology in software design and reuse. Investigates domain modeling methods that model the application domain as a family of software products from which destination systems can be configured. It covers reusable software patterns, including architecture and design patterns, software components, and object-oriented frames. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 621.Registration restrictions: Enrollment is limited to postgraduate or non-graduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 724: Program analysis for software testing. Three points. Different methods for software analysis, mainly for testing purposes. Analysis techniques, algorithms, tools and applications. The goals are to explore current research issues, learn how to create analysis tools, and understand how these techniques can be applied to software-related activities such as maintenance, reuse, and optimization. It is offered by It. It can't be repeated for credit. Recommended Condition: A compiler class (e.g.CS 540) or a test class (e.g. SWE 637) or instructor's license. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 737: Advanced software testing. Three points. Cutting-edge concepts and techniques in software testing. An in-depth study of existing approaches to software testing, as well as the development of new approaches. Applications of existing concepts and techniques to new technologies. Advanced MS students learn in-depth knowledge about how to apply tests in difficult and challenging real-world scenarios. Doctoral students learn current research trends, both theoretical and practical. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 637.Registration restrictions: Enrollment is limited to postgraduate or non-graduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSe saved: This course on the normal scale of graduates. SWE 760: Software analysis and real-time system design. Three points. Background for students who want to conduct research in software engineering systems in real time. Provides an understanding of basic real-time software system analysis, concepts and design methods, and how they are used to develop large-scale and real-time software systems. It also explores explores impact of emerging technologies. Includes term work in the design and analysis of complex, real-time software system. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 621.Registration restrictions: Enrollment is limited to postgraduate or non-graduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 763: Software engineering experimentation. Three points. Detailed study of the scientific process, in particular using an experimental method. It examines how empirical studies are conducted in software engineering. It examines the 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. It is offered by It. It can't be repeated for credit. Recommended Condition: SWE 621, or instructor's license. Registration restrictions: Enrollment is limited to postgraduate or non-graduate students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 795: Advanced issues in software engineering. Three points. Advanced topics that don't happen in existing courses. Topics usually let's take up knowledge in one or more existing MS SWE courses. Notes: Repeated within grade for credit when the subject differs. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Specific designation: Subject variesEnthing condition: 12 appropriations applicable to the Member States. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a non-grade undergraduate degree cannot enroll. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 796: Directed readings in software engineering. Three points. Analysis and investigation of the modern problem in software engineering. It requires prior approval from the faculty member who oversees the student's work. A written report is also required. It is offered by It. It can't be repeated for credit. Registration Restrictions: Registration is limited to postgraduate or non-graduate level. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: ResearchGrading: This course is graded on the normal graduate scale. SWE 798: Research Programme. Three points. Postgraduate candidates undertake a project using knowledge in the MS program. Topics selected in consultation with a faculty sponsor. The research programme shall be selected under the guidance of the full-time postgraduate member of the teaching staff, resulting in a written technical report. Notes: Prior approval is required from the school sponsor who supervises the student's work. To register, students must complete an independent study form available at the department's office. It must be initiated by the school sponsor and approved by the president of the department. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Recommended Condition: 18 units applicable to the degree of multiple sclerosis. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: ThesisSnable: This course is graded on the normal scale of graduates. SWE 799: Thesis. 1-6 units. The research project was completed under the supervision of the faculty member, which results in the technical report accepted by the three-member faculty committee. The report should be supported during the oral presentation. Notes: To register, students must complete the independent study form available at the department's office. It must be initialed by the faculty sponsor and approved by the president of a department. It is offered by It. It can't be repeated for credit. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a non-grade undergraduate degree cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: ThesisDemit: This course is graded on the satisfactory/no credit scale. SWE 821: Software Engineering Seminar. Three points. Study of the application of software engineering principles, design methods, and support tools through real problems extracted from teaching staff and industry projects. Notes: It can be repeated by changing the theme. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Recommended Condition: SWE 621 Registration Restrictions: Enrollment is limited to graduate-level students. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: Storage Seminar: This course is graded on a regular scale. SWE 825: Special topics in web-based software. Three points. Advanced topics in definition, design, modeling, development, development, testing and software retention written as web and web services. It can be repeated with a change in theme. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Specialized Designation: Theme VariesEnse Condition: SWE 642 Software Engineering for The World Wide Web.Registration Restrictions: Enrollment is limited to graduate students level. Enrollment limited to students at the Volgenau Volgenau School of Engineering Type: LectureSeed: This course is graded on a regular scale. Scale.

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