DIVISION OF COMPUTER SCIENCE

Web Site: https://twu.edu/computer-science/

Courses

Contact hours identified in the course descriptions are based on a 15-week term. Students who enroll in Summer or mini-terms are expected to meet the same total number of contact hours as a 15-week term.

CSCI 5001. Programming for Informatics. Programming tools used in data analytics, the Object-Orient programming paradigm, operating systems tools, and web-based interface design and implementation. One lecture hour a week. Credit: One hour.

CSCI 5003. Information Systems Infrastructure and Programming. Elements of information systems infrastructure and programming tools crucial for data science. Networking essentials, database management systems, operating systems tools, and programming tools for data analytics. Three lecture hours a week. Credit: Three hours.

CSCI 5011. Information Systems Infrastructure. Essentials of information systems infrastructure. Network servers, web servers, database servers and clients. One lecture hour a week. Credit: One hour.

CSCI 5103. Fundamentals of Informatics. Fundamental computing concepts for informatics study. Topics include problem-solving logic and algorithms, data management, information and knowledge discovery, security and ethics issues related to informatics, technology project management, user interface, and interprofessional application of informatics in specific fields' case studies. Prerequisites: Computer competence and experience with data analysis applications such as spreadsheet software. Three lecture hours a week. Credit: Three hours.

CSCI 5123. Foundations of Information Systems Security. Overview of essential concepts in information systems security. Risks, threats, availability, vulnerabilities, integrity, and confidentiality aspects of information systems in the digital world. Three lecture hours a week. Credit: Three hours.

CSCI 5133. Information Security Risk Management. Introduction to security risk management frameworks and practices. Organizational management of information technology asset risks. Security threats and vulnerabilities recognition and associated risk analysis; fundamentals of risk management; strategies and approaches to mitigating risk; and risk reduction plan creation. Prerequisite: CSCI 5123. Three lecture hours a week. Credit: Three hours.

CSCI 5143. Human Aspects in Cybersecurity: Ethics, Legal Issues, and Leadership. Relationship between the law and practice of information security. Special cybersecurity management considerations required to protect people, information, infrastructure, and other assets. Prerequisite: CSCI 5123. Three lecture hours a week. Credit: Three hours.

CSCI 5203. Database Systems. Design, implementation, and use of relational database systems (model and query language SQL). Examination of file organization, database storage, indexing and hashing, query evaluation and optimization, transaction processing, concurrency control and recovery, and database integrity and security. Investigation of latest developments in other large-scale data management techniques and systems. Prerequisite: CSCI 5103 or permission of instructor. Three lecture hours a week. Credit: Three hours.

CSCI 5343. Computer Forensics. Forensic tools for hardware, software, and networking. Attack scenarios, collection of evidence, and analysis of collected data. Observation strategies, debugging, and incident response. Prerequisite: CSCI 5123. Three lecture hours a week. Credit: Three hours.

CSCI 5413. Data Communication Networks. Analysis of networks and data communication avenues to gather, transfer, manage, and manipulate data for making contextualized data-driven decisions; network and communication security and integrity to support private and confidential data contexts; strengths and weaknesses of communication technologies at various levels and contexts. Prerequisite: CSCI 5103 or permission of instructor. Three lecture hours a week. Credit: Three hours.

CSCI 5423. Web Application Security. Web-based systems in different evolutions of web technologies and architectures. Single sign-on principle for web-based systems. Role of certificate authority and various public key cryptographic standards (PKCS) for web infrastructures. Distribution of infrastructures and their security requirements. Secure coding standards for web development. Prerequisite: CSCI 5123. Three lecture hours a week. Credit: Three hours.

CSCI 5443. Human-Computer Interface. Critique, refinement, and creation of intermediate and advanced human/computer interfaces; stakeholder needs and data flexibility/transferability of technical interfaces; traditional, mobile, and wearable computing. Prerequisite: CSCI 5103 and knowledge of web/scripting language, or permission of instructor. Three lecture hours a week. Credit: Three hours.

CSCI 5453. Usable Privacy and Security. Design of secure systems with a human-centric emphasis by combining insights from computer systems, human-computer interaction (HCI), and public policy. Introduction to core security and privacy technologies. Usable authentication, user-centered web security, and anonymity software. Prerequisite: CSCI 5443. Three lecture hours a week. Credit: Three hours.

CSCI 5513. Data and Information Visualization. Transformation of data into interactive visual representations for effective analytical reasoning and decision making; acquisition, preparation, and analysis of large data sets; techniques, algorithms, and software tools to create visualizations; techniques for analytical reasoning and data representation and transformation to support production, presentation and dissemination of visualization results. Prerequisite: CSCI 5103. Three lecture hours a week. Credit: Three hours.

