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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, Menascé, Motro, Ofmutt, 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 ayny, 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, Gomaa, 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) 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 & amp; ComputingRegistration Restriction: Students with the great VSE feature may not register. Schedule Type: Lecture Shake: This 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. 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 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. 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 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 students in 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 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 & amp; ComputingRegistration Restriction: Required Preactions: (minimum score of 65 in 'Math Placement Transcendantals', minimum score of 07 in 'Math Placement Transcendantals', MATH 105C, 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. 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: (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. 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 colocation: 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 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, 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: (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 representations, 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: (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 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 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 adjorithms 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: 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 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 Conditions: 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 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: (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 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, 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 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. developing, and implementing an ORACLE relational database and using the database for gueries, transaction processing, and reporting. It is offered by It. It's limited to two attempts. Registration restrictions: (CS 310C) and (CS 330C). C Requires a minimum degree of C.Students with the VSEterminated important attribute cannot be registered. Program type: This course is graded on the undergraduate normal scale. CS 451: Computer 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 (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. 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, 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 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 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. It is offered by It. It's limited to two attempts. Registration restrictions: Reguired conditions: (CS 310C) and (CS 367C or ECE 445C). C Reguires 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, 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. 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.

Principles and methods for the representation of knowledge, reasoning, learning, problem solving, programming, heuristic search and processing of natural language and their application in the building of intelligent systems in various fields. Uses lisp, PROLOG or specialized system programming language. 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: LectureSeed: This course is graded on the undergraduate normal scale. CS 482: Computer vision. Three points. Basic principles of visual processing, edge detection, partitioning, native images, image modeling, representation of visual knowledge, and image understanding. Students complete projects involving real images. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (MATH 203C) 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 483: Algorithm analysis. Three points. Analyzes computational resources for important types of problems from alternative algorithms and their related data structures, using mathematically rigorous techniques. Specific algorithms have been analyzed and improved. It is offered by It. It's limited to two attempts. Registration restrictions: Required conditions: (CS 310C) and (CS 330C) and (MATH 125C). 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 484: Data mining. Three points. Basic principles and methods for data analysis and knowledge discovery. Emphasizes the development of basic skills for modeling and correlation; sorting events; grouping? biometrics; business intelligence; and the extraction of complex types of data. It is offered by It. It's limited to two attempts. Registration restrictions: CS 310C and (STAT 344C or 334C). C Requires a minimum degree of C.Students with the VSE-terminated important attribute cannot be registered. Program Type: LectureSeed: This lesson on the undergraduate normal scale. CS 485: Autonomous Robotics. Three points. It covers various key topics in autonomous architectures and their interaction with physical material, elementary kinematics and robot control, motion and orbit design, orbit, design, learning and adaptation, modeling and fusion of sensors. Includes projects involving natural robots. It is offered by It. It's limited to two attempts. Registration Restrictions: CS 262C, 310C and MATH 203C.C Reguires 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 490: Design Report. Three points. Capstone courses focusing on the design and successful implementation of major software projects, including a wide range of knowledge and skills, developed by the student group. It requires the final report to the faculty-industry panel. It is offered by It. It can be repeated within the grade for a maximum of 12 units. Recommended Conditions: (CS 321C or 421C) and (CS 483C). 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 491: Senior Design project funded by industry. Three points. Senior design project for a scale. successful implementation of the major software project determined by an industry sponsor, comprising a wide range of knowledge and skills, developed by the student group. It requires the final report to the faculty-industry panel. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Registration restrictions: Reguired conditions; CS 367C, 321*C and 483*C.* Can be obtained at the same time. C Reguires a minimum grade of C.Enrollment limited to students with a significant, minor, or concentration in Applied Computer Science or Computer Science. Students with the VSE-terminated important feature cannot be enrolled. Program Type: LectureSeed: This course is graded on the undergraduate special scale. CS 498: Independent Study in Informatics. 1-3 units. Research and analysis of selected problems or issues in computer science. The matter must be dealt with by an instructor and approved by the President of the Department prior to registration. Notes: It can be repeated if it matters significantly differently. It is offered by It. It can be repeated within the condition; 60 units, CS major, and instructor's license. Registration restrictions; Students with the VSEterminated important feature cannot register. Program Type: Independent StudyAthens: This course is graded in undergraduate Scale. CS 499: Special Informatics Issues. Three points. Topics of particular interest to undergraduate students. Notes: It can be repeated if it matters significantly differently. It is offered by It. It can be repeated within the condition for a maximum of 6 appropriations. Specialized rating: Theme Theme Prerequisite: 60 units. Additional conditions may vary depending on the nature of the issue. Registration Restrictions: Required conditions: CS 310C and 330C.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 504: Principles of Data Management and Mining. Three points. Techniques for storing, managing and using data, including databases, relational models, shapes, gueries, and transactions. On Line Transaction Processing, Data Storage, Star Shape, On Line Analytical Processing. MOLP, HOLAP, and hybrid systems. Overview of data mining authorities, models, supervised and unsupervised learning, finding patterns. Massive parallel architectures and Hadoop. Notes: This course cannot be taken for credit by students of MS CS, MS ISA, MS SWE, CS PhD or IT doctoral programs. It is offered by It. It can't be repeated for credit. Registration restrictions: Enrollment is limited to 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. CS 530: Mathematical Foundations of Computer Science. Three points. This course focuses on the subjects of basic mathematical structures, mathematical logic and probability theory; and application of these concepts to problem solving and formal reasoning through practice using computational tools. Notes: Cannot be taken for credit by students in PhD CS or accelerated MSCS programs. It can only be taken in the first half at THE GUMU. It is offered by It. It can't be repeated for credit. Recommended Condition: MATH 125 and STAT 344. Registration restrictions: Enrollment is 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. CS 531: Computer Systems and Basic System Programming Principles. Three points. This course is a practical introduction with operating systems. This focuses on fundamental data structures needed to design and implement system applications and continues with an introduction to the Unix application programming interface, signals, threads, and processes-to-process communications. This course is taught by a using C, with special themes in both Java and Python. It cannot be taken for credit by students in PhD CS or accelerated MSCS programs. It can only be taken in the first half at THE GUMU. