CUSBLT MCS COURSE DESCRIPTIONS

MCS505 - Computer Networks

3 credit hours

This course takes a structured approach to explaining how networks work from the inside out. It starts with an explanation of the physical layer of networking, computer hardware and transmission systems; then works his way up to network applications. This course's in-depth application coverage includes email; the domain name system; the World Wide Web (both client- and server-side); and multimedia (including voice over IP, Internet radio video on demand, video conferencing, and streaming media. Finally this course includes a section devoted exclusively to network security.

MCS510 - Data Analysis

3 credit hours

This course teaches students everything they need to get started for the fast-growing field of data analysis using Python. It links each new concept with easy-to-apply, relevant examples from modern data analysis.

This guide helps today's newcomers learn both Python and its popular Pandas data science toolset in the context of tasks they'll really want to perform. Following the proven Software Carpentry approach to teaching programming, this course introduces each concept with a simple motivating example, slowly offering deeper insights and expanding your ability to handle concrete tasks.

MCS515 - Data Systems

3 credit hours

This course introduces the fundamental concepts necessary for designing, using, and implementing database systems and database applications. Our presentation stresses the fundamentals of database modeling and design, the languages and models provided by the database management systems, and database system implementation techniques. The goal is to provide an in-depth and up-to-date presentation of the most important aspects of database systems and applications, and related technologies. It is assumed that readers are familiar with elementary programming and data-structuring concepts and that they have had some exposure to the basics of computer organization.

MCS520 - Machine Learning Fundamentals

3 credit hours

This course introduces readers to the area of machine learning in an extremely easy to understand manner. Through numerous worked-out problems, diagrams and notes, the text makes this challenging subject easy to assimilate. The course starts with a simple introduction to the concepts of machine learning and expands it by delving into the details of different learning algorithms by using sample caselets. The topics have been designed so that students will earn industry-readiness by just following the course.

MCS525 - Parallel Systems

3 credit hours

This course provides a basic, in-depth look at techniques for the design and analysis of parallel algorithms and programming them on commercially available parallel platforms. The book discusses principles of parallel algorithms design and different parallel programming models with extensive coverage of MPI, POSIX threads, and OpenMP. It provides a broad and balanced coverage of various core topics such as sorting, graph algorithms, discrete optimization techniques, data mining algorithms, and a number of other algorithms used in numerical and scientific computing applications. Finally, the student will be introduced to big-data frameworks.

MCS530 - Python Fundamentals

3 credit hours

This book teaches the python programming language with an extra touch of programing theory such as the difference between procedural programming and functional programming. After going through the standards objects of the language, this course will go through all the main libraries including the file I/O library. The course includes some advanced programming notions, such as the usage of Regex and Parsing. equipping all these notions, the student will be comfortable with the Python. Finally, this course will focus on Python3.

MCS535 - Software Systems

3 credit hours

This course is designed to help the student understand the software layers found on modern computer systems and how they interact with each other. The first part will focus on software layers that form a single computer. For this part is focused on UNIX and Linux systems. After this part the student will have access to a Linux system. The student is encouraged to deploy the Linux systems on its own machine. Otherwise, the systems will be deployed in a virtual machine. In the second part, the student will be introduced to cloud infrastructures, the different services offered, such

as Saas, PaaS, and IaaS and the different technologies used: virtualization technologies (para-virtualization, full virtualization), containers, kubernetes. In the final part the student will be introduced to IoT (Internet of Things) systems.

MCS540 - Data Algorithms

3 credit hours

In this course, students will learn about memory and Unicode, modularity and abstraction, binary search, data structures, and recursion. Students will also learn about how to convert to binary and hexadecimal, the top systems that computers use when storing values or representing a color. Then, students will learn how to optimize algorithms to cut down on runtime using a framework called time complexity.

MCS545 - Artificial Intelligence

3 credit hours

In this course, students will learn about what is AI, explore neural networks, understand deep learning frameworks, implement various machine learning algorithms using Deep Networks. Students will also explore how different layers in neural networks does data abstraction and feature extraction using Deep Learning.

MCS550 - Cybersecurity

3 credit hours

This course is designed to provide students with an overview of various technical and managerial issues associated with cybersecurity. The topics that are covered in this course include cybersecurity programs, risk assessment and management, IT security controls and technologies, IT auditing, security standards and laws, cyber insurance, and other cyber related risk mitigation strategies.

MCS555 - Capstone in Data Science

3 credit hours

The purpose of the Capstone Project in Data Science is for the students to apply theoretical knowledge acquired during the M.Sc. in C.S. program to a project involving actual data in a realistic environment. During the project, students engage in the entire process of solving a real-world data science project, from collecting and processing actual data to applying suitable and appropriate analytic methods to the problem. Both the problem statements for the project assignments and the datasets originate from real-world domains similar to those that students might typically encounter within industry, government, non-governmental organizations (NGOs), or academic research.