CSCI 5573. Foundations of Data Science. Extraction of knowledge from data requiring an integrated skill set spanning statistics, machine learning, databases, algorithms, and other branches of computer science. Concepts, techniques, and tools needed for diverse facets of data science practice, including data collection and integration, data cleaning, exploratory data analysis, predictive and other types modeling, visualization and animation, evaluation, interpretation, and effective communication. Prerequisite: CSCI 5103. Three lecture hours a week. Credit: Three hours.

CSCI 5663. Statistical Programming. Design of statistical programs to manipulate raw data, generate reports, and analyze data. Numerous case studies demonstrate appropriate analysis based on the experimental design. Advanced statistical research methods such as ANOVA, MANOVA, repeated measures ANOVA, Multiple Linear and Logistic regression, factor analysis, and survival analysis SAS. Prerequisite: Six hours undergraduate statistics, or three hours graduate level statistics, or equivalent. Three lecture hours a week. Credit: Three hours.

CSCI 5673. Big Data: Management, Access, and Use. Fundamentals of big data and big data analytics; NoSQL systems and tools and techniques used in big data scenarios. Exploration of the big data phenomenon from multiple perspectives: historical, theoretical, statistical, philosophical, ontological, and ethical. Possible solutions to the problems of big data involving compression, mining, database design, visualization, interface design, security, management, and use, with application to multiple fields. Prerequisite: CSCI 5103. Three lecture hours a week. Credit: Three hours.

CSCI 5683. Big Data Security. Fundamental security techniques and practices applied to big data environments. Challenges and solutions to security regarding production, storage, and use of big data. Exploration of big data security from multiple perspectives: big data security threats, cloud security, communication security, endpoint security, data mining solutions, data encryption, access control, intrusion detection and prevention, centralized key management, and user privacy policy. Prerequisites: CSCI 5123 and CSCI 5673. Three lecture hours a week. Credit: Three hours.

CSCI 5743. Cryptography. Cryptographic principles, algorithms, and applications. Fundamental concepts of cryptography, including encryption, decryption, hash functions, digital signatures, and key management. Classical and modern cryptographic techniques, with an emphasis on their mathematical foundations and practical implementations. Prerequisite: CSCI 5123. Three lecture hours a week. Credit: Three hours.

CSCI 5803. Data Warehousing. Design, implementation, and management of data warehouse systems and their applications; requirements for gathering data for data warehousing; data warehouse architecture; dimensional model design for data warehousing; physical database design for data warehousing; extracting, transforming, and loading strategies; design and development of intelligence applications for decision support; and expansion and support of a data warehouse. Prerequisite: CSCI 5203. Three lecture hours a week. Credit: Three hours.

CSCI 5823. Modeling Machine Learning. Machine learning algorithms and their applications in problem solving and data analysis, data pre-processing, data representation, and machine learning model evaluation. Prerequisite: CSCI 5103. Three lecture hours a week. Credit: Three hours.

CSCI 5833. Data Mining and Analysis. Study of algorithms and computational paradigms to find patterns in data and perform prediction and forecasting to extract useful knowledge from raw data. Application of data preparation techniques, data mining techniques, and visualization. Prerequisite: CSCI 5203 and elementary statistics. Three lecture hours a week. Credit: Three hours.

CSCI 5903. Special Topics. Variable content. May be repeated for additional credit. Three lecture hours a week. Credit: Three hours.

CSCI 5913. Independent Study. Selected topics in advanced computer science. May be repeated for additional credit. Credit: Three hours.

CSCI 5921. Statistical Analysis With Computers. Exposure to available University resources in research design and data analysis, including fully computerized statistical analysis techniques. Appropriate for graduate students who are at least in the proposal/prospectus phase. May be repeated for additional credit. Prerequisite: Permission of the instructor. Credit: One hour.

CSCI 5923. Capstone in Informatics. Culminating organization and/or community-based interdisciplinary/interprofessional project supported through informatics and technology and applied to a specific domain to demonstrate knowledge and skills acquired in the informatics program. Immersive, investigative, and reflective opportunity for deep study on a selected area of practice/application domain. Prerequisite: Completion of 24 semester credit hours and permission of Instructor. Credit: Three hours.

CSCI 5953. Internship. Cooperative work-study arrangement between business, industry, or selected institutions with the University. Nine practicum hours a week. Credit: Three hours.

CSCI 5981. The Professional Portfolio. Development of a professional portfolio by students in the Master of Arts in Teaching program demonstrating the student's growth in the Learner-Centered Competencies. Pass-fail grade only. May be repeated. Credit: One hour.