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and CS 367 or equivalent. 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. CS 540: Language processors. Three points. Basic programming language processors, such as assemblers, interpreters, and compilers. Topics include the design and manufacture of language processors, formal editorial definition methods, analysis techniques, and code creation techniques. language processors and experience with programming environments. It is offered by It. It can't be repeated for credit. Recommended Condition: MATH 125 and CS 330 and CS 465. Registration Restrictions: Enrollment is 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. CS 550: Database systems. Three points. An introduction to database management with an emphasis on database design theory, object databases, XML and Web data. 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 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. CS 551: Computer graphics. Three points. Graphics principles and programming. Topics graphics material, smoothing, transformations, viewing, lighting, blending, texture mapping, color models, curves, surfaces, and animations. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and CS 367. Registration restrictions: recording: 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. CS 555: Computer communications and networking. Three points. Data communication techniques and systems between computing devices and Internet Protocol Suite levels. Topics include the role of various media and software components, local and wide-area network protocols, network design, performance and cost issues, and emerging advanced commercial technologies. Emphasizes the TCP/IP protocol family. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and CS 367 and STAT 344. Registration Restrictions: Enrollment is limited to students with an advanced category for nomination, Graduate, Non-Degree or Senior Plus. Registration is limited to Graduate, Non-Degree or 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. CS 571: Operating systems. Three points. Operating systems, including processes, memory management, I/O, process communication, files, directories, shells, distributed systems, performance, and user interface. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and CS 367 and CS 465. Registration restrictions: Enrollment is 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. CS 580: Introduction to Artificial Intelligence. Three points. Principles and methods for the representation of knowledge, reasoning, learning, problem solving, programming, heuristic search and processing of natural language and their application in the building of intelligent systems in various fields. LISP, PROLOG, or specialized system programming language. It is offered by It. It can't be repeated for credit. Recommended CS 310 and CS 330. Registration restrictions: Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Registration is limited to at the College of Engineering of the Volgeni School of Engineering. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 583: Algorithm analysis. Three points. Topics include analyzing successive and parallel algorithmic strategies, such as greedy methods, divide and conguer strategies, dynamic programming, search and transit techniques, and approach algorithms. and analyzing specific algorithms. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and CS 330 and MATH 125. Registration restrictions: Enrollment is limited to students with a class of Advanced for Nomination, 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. CS 584: Data Mining Theory and Applications. Three points. Concepts and techniques in data mining and interdisciplinary applications. Topics include databases. data cleaning and transformation; a description of the concept; association and correlation rules; data classification and predictive modelling; performance analysis and scalability; data mining in advanced database systems, including text, audio and images; emerging issues and future challenges. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 310 and STAT 344. Registration restrictions: Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus. Registration is limited to Postgraduate, 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. CS 587: Introduction to Cryptography. Three points. It covers standard security definitions for the most common tasks: data encryption and authentication, both in private key settings and in public key settings. It covers the process of official proof that constructions and applications, such as how to correctly use block encryptions and hash functions for the above tasks. In addition, several current issues in cryptography can also be covered. It is offered by It. Not be repeated for credit. Recommended Condition: CS 330 Enrollment limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus. Students in a nonundergraduate degree cannot enroll. Program Type: LectureSeed: This course is graded at the Master's Degree Scale. CS 595: Key topics in Computer science that don't happen in existing courses. It is offered by It. It can be repeated within the grade for a maximum of 9 units. Specialized Designation: Subject Varies Enrollment Restrictions: Enrollment is limited to students with an advanced class in candidacy, Graduate or Non-Degree.Students in a non-undergraduate degree may not enroll. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 600: Calculation theory. Three points. Introduction to logic and proof techniques, official languages, automatic theory and computational complexity. Specific topics include regular and frameless languages, Turing machines, NP-completeness, and undecidability. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 583B-, B- Requires a minimum grade of B-, Enrollment is limited to students with a class of Advanced for Nomination. 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. CS 611: Computational Methods of Genomics. Three points. It covers 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 seguence assembly, gene prediction, and protein structure prediction. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 583B-, B- Requires a minimum grade of B-, Enrollment is limited to students with a class of Advanced for Nomination, 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. CS 630: Advanced algorithms. Three points. Provides an overview of advanced algorithm design and analysis techniques. Topics include algorithms for hash tables, table operations, number theory, string mapping, computational geometry, combination optimization, and linear programming. also the areas of occupancy algorithms and Np. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 583B-. B- Requires a minimum grade of B-. Enrollment is limited to students with advanced gualification, master's degree, non-degree or Senior Plus. Registration is limited to students at the Volgenau School of Engineering college, Program Type: LectureSeed: This course is graded on the normal scale of graduates, CS 633: Computational Geometric modelling, Emphasizes the data structures used to represent geometric objects and algorithms to manipulate these data structures. Topics include range search, polygon triangization, convex hulls, motion design, visibility, and grid productions: Prerequisite required: CS 583B-. B- Requires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination. Graduate, Non-Degree or Senior Plus, Registration is limited to 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. CS 635: Parallel Calculation, Foundations. Three points. It covers three main parallel examples of computers: MIMD calculation, SIMD calculation, and data flow calculation. Emphasizes the interfaces between algorithm design and implementation, architecture, and software. Examines parallel algorithms and parallel programming languages in relation to the architecture of specific parallel computers. It is offered by It. It can't be repeated for credit, Recommended Condition: Adeguacy in programming language C. Registration restrictions: Required Conditions: (CS 583B- and 571B-). B- Requires a minimum grade of B-. Enrollment is 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. CS 640: Advanced compilers. Three points. Examines advanced compiler techniques, such as code optimizations for sequential and parallel computers, compilers for logical, functional, or object-oriented languages, and other topics in the current literature. It is offered by It. It can't be repeated for credit. Registration restrictions: (CS 540B- and 583B-), B- minimum grade B-. Enrollment is 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 level students. Students on a non-grade undergraduate level students. normal scale of graduates. CS 650: Advanced database management. Three points. Study of the internal architecture of database systems. Topics include: physical data organization and indexing, guery processing and optimization, transaction processing, database system architectures, web services, and Web data security. It is offered by It. It can't be repeated for credit. Registration Restrictions: Reguired Conditions: (CS 550B- or INFS 614B-). B- Reguires a minimum grade of B-. Enrollment is 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. CS 655: Wireless and mobile computing. Three points. This course provides an introduction to wireless and mobile networking. Topics include wireless and mobile principles and architectures, and fundamental issues of wireless and mobile network level, including IEEE 802.11, and emerging wireless networks such as Internet-of-Things, high-speed millimeter waves, vehicle networks and mobile and IoT detection, smart homes and smart cities. It is offered by It. It can't be repeated for credit. Recommended Condition: CS 555 Enrollment Restrictions: Enrollment limited to students with a class of Advanced for Nomination. Graduate, Non-Degree or Senior Plus, Students in non-undergraduate degree cannot enroll. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 657: Mining bulk datasets with MapReduce. Three points. It covers techniques for extracting large datasets, including distributed file systems and map reduction, similarity search, and data flow processing. It covers classic problems in data mining, such as grouping, extracting correlation rules and others in terms of scalability. It includes a final project to practice concepts covered in the classroom. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required to Graduate of B-. Enrollment is limited to Students with a class of Advanced for candidate, Graduate, Non-Bachelor 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. Networked virtual environments Three points. Networked virtual environment overview, networking and multimedia concepts, virtual simulation concepts, efficiency/performance issues, and online conferences/virtual environments, as well as a final session where groups of one or two people create a minimally functional networked virtual environment over the Internet using multicast network software. Lectures available online/recorded. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite reguired: CS 555B-. B- Reguires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus.Registration is limited to Students. Students on a non-grade undergraduate level students. School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 662: Computer graphics game technologies. Three points. Addresses certain graphics game technologies. shadows. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite reguired: CS 551B-. B- Reguires a minimum grade of B-. Enrollment 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. CS 667: Biometrics and identity management. Three points. Basic principles and methods for automatic authentication of individuals. Technologies include facial, fingerprint and iris recognition. verification and verification and verification of speakers. Additional topics cover multimodal biometrics, system design, performance evaluation and privacy concerns. Duration work is required. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 580B-. B- Requires a minimum grade of B-. Enrollment is 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 in a non-degree cannot be registered. 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. CS 672: Computer system performance assessment. Three points. Theory and practice of analytical models of computer systems. Topics Topics open and closed multi-class queue networks, one- and multi-class average value analysis, Markov chains, Internet data center performance and availability models, software performance engineering, and e-commerce performance. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite required: CS 571B-. B- Requires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus. Registration is limited to 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. CS 673: Multimedia computing and systems. Three points. It focuses on technological and developmental environments in the development of multimedia applications. Projects include experience with multimedia writing tools and simulations to evaluate performance. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite required: CS 571B-. B- Requires a minimum grade of B-Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus. Registration is limited to 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. CS 675: Distributed systems and applications. Topics include distributed communication examples, intermediate software, coordination and synchronization, distributed transactions, consistency and replication, fault tolerance and reliability, and peer-to-peer systems. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 571B-. B- Requires a minimum grade of B-. Enrollment is 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 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. CS 681: Guiding Cognitive Factors. Three points. Design and development of cognitive factors that learn the problem-solving experience directly from field specialists. Topics include expert knowledge mixed-initiative reasoning based on knowledge and evidence, design and development of ontology, multistrategy rule learning, and knowledge-based maintenance. Projects include the development of specific cognitive factors teaching and learning. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 580B-. B- Requires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus.Registration is limited to Students. Students on a non-grade undergraduate level students. School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 682: Computer vision. Three points. Study of computational models of visual perception and their application in computer systems. Topics include early visual processing, edge detection, partitioning, native images, image modeling, representation of visual knowledge, and image understanding. It is offered by It. It can't be repeated for credit. Registration restrictions: (CS 580B- and (CS 583B- or 584B-)). B- Requires a minimum grade of B-. Enrollment is 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 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. CS 683: Parallel algorithms. Three points. Examines the design and analysis of parallel algorithms for PRAM architectures and existing SIMD and MIMD architectures. Topics include sorting, chart algorithms, numerical algorithms, and computational complexity. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite required: CS 583B-. B- Reguires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Plus. Registration is limited to 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. CS 684: Chart algorithms. Data structures include incoherent sets, piles, and dynamic trees. Algorithms include minimal trees that extend, path, maximum flow, and chart level. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 583B-. B- Requires a minimum grade of B-. Enrollment is limited to Postgraduate, 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. CS 685: Autonomous Robotics. Three points. It examines developments in intelligent autonomous systems. He studies applications of artificial intelligence, computer vision and machine learning in robotics. Topics include analysis and design of algorithms and architectures for design, navigation, understanding of sensory data, sensor fusion, spatial reasoning, motion control, knowledge acquisition, learning concepts and processes, self-organization and adaptation to the environment. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 580B-. B- Requires a minimum grade of B-. Enrollment is 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 at the Volgenau School of Engineering college, Program Type; LectureSeed; This course is graded on the normal scale of graduates. CS 686: Image editing and applications. Three points. Concepts and techniques in image processing, transforming, improving, restoring, and encoding methods. Students complete projects involving physical images. It is offered by It. It can't be repeated for credit, Registration restrictions: Prereguisite required: CS 583B-, B- Requires a minimum grade of B-, Enrollment is limited to students with a class of Advanced for Nomination. Graduate, Non-Degree or Senior Plus, Registration is limited to students with a class of Advanced for Nomination. 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. CS 687: Advanced Artificial Intelligence. Three points. It explores fundamental issues of artificial intelligence, such as the roles of knowledge and search, the formalization of knowledge and conclusion, and symbolic versus emerging approaches to intelligence. It studies advanced programming techniques for artificial intelligence, related to fundamental issues, and important areas of application for artificial intelligence. Notes: A large planning project is required. It is offered by It. It can't be repeated for credit. Registration restrictions: prerequisite: CS 580B-. B- Requires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Senior Senior limited to postgraduate, non-undergraduate 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, CS 688; Mechanical Learning. Three points. This course covers the theory and principles that govern different examples of machine learning. The emphasis is on statistical theory and methodology. Topics include: Model selection and generalization; Over-ing and positioning; Bayesian theory and decision theory? Maximum probability estimate, MAP? Legalisation? Bias-variance compensation. Curse of the dimension? Decrease dimensions? Linear classification models. Neural Networks (Backpropagation); Deep Learning (CNN); Core methods? Support Vector Machines Set Methods? Unsupervised Learning (Clustering, EM, Mix Modeling); Strengthening learning. It is offered by It. It can't be repeated for credit. Registration restrictions: CS 580B- or 584B-. B- Requires a minimum grade of B-. Enrollment is 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 at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 689: Design Movements of robots and molecules. Three points. It covers topics from artificial intelligence, algorithms that model and simulate physical and biological systems and focuses on motion design algorithms for robotic systems in the presence of obstacles. Simple deterministic and sample approaches to motion planning, as well as advanced design methods, including kinematic and dynamic design, will be covered. Selected topics include sensor-based motion design, handling design, assembly design, uncertainty design and robotic-inspired methods for calculating functionally relevant molecular chain movements. