CSE 511 Data Processing at Scale

Database systems are used to provide convenient access to disk-resident data through efficient query processing, indexing structures, concurrency control, and recovery. This course delves into new frameworks for processing and generating large-scale datasets with parallel and distributed algorithms, covering the design, deployment and use of state-of-the-art data processing systems, which provide scalable access to data.

CSE 575 Statistical Machine Learning

The link between inference and computation is central to statistical machine learning, which combines the computational sciences with statistics. In addition to artificial intelligence, fields such as information management, finance, bioinformatics, and communications are significantly influenced by developments in statistical machine learning. This course investigates the data mining and statistical pattern recognition that support artificial intelligence. Main topics covered include supervised learning; unsupervised learning; and deep learning, including major components of machine learning and the data analytics that enable it.

CSE 578 Data Visualization

Visual representations generated by statistical models help us to make sense of large, complex datasets through interactive exploration, thereby enabling big data to realize its potential for informing decisions. This course covers techniques and algorithms for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science to enhance the understanding of complex data.

CSE 551 Foundations of Algorithms

Advanced topics in formal algorithm design and analysis, including advanced shortest-paths algorithms, amortized analysis, network flows, NP-completeness and selected topics in computational geometry, distributed/parallel, randomized, and approximation algorithms.

CSE 571 Artificial Intelligence

Definitions of intelligence, computer problem solving, game playing, pattern recognition, theorem proving, and semantic information processing; evolutionary systems; heuristic programming.
CSE 572 Data Mining

Advanced data mining techniques: classification, clustering, association, preprocessing; performance evaluation; information assurance, Web mining, security and privacy issues, and other applications. Students must have a solid background in database management systems, search, learning, and statistics to be successful in this course.

CSE 445 Distributed Software Development

Distributed system architectures and design, service-oriented computing, and frameworks for development of distributed applications and software components.

CSE 545 Software Security

Theories and tools for software security, including secure design, threat analysis and modeling, security testing and coding.

CSE 539 Applied Cryptography

Uses cryptography for secure protocols over networked systems, including signatures, certificates, timestamps, electrons, digital cash, and other multiparty coordination.

CSE 512 Distributed Database Systems

Distributed database design, query processing, and transaction processing. Distributed database architectures and interoperability. Emerging technology.

CSE 548 Advanced Computer Network Security

Comprehensive understanding of network security and corresponding solutions, including cryptography, access control, secure Web transactions, e-mail security, and viruses.

CSE 579 Knowledge Representation and Reasoning

Covers knowledge representation and reasoning algorithms in artificial intelligence, shows how they can be used in practice, and provides an overview of current research trends.

CSE 566 Software Project, Process, and Quality Management

Project management, risk management, configuration management, quality management, and simulated project management experiences.
**CSE 573 Semantic Web Mining**

Data mining techniques for structuring and organizing unstructured sources such as text and Web data into meaningful machine-processable information; computational aspects of information extraction and data linkage; discovery and prediction tasks where text serves as data such as detecting events, measuring public opinion and making recommendations. A background in databases, algorithms and theory of computation is necessary to be successful in this course.

**CSE 531 Distributed & Multiprocessor OS**

Distributed systems architecture, remote file access, message-based systems, object-based systems, client/server paradigms, distributed algorithms, replication and consistency, and multiprocessor operating systems.

**CSE 543 Information Assurance and Security**

Comprehensive understanding of information assurance and security problems with the solutions as well as hands-on experiences about applying these solutions.

**CSE 460 Software Analysis and Design**

Object-oriented and structured analysis and design; software architecture and design patterns; component-based development; software safety and reliability.

**CSE 565 Software Verification, Validation, and Testing**

Test planning, requirements-based and code-based testing techniques, tools, reliability models, and statistical testing.

**CSE 598 Engineering Blockchain Applications**

Blockchain technology is revolutionizing digitalization prospects for many industries and emerging as an exciting and rapidly growing field. By detailing the architecture of the technology, this course ensures that learners will be well versed in blockchain fundamentals. At the same time, it is designed to put learners on the leading edge by presenting the abstract nature of blockchain technology and emphasizing its broad applicability. Topics include the mathematical and cryptographic underpinnings of the technology, as well as mining, consensus protocols, networking, and decentralized governance.