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite reguired: CS 583B-. B- Reguires a minimum grade of B-. Enrollment is 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 in an undergraduate non-grade cannot be registered. 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. CS 695: IT issues Three points. Units. issues in computer science that do not occur in a regular sequence of computer science. Notes: It can be repeated by It. It can be repeated within the term. Specialized identification: Theme VariesAmended Prerequisite: Completion of at least two basic courses and instructor's permission. Registration restrictions: Enrollment is limited to students with an advanced class in the application. 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. CS 697: Independent Reading and Research. 1-3 units. Students can take courses under the supervision of consenting faculty members. Students usually submit a written statement of course content and a temporary reading list as part of the request for approval. A bibliographical review, project report or other written product is usually required. It is offered by It. It can't be repeated for credit. Recommended Condition: Completion of at least two basic courses and instructor's permission. Registration restrictions: Enrollment is limited to students with an advanced class in the application, 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: Research Methodology in Informatics. Three points. Topics include approaches to the evaluation, writing and presentation of scientific papers, research integrity issues and guantitative models and methods in experimental computer science. Techniques for the use of analytical analysis of data are presented. Students apply these techniques to a project, write a report and make a presentation in class. It is offered by It. It can't be repeated for credit. Recommended Condition: Introduction to the Ph.D. in Informatics Programs. Registration restrictions: Enrollment is limited to students specializing in Computer Science or Informatics. Registration is limited to students with a Ph.D. degree in Philosophy. Enrollment is limited to students at the Volgenau School of Engineering college. Type LectureSeed: This course is graded on the normal scale of graduates. CS 701: Research experience in Computer Science. Three points. Readings and research for early-stage doctoral students under the direction of a member of the IT teaching staff. Research must refer to a professionally prepared document and be presented at a public meeting at the end of the six-month period. It is offered by It. It can be repeated within the condition for a maximum of 3 units. Recommended Condition: CS 700 Registration Restrictions: Enrollment is limited to students specializing in Computer Science or Informatics. Registration is limited to students with a Doctor of Philosophy degree. Program Type: ResearchGrading: This course is graded on the normal graduate scale. CS 706: Simultaneous software systems. Three points. Topics include simultaneous programming languages and constructions, as well as specifications, design, verification, and validation of concurrent programs. Students are required to solve simultaneous scheduling problems and control solutions using verification, testing, and debugging tools. It is offered by It, It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 571B-. B- Requires a minimum grade of B-. Registration is limited to postgraduate 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. CS 719: Expandable Internet services. Three points. It discusses, from a quantitative point of view, the characteristics of the most important technologies used to support the implementation of e-business sites. Includes topics such as e-business site hardware and software architectures, authentication, payment services, understanding customer behavior, workload characterization, scaling analysis, and performance forecasting. Notes: Term paper and work are required. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: (CS 555B- and 571B-). B- Requires a minimum grade of B-. Registration is limited to postgraduate 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. CS 747: Deep Learning (DL). Deep learning is a machine learning approach based on representations of learning data as opposed to designing workspecific algorithms. The course covers the concepts of Multilayer Perceptrons (MLPs) and algorithms for their training (slope descent, backpropagation), Legalization of DL, Networks (CNNs), Autoencoders, Repeating Networks (RNNs), and Deep Generative Models including spinal confrontational methods. Problems from various application areas, such as natural language processing and computer vision, will be discussed. It is offered by It. It cannot be repeated for Prerequisite: CS 688 Registration Restrictions: Enrollment is limited to students specializing in Computer Science or Software Engineering. Enrollment is limited to students in a Master's degree in Science. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 752: Interactive graphics methods and tools. Topics include visualization, modeling, rendering, animation, simulation, virtual reality, graphics software tools, and current research topics. It is offered by It. It can't be repeated for credit. Registration 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. CS 755: Advanced computer networks. Three points. Current and emerging issues in advanced computer networks and applications. Topics include software systems related to networking architectures and protocols with packet and cell switching, high-performance LANs, programming and congestion control, mobile network, multimedia applications, and next generation Internet. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 555B-. B- Requires a minimum grade of B-. Registration is limited to postgraduate or non-graduate level students. Students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 756: Computer network performance analysis. Examines the elementary tail analysis. Examines the elementary tail analysis. end applications on local and wide-ranging networks, the internet, and emerging networking technologies. Much of the course is devoted to projects, usually performed in groups of students, who apply the techniques presented. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: CS 555B-. B- Requires a minimum grade of B-. Registration 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. CS 773: Design and Development of Systems In Real Time. Three points. Real-time systems and principles that support design and implementation. Emphasizes the fundamental effects of real-time applications involving operating systems, communication networks, databases, and multimedia offered by Computer Science. It can't be repeated for credit. Registration 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. CS 774: Computational vision. Three points. It studies recent advances in the development of mechanical vision algorithms and knowledge-based vision systems. Topics include scalespace; Processing gabor and waveforming; distributed and hierarchical processing gabor and waveforming; distributed and hierarchical processing using neural networks; motion analysis; active, functional and selective perception; identification of objects and objectives; expert systems; data fusion; and machine learning. It emphasises the integration of the system in terms of perception, control, action and adaptation. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: (CS 682B- and 686B-). B- Requires a minimum grade of B-. Registration is limited to postgraduate or non-graduate level students. Students on a non-graduate 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. CS 775: Advanced pattern recognition. Three points. It covers statistical learning theory. Topics include the decision theory and bayes theorem, density assessment (parametric and non-parading), linear and nonlinear analysis of discs, SVM and kernel methods, SRM and model selection, performance evaluation. It is offered by It. It can't be repeated for credit. Registration restrictions: Prereguisite required: CS 688B-. B- Reguires a minimum grade of B-. Registration is limited to postgraduate level students. Students on a non-grade undergraduate degree cannot enroll. Registration limited students at The Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 777: Intelligent human-computer interaction, and anthropocentric systems and their applications. Topics include video editing, visualization, virtual environments, environments, image and scene modeling, analysis and composition, facial and gesture recognition, facial and gesture recognition, and speech and natural language processing. Notes: Duration work and timely review are required. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: (CS 580B- and 551B-) or (CS 682B-). B- Requires a minimum grade of B-. Registration is limited to postgraduate 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. CS 779: Issues in durable and secure computer systems. Three points. It covers the study of alternative computer systems. Three points in durable and secure computer systems. architectures. It examines recent papers and reports. It is offered by It. It can't be repeated for credit. Specific Identification: Subject Varies Registration Restrictions: CS 571B- or ISA 562B-. B- Requires a minimum grade of B-. Registration 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. CS 782: Advanced machine learning. Three points. The course covers recent developments in the field of machine learning. Possible topics include: Learning Theory (PAC, Error Limits, VC-Dimension); Learning with structured data (e.g. graphs); Theme modeling? Text learning? Graphic models (bayesian networks); Learning HMMs. Topics can change depending on the instructor. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: (CS 681B-, 687B- or 688B-). B- Required Conditions: (CS 681B-, 687B- or 688B-). cannot enroll. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graduates. CS 787: Decision guidance systems. Three points. Decision guidance systems support a repetitive process of providing recommendations that can be meritocratic and extracting feedback from human decision-makers, with a view to achieving the best possible course of action. Focuses on models, languages, algorithms and applications management of decision-making guidelines, which are used for the rapid development of decision guidance applications. It is offered by It. It can't be repeated for credit. Registration Restrictions: Required Conditions: (INFS 614B- or CS 550B-). B- Requires a minimum grade of B-. Registration is limited to students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. CS 788: Autonomous computing. Three points. It studies self-management, self-optimization, self-forming, self-regulation, self-medication and the computer systems that protect themselves. This course analyzes many examples of autonomous systems as well as various techniques for the design and construction of such systems. This is a doctoral seminar based on reading and analyzing current work. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: (CS 555B-, 571B- or ISA 562B-). B- Requires a minimum grade of B-. Registration is limited to postgraduate or non-graduate level students. Students on a non-graduate 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. CS 795: Advanced themes in CS. 3 credits. Advanced themes that do not appear in normal order. Notes: It can be repeated for credit when the subject differs. It satisfies the scope requirement of the Member States only if it is explicitly stated in the curriculum of that department Only such a course should be used for range requirements. It is offered by It. It can be repeated within the term. Specialized designation: Theme VariesEmnatoAgus: Entrance to the Doctoral Computer Science Program. 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: LectureSeed: This course is graded on the normal scale of graduates. CS 798: Project Seminar. Three points. Postgraduate candidates undertake a project using the knowledge gained in the postgraduate program. Notes: Topics selected in consultation with the consultant. It meets the requirement of the project or thesis for Member States in computer science. It is offered by It. It can't be repeated for credit. Recommended Requirement: 18 hours of credit applicable to M.S. in computer science. 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: This course is graded on the Graduate Special Scale. CS 799: Thesis. 1-6 units. Original or exhibit work evaluated by the committee of three faculty members. It is offered by It. It can be repeated within the grade. Recommended Condition: 18 hours of credit applicable to M.S. in Computer Science. Registration Restrictions: Enrollment is limited to postgraduate or nongraduate level non-undergraduate degree cannot be enrolled. 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. CS 800: Informatics Conference. 0 units. Students are required to attend colloquia including conversations from distinguished speakers, faculty candidates, and Mason faculty. Notes: This course introduces doctoral students in research subjects in computer science. It is offered by It. It can be repeated within the grade for a maximum of 2 units. Registration restrictions: Registration is limited to students specializing in Informatics. Enrollment is limited to students with a Ph.D. degree in Philosophy. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: SeminarDeic: This course is rated on a satisfactory/no credit scale. CS 895: Research topics in CS. 3 credits. Advanced themes that do not appear in normal order. Notes: It can be repeated for credit when the subject differs. Only such a course should be used for range requirements. It is offered by It. It can be repeated within the term. Specialized designation: Subject VariesEmnataian condition: Ph.D. status. Registration restrictions: Registration is limited to graduate-level students. 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. CS 896: Directed by Reading and Research. 1-6 units. Reading and research on a specific topic under the direction of a faculty member. Notes: Students can enroll in this course only after meeting the CS PhD range requirement. It can be repeated within the grade for a maximum of 18 credits. Recommended Condition: Instructor's License.Registration Restrictions: Enrollment limited to students in the vs-PHD-CS program. Registration is limited to postgraduate level students. Enrollment is limited to students with a Ph.D. degree in Philosophy. Enrollment is limited to students at the Volgenau School of Engineering college. Program Type: ResearchGrading: This course is graded on the normal graduate scale. CS 990: Presentation of Thesis Theme. 0 units. Students draw up a professional presentation of a research proposal and present it for criticism to fellow students and interested schools. Notes: It must be completed before presenting a thesis research proposal. It is offered by It. It can't be repeated for credit. Equivalent to CEIE 990, IT 990, 990. Recommended Condition: Student must have passed the exams that qualify for PhD. Registration restrictions: Registration is limited to graduate-level students. Enrollment is limited to graduate-level students at the Volgenau School of Engineering college. Schedule: This course is graded based on the Satisfactory/No Credit Scale scale. CS 998: Ph.D. Thesis Proposal. 1-12 units. Work on a research proposal that forms the basis for a doctoral thesis. Notes: No more than 24 cs 998 and 999 units can be applied to doctoral gualification requirements. It is offered by It. It can be repeated within the grade. Recommended Condition: The student must have passed the gualifying exams and must have a dissertation counselor. Registration restrictions: Registration is limited to students at the Volgenau School of Engineering college. Program Type: ThesisDemit: This course is graded on the satisfactory/no credit scale. CS 999: Ph.D. Thesis. 1-12 units. Thesis research under the supervision of the thesis director. Notes: No more than 24 cs 998 and 999 units can be applied to doctoral gualification requirements. It is offered by It. It can be repeated within the grade. Recommended Condition: Entry to the nomination. Enrollment restrictions: Enrollment is limited to students with an advanced class in the application. 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. INFS 501: Discrete and Logical It System Structures. Three points. Study of distinct and logical structures for the analysis and design of information systems, including basic techniques of theory and proof, theoretical and blaming logic, trees and graphs, finite state machines, official languages and their relationship with automatics, computationality and computational complexity, standard semantic-functional, claiming and declarative approaches. Notes: The credit cannot be applied to a master's degree at the Volgenau School or to a BS degree in computer science. It is offered by It. It can't be repeated for credit. Recommended Prerequisite: Completion of 6 hours of undergraduate mathematics. Registration restrictions: Enrollment is limited to Students with an advanced class in the application, Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Program Type: LectureSeed: This course is graded on the normal scale of graduates. INFS 515: Course and computer organization operating systems, machine representation of numbers, instruction sets formats, addressing techniques, memory organization, internal structure and processor operation. Symbolic assembly language fundamental concepts of operating systems: synchronization between processes, memory management, virtual memory, file and disk I/O management, as well as LINUX operating system case studies. Notes: The credit cannot be applied to a master's degree at the Volgenau School or to a BS degree in computer science. It is offered by It. It can't be repeated for credit. Equivalent to ECE 445. Recommended Prerequisite: Undergraduate courses or equivalent knowledge in structured programming in a high-level language. 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. Program Type: LectureSeed: This course is graded on the normal scale of graduates. INFS 519: Program Design and Data Structures and algorithms applied to programming solutions to application problems. The course emphasizes programming in a modern high-level language. A lab is required. Notes: The credit cannot be applied to a master's degree at the Volgenau School or to a BS degree in computer science. It is offered by It. It can't be repeated for credit. Recommended Condition: Undergraduate courses or equivalent knowledge in structured programming in a highlevel language. Registration restrictions: Enrollment is limited to students with an advanced class in the application, Graduate level students. Students on a non-grade undergraduate degree cannot enroll. Program Type: LectureSeed: This course is graded on the normal scale of graduates. INFS 612: Principles and practices of communication networks. Three points. Introduces principles and practices of communication, management, security, and other modern network-related issues. Examples of hardware of course are protocols such as HTTP(S), DNS, TCP/IP, RSVP, SNMP, algorithms such as Dijkstra connection status routing. and security measures such as firewalls and encryption, the principles behind them and performance analysis. Notes: No replacements can be made for this class. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 501, 515, 519, and SWE 510, or Equivalent Enrollment Restrictions: Enrollment limited to students with an advanced class for nomination, Graduate, Non-Degree or Senior Plus. Registration limited to Graduates, Non-Degree or Undergraduate level 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. INFS 622: Analysis and Design of Information Systems. Three points. Complete Completion computational technologies, system analysis, system design practices and management and decision support systems. It includes cases, a computer lab. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 501, 515, and 519, or equivalent enrollment restrictions: Enrollment is limited to students with an advanced class in nomination, Graduate, Non-Degree or Senior Plus. Enrollment is limited to Postgraduate, 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. INFS 623: Web search engines and pre-sentence systems. Three points. Study of Web search engines and recommendation systems. Topics including classic information retrieval methods, binary recovery systems, ranking recovery, performance metrics, Web detection, link analysis, overall search engine architecture, basic principles and classification of recommendation systems, user learning interests and object properties, and case studies. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 501, 515, 519, and SWE 510. Registration Restrictions: Enrollment 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. INFS 640: Introduction to E-Commerce. Three points. It studies e-commerce from both a management and a technical point of view. Topics include e-commerce models and concepts; Protocols and branding; safety protocols and standards; e-commerce payment systems; and case studies between businesses, businesses to businesses, consumer-to-consumer and eGovernment. 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: LectureSeed: This course is graded on the normal scale of graduates. INFS 697: Topics in Information Systems. 1-6 units. It presents specific issues in information systems that do not appear in the normal INFS sequence. Notes: It can be repeated for credit when distinct offers of course differ in subject Varies Enrollment Restrictions: Enrollment is limited to students with an advanced class in the nomination, Graduate, Non-Degree or Senior Plus.Registration is limited to 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. INFS 740: Programming databases for the Web. Three points. Information systems accessible via the Internet and the Internet are becoming widespread. The course focuses on technologies and industry standards for accessing and handling permanent data that are suitable for web applications. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 614. 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. INFS 760: Advanced database management. Three points. Study of advanced database and language models, database design theory, transaction processing, retrieval, matching, distributed database and security and integrity. It discusses recent developments and research directions. It is offered by It, It can't be repeated for credit, Recommended Condition; INFS 614.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. INFS 770: Knowledge Management for E-Business. Three points. It deals with the management of knowledge (KM) from managerial, technical points of view within the large organizations active through the Internet and the Internet and the Internet and the Internet. Topics include the life cycle of km for the creation, aggregation, dissemination and sharing of knowledge. as XML, RDF, web services, and semantic web for e-business. business rules and reasoning mechanisms; and digital rights management for e-business. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 622 or instructor's license. registration: Registration is limited to students of postgraduate or non-graduate level. Students on a non-graduate level. Students on a non-graduate 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. INFS 772: Intelligent factors and semantic semantics Three points. The course covers the role of intelligent actors in collaborating on access, harvesting, sifting and winnow information and knowledge from the semantic web. Topics include agent architectures, practical reasoning and abstractions, a BDI framework for agents' reasoning, commitments and actions; Semantic web ontology languages, description logics, reasoning languages, and rules. and agent communication languages, protocols and standards. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 614 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. INFS 774: Business architecture. Three points. This course presents the basic concepts and methodologies for the industry known as Enterprise IT Architecting within a framework, structure and methodology. Enterprise IT Architecting is a necessary step in the design and development of an IT system. It includes the definition of business, work, operational, information and technical perspectives. Therefore it is the system development process activation approach that creates complex information systems. It is offered by It. It can't be repeated for credit. Recommended Condition: INFS 622 or instructor's license. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a nongrade 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. INFS 796: Directed Readings in Information Systems. Three points. Research and analysis of the modern problem in the development of information systems. 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. Prior approval is required from the sponsor of a school that supervises the student's work. A written report is required.. It is offered by It. It can be repeated within the condition: Master's degree in information systems, with at least 12 previous units in the Member States. 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: ResearchGrading: This course is graded on the normal graduate scale. INFS 797: Advanced topics in Information Systems, 1-6 units, Special advanced themes that do not appear in the normal INFS sequence. Notes: May May for credit, where the distinct offers differ naturally in the subject. It is offered by It. It can be repeated within the grade. Specialized designation: Subject Varies 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. INFS 798; Research Programme. Three points. Research programme selected under the guidance of the full-time postgraduate member of the teaching staff, resulting in a written technical report. 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. Prior approval is required from the sponsor of a school that supervises the student's work. It is offered by It. It can't be repeated for credit. Recommended Condition: 18 units applicable to Member States. 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: Thesis Storage: This course is graded on the Graduate Special Scale. INFS 799: Thesis. 1-6 units. Original or compiling work evaluated by a committee of three faculty members. Notes: To register, students must complete the independent study form available at the department. It is offered by It. It can be repeated within the grade. Recommended Condition: 18 units applicable to Member States. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a non-graduate 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. ISA 562: Information Security Theory and Practice. Three points. Technical introduction to information security theory and practice is required, which serves as the first security course for the MS-ISA degree, as a prerequisite for all subsequent ISA courses (at levels 600 and 700) and is part of most of the subjects covered by the CISSP exam. It also serves as an entry-level course available to non-ISA students, including MS-CS, MS-IS and MS-SWE students, including MS-CS, MS-IS and MS-SWE students. It is offered by the 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. Registration is limited to students of the Volgenau School of College. Program Type: LectureSeed: This course is graded on the normal scale of graduates. ISA 564: Security Laboratory. Three points. It provides practical experience in configuring and experimenting with security systems and software networked on products in a live laboratory environment, in order to understand security threats in the real world. It takes both aggressive and defensive approaches and exposes students to a variety of real attacks, including viruses, worms, rootkits and botnets. Possible mitigation and defense mechanisms, such as firewalls and intrusion detection software, are also covered. It is offered by It. It can't be repeated for credit. Recommended Condition: ISA 562 and CS 531 or equivalent. Registration restrictions: Enrollment is limited to students with an advanced class in the application, 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: LaboratoryApolym: This course is graded on a regular scale. ISA 650: Security policy and its management of information systems that have national and international connectivity. Topics include legal, international, cultural and local actors. Students are expected to participate regularly in the presentation of material, the discussion of recent security issues and the drafting of short documents on important current issues. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: ISA 562B-. B- Requires a minimum grade of B-. Enrollment is limited to students with a class of Advanced for Nomination, 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. ISA 652: Safety check and compliance check. Three points. It presents the fundamental concepts of the IT security control and control process carried out in a variety of environments, including government, the financial sector and the healthcare industry. The goal of this course is to allow students to structure and perform checks based on the specifications of the Sarbanes-Oxley, HIPAA, and FISMA control programs. It covers in depth all CISA certification requirements. The who complete the course are encouraged to attempt the certification examinations on their own. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: ISA 562B-. B- Requires a minimum grade of B-. Enrollment is limited to students with class class Students, Postgraduates, Non-Bachelors or Senior Plus.Registration is limited to postgraduate or undergraduate or undergraduate level students. Students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. ISA 656: Network security. Three points. An in-depth introduction to network security theory and provides deep coverage of widely used network security protocols such as SSL, TLS, SSH, Kerberos, IPSec, IKE, and LDAP. It covers countermeasures for distributed denial of service attacks, security and spam countermeasures, wireless security, multicast security, and trust negotiation. It is offered by It. It can't be repeated for credit. Registration Restrictions: Required Conditions: (ISA 562B- and INFS 612B-) or CS 555B-. B- Requires a minimum grade of B-. Enrollment is 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. ISA 673: Operating system security. Three points. It covers key issues and advanced issues in operating system (OS) security, including operating system-level security techniques such as recording, system call control, and memory protection will be discussed. Recent advanced techniques such as honeys and honeys, system randomization, vulnerability fingerprinting and virtualization will also be introduced. It is offered by It. It can't be repeated for credit. Recommended Condition: ISA 562. Registration restrictions: Enrollment is limited to students with a class of Advanced for Nomination, Graduate, Non-Degree or Undergraduate level students. Students on a non-grade undergraduate degree cannot enroll. Enrollment limited to students at Volgenau School of Engineering Program Type: LectureSeed: This course is graded on the normal scale of graduates. ISA 674: Detection of intrusions. Three points. Studies of methodologies, techniques and tools for monitoring events on an electronic system or network, with the aim of preventing and detecting unwanted process activities and recovery malicious behavior. Topics include threat types, host and network-based information sources, vulnerability analysis, denial of service, deployment and management of intrusion detection systems, passive versus active responses, and planning recovery solutions. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: ISA 564B- and 656B-. B- Requires a minimum grade of B-. Enrollment is 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. ISA 681: Secure software design and programming. Three points. Software security theory and practice, focusing in particular on some 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. Emphasis is placed on methodologies and tools to identify and eliminate security vulnerabilities, techniques to prove the absence of vulnerabilities, and ways to avoid security holes in new software. It explores how to design software with security in mind from scratch and integrates analysis and risk management throughout the software's lifecycle. It is offered by It. It can't be repeated for credit. Equivalent to SWE 681. Recommended Condition: SWE 619. Registration Restrictions: Enrollment is 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. ISA 697: Information security issues. 1-6 units. Specific issues in security and ensuring information that does not appear in the normal ISA sequence. Notes: It can be repeated within the condition for a maximum of 12 appropriations. Specialized designation: Subject Varies Registration Restrictions: Enrollment is limited to students with an advanced class in the application, 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: LectureDeline: This course is graded Normal scale. ISA 763: Security protocol analysis. Three points. It teaches how to design, understand, verify and test communication protocols to meet their objectives of identifying the key elements of a communication protocol. specifying security properties accurately. modelling bodies and poorly regarded bodies against which a protocol should be ensured; discussing verification and testing methods and their limitations, ensuring that this protocol meets the specified safety objectives in the presence of specific bad actions; design of a medium-sized protocol meeting the requirement specifications; use of existing tools to define and verify security protocols; and testing protocols to achieve their safety objectives. It is offered by It. It can't be repeated for credit. Registration restrictions: Prerequisite required: ISA 656B-. B- Requires a minimum grade of B-. Registration 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. ISA 764: Safety experimentation. Three points. He teaches how to conduct security experiments and empirically to demonstrate, validate and evaluate security vulnerabilities, exploits, and defense mechanisms. By the end of the course, students will gain a deeper understanding and experience firsthand in capturing packages of interests from both wired and wireless networks, and responding to interested network streams and how shellcode various buffer overflow attacks, worms, spyware, rootkits, botnets, anonymous communication and traceback mechanisms work. It is offered by It. It can't be repeated for credit. Registration restrictions: Required Conditions: ISA 564B- and 656B-. B- Requires a minimum grade of B-. Registration is limited to postgraduate 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. ISA 785: Research in Digital Criminology, Including open problems in digital criminology, countermeasures against digital criminology, and fundamental and practical limitations of today's digital forensic techniques. It also covers established techniques and tools for digital criminology, as well as legal and ethical issues. It is offered by It. It can't be repeated for credit. Registration Restrictions: Required Conditions: (ISA 562B- and INFS 612B-) or CS 555B-. B- Requires a minimum grade of B-Registration is limited to postgraduate or non-graduate level students. Students in a non-undergraduate degree cannot limited to students at the College of Engineering. Program Type: LectureSeed: This course is graded on the normal scale of graduates. ISA 796: Directed readings in information security. Three points. Research and analysis of the modern problem in information security. Notes: Prior approval is required from the school sponsor who supervises the student's work. 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. A written report is also required. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Recommended Condition: Graduate standing in security and secur 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: ResearchGrading: This course is graded on the special graduate scale. ISA 797: Advanced issues in information security. Three points, Especially advanced issues that do not occur in the normal ISA sequence. Notes: It can be repeated for credit when discrete offers naturally differ in subject matter. It is offered by It, It can be repeated within the condition for a maximum of 9 units. Specialized designation: Subject Varies Registration Restrictions: Enrollment is limited to postgraduate level students. Students on a non-grade undergraduate level students. Students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. ISA 798: Research Programme. Three points. Research programme selected under the guidance 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 the independent study form available at the department's office. It must be initialed by the president of a department. It is offered by It. It can be repeated within the grade for a maximum of 9 units. Recommended Condition: 18 units applicable to Member States. Registration restrictions: Registration is limited to postgraduate or non-graduate students. Students on a non-graduate degree cannot enroll. Registration is limited to students in the College of Engineering. Program Type: Thesis Storage: This course is graded on the Graduate Special Scale. ISA 799: Thesis. 1-6 units. Original or extrinsic work selected and completed under the supervision of the postgraduate member of the teaching staff, 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 an independent study form in the department's office. It must be initialed by the faculty sponsor and approved by the faculty sponsor and licence. 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, ISA 862; Models for computer security. Three points. This class will focus on ongoing security research with an emphasis on network and software security. 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. Registration restrictions: Prerequisite required: ISA 562B-. B- Requires a minimum grade of B-. Registration is limited to postgraduate level students. 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. ISA 863: Advanced issues in computer security. Three points. Current advanced research issues. The content varies depending on the interests of the school, research developments and student participation. It may include official computer security models, multi-level data models, multi-level database management system architectures, secure co-identification control protocols, distributed secure system architectures, integrity models and mechanisms, security policy and requirement analysis. It is offered by It. It can be repeated within the grade for a maximum of 6 credits. Specific Identification: Subject Varies Registration Restrictions: Required Condition: ISA 562B-. B- Requires a minimum grade of B-. Registration is limited to postgraduate level students at the Volgenau School of Engineering college. Program Type: LectureSeed: This course is graded on the normal scale of graduates. SWE 205: Software usability analysis and design. Three points, Principles of user interfaces design, Concepts for objective and quantitative evaluation of the usability of software user interfaces and an understanding that usability is more important than efficiency for almost all modern software projects, and often the primary factor leading to its success. The main topics include cognitive patterns for human perceptions and needs, which are used as a basis for analytical and critical thinking about user interfaces. special engineering principles for designing usable menus, forms, command languages, Web pages, graphical user interfaces, and web-based user interfaces, exams, and design projects. It is offered by It. It's limited to two attempts. Registration Restrictions: Required conditions: ENGH 101C or 100C.C Requires 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. SWE 301: Preparation of traineeships. 0 units. Preparing for internship educational experience. It is intended for, but not limited to, students who are planning internship opportunities. Basic interview skills. Techniques for applying academic knowledge to practical software development. Techniques for extracting knowledge from practical experience. Peer-reviewed presentation by students who have completed an internship. It is offered by It. It's limited to ACS or CS majors with junior standing or instructor's permission. Registration restrictions: Students with the vse main attribute terminated by the VSE may not register. Program Type: Lecture Shake: This course is rated on the satisfactory/no credit scale. SWE 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 object-oriented modeling, and dynamic modeling using Unified Modeling Language (UML) notation. Concepts and methods for designing largescale 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. Equivalent to cs 321.Registration restrictions: Required conditions: ((ENGH 302C) or ((HNRS 110C) and (HNRS 122C, 130C, 131C, 230C or 240C)) and (CS 310C)). C Requires a minimum C.Enrollment degree limited to students with an important in Applied Computer Science, Computer Science or Systems Engineering. Enrollment is limited to students with a minor in Computer Science or Software Engineering. Enrollment is limited to 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. SWE 332: Object-oriented software design and application. Three points. In-depth study of software design and application. Three points. In-depth study of software design and application. design patterns, and removal techniques, including typing, access control, inheritance, 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 CS 332.Registration Restrictions: CS 310C and MATH 125C.C Requires 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. SWE 401: Boarding school thoughts. 1 credit. Reflection on internship educational experience. It is intended for, but not limited to, students who complete an internship in the Applied Computer Science Software development. Analysis of techniques for extracting knowledge from practical experience. Presentations of students summarizing internships concerning them with academic objectives of the program. It is offered by It. It's limited to two attempts. Recommended Condition: Completion of traineeships. Registration Restrictions: Required condition: SWE 301C.C Requires minimum degree of C.Students with the VSE terminated important attribute cannot be registered. Program Type: Lecture Shake: This course is rated on the satisfactory/no credit scale. SWE 432: Web application development. Three points. A comprehensive introduction to designing and implementing applications for the web, including client-side and server-side deployment, Explore principles for designing web applications that are powerful, scalable, and secure, that allow change and reuse and can be used for their destination. Topics include client-server communication, asynchronous scheduling, persistence, security, web deployment tools, document object model, templates and data connection, interaction techniques, and site design for the web. It is offered by It. It's limited to two attempts. Registration restrictions: (MATH 125C) and (CS 321C). 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. SWE 437: Software control and maintenance. Three points. Concepts and to test and modify software in evolving environments. Topics include unit, module, subsystem, and system-level software testing, programmer test; automatic and manual techniques for the creation of software to increase durability and reuse; software evaluation for and validation of software changes. It is offered by It, It's limited to two attempts. Registration restrictions: Required conditions: (MATH 125C and 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. SWE 443: Software architectures. Three points. It teaches how to design, understand and evaluate software systems at the architectural forms in existing software systems, describe the architecture of a system accurately, create architectural forms in existing software systems. alternatives to address a problem and choose from each other, design a medium-sized software system that meets a specification of requirements, use existing tools to speed up software design , and assess the suitability of a given architecture in meeting a set of system requirements. It is offered by It. It's limited to two attempts. Registration Restrictions: Required conditions: CS 321C, 421C, SWE 321C or 421C.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. SWE 510: Object-oriented programming in Java. Three points. Introduces students to programming in the Java language. Topics include problem-solving methods and algorithm development, program development in a modular, object-oriented way. Introductory use of OO language features, including data hiding, inheritance, polymorphism, and exception handling. Objectives include the design and development of Java servlets and applets. The emphasis on programme development is reinforced through various programming projects. Notes: The credit cannot be applied to a master's degree at the Volgenau School or to a BS degree in computer science. It is offered by It. It can't be repeated for credit. Recommended Condition: Undergraduate courses or equivalent knowledge in programming in a high-level language. 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 Senior Plus. Registration is limited to Graduate, Non-Degree or Senior Plus. Registration is limited to students. course is graded on the normal scale of graduates. SWE 619: Object-oriented software specification and construction. Three points. In-depth study of software manufacturing using modern, object-oriented language with support for graphical user interfaces and complex data structures. Specifications, design patterns and techniques for removal, removal, removal, data, repetition, type and polymorphic. Hide information, objects, and inheritance. Handling exceptions, event-based systems, and matching. 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 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 620: Software requirement analysis and specifications. Three points. In-depth study of object-oriented modeling requirements, including use case modeling, static modeling and dynamic modeling with

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 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 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 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, 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 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. 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, 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 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 to test the 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 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 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. 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, 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 is 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 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 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. 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, including architecture and design patterns, including architecture and design patterns, software products from which destination systems can be configured. It covers reusable software patterns, including architecture and design patter 621. Registration restrictions: Enrollment is limited to postgraduate level students. Students on a non-grade undergraduate level 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 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. SWE 637) or a test class (e.g. SWE 637) or a normal scale of graduates. SWE 737: Advanced 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 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 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, 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: Registration is limited to postgraduate or non-graduate students. Students on a non-graduate 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 r 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 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 approved 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 initialed 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: ThesisSmable: 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 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 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, 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 VariesEnsise 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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