

Computer Science/ Distributed Systems (M.S.)

Program Description

The master of science (M.S.) degree-seeking student should consult the Admission, Enrollment, and Academic Policies sections under Academic Policies and Procedures for policies regarding application, admission, registration, and the academic policies of Webster University.

A student may have a maximum of 3 credit hours of coursework from other graduate programs.

Students may not apply for dual majors because of the technical nature of the M.S. degree program.

Degree Completion

Students should consult the Academic Policies section under Academic Policies and Procedures for general information regarding degree completion.

Computer Science with an Emphasis in Distributed Systems

The M.S. in computer science with an emphasis in distributed systems is designed to teach students the principles of distributed information processing. The program emphasizes both theory and practice. Students will learn the underlying principles on which the technology is based, and will learn to use some of the current tools in the field.

Students seeking the M.S. degree in computer science/distributed systems should hold a baccalaureate degree in computer science from an institution accredited by one of the regional accrediting agencies. Students entering this program should have an understanding of operating systems theory (COSC 2610), systems analysis (COSC 2810), algorithms (COSC 2250), and data structures (COSC 3100). They should possess good mathematical skills and be proficient in the C++ programming language (COSC 1550 and COSC 1560).

Program Curriculum

The 36 credit hours required for the M.S. degree must include the following courses for a major in computer science with an emphasis in distributed systems:

Core Courses

COSC 5000 Distributed Systems (Requisite Course)
COSC 5010 Object-Oriented Analysis and Design
COSC 5020 Object-Oriented Programming
COSC 5040 Distributed Database Design
COSC 5050 Distributed Database Applications
COSC 6000 Distributed Systems Project

Five Elective Courses chosen from the following:

COSC 5030 Agile Software Development
COSC 5060 Systems Concepts
COSC 5110 Network Architecture
COSC 5120 Data Communication
COSC 5130 Computer Security and Reliability
COSC 5140 Network Design and Management
COSC 5150 Distributed Application Development

In addition, the student may choose one elective course offered in this major or one elective graduate course from a different major.

Program Learning Outcomes for Computer Science with an Emphasis in Distributed Systems

- Students will demonstrate critical thinking skills.
- Students will demonstrate the ability to solve problems related to the program content.
- Students will demonstrate an understanding of the concepts and principles of distributed systems.
- Students will be able to analyze, design and implement a distributed system application using techniques and models from the computer science program.
- Students will be able to document a distributed system application including both user documentation and technical documentation.
- Students will be able to make a formal presentation of a distributed systems project including demonstrating the working application.

Graduate Certificate in Computer Science/ Distributed Systems

This certificate is designed to provide students with the tools and knowledge to work in a distributed processing environment. The certificate may be earned as part of the M.S. in computer science/distributed systems or as a stand-alone graduate certificate.

The student seeking the graduate certificate in computer science/distributed systems should hold a baccalaureate degree in computer science from an institution accredited by one of the regional accrediting agencies. Students entering this program should have an understanding of operating systems theory (COSC 2610), systems analysis (COSC 2810), algorithms (COSC 2250), and data structures (3100). They should possess good mathematical skills and be proficient in the C++ programming language (COSC 1550 and COSC 1560).

The 18 credit hours required for the graduate certificate in computer science/distributed systems must include the following courses:

COSC 5000 Distributed Systems (Requisite Course)
COSC 5010 Object-Oriented Analysis and Design
COSC 5020 Object-Oriented Programming
COSC 5040 Distributed Database Design
COSC 5050 Distributed Database Applications

One Elective (the student will choose from the following courses):

COSC 5030 Agile Software Development
COSC 5060 Systems Concepts
COSC 5110 Network Architecture
COSC 5120 Data Communication
COSC 5130 Computer Security and Reliability
COSC 5140 Network Design and Management
COSC 5150 Distributed Application Development

The student seeking the graduate certificate should consult the Admission, Enrollment, Academic Policies, and Graduate Certificates sections of this catalog for information regarding application, admission, registration, and the academic policies of Webster University.

Program Learning Outcomes for Graduate Certificate in Computer Science/Distributed Systems

- Students will demonstrate critical thinking skills.
- Students will demonstrate the ability to solve problems related to the program content.
- Students will demonstrate an understanding of the concepts and principles of distributed systems.
- Students will be able to analyze and design a distributed system application using techniques and models from the computer science program.
- Students will be able to document a distributed system application including both user documentation and technical documentation.

Course Descriptions

COSC 5000 Distributed Systems (Requisite Course) (3)

Students will examine the fundamentals of computer information systems in a distributed environment, including network concepts, operating systems concepts, network operating systems, transaction management, and time coordination. Emphasis will be placed on the elements necessary for distributed information systems.

COSC 5010 Object-Oriented Analysis and Design (3)

Students will learn the principles of object-oriented analysis and design: classes, polymorphism, encapsulation, and inheritance. The emphasis is on development principles for medium, large, and distributed systems. Students will develop a logical design project. Prerequisite: programming proficiency in C++.

COSC 5020 Object-Oriented Programming (3)

Students will apply the principles of object-oriented programming in the implementation of a major information system project using C++. Students will implement the object-oriented design from COSC 5010. Prerequisite: COSC 5010.

COSC 5030 Agile Software Development (3)

Students will explore the important principles of software development: delivering value to the customer, focusing on individual developers and their skills, collaboration, an emphasis on producing working software, the critical contribution of technical excellence, and a willingness to change course when demands shift. Several key software development methods are investigated and one methodology is actively examined using a course development project. Prerequisite: COSC 5020.

COSC 5040 Distributed Database Design (3)

Students will study the principles of homogeneous database technology and the principles of distributed database systems. The emphasis will be on the integration of heterogeneous database management systems into a coherent system. Students will develop a logical design for a distributed database. Prerequisite: COSC 5000.

COSC 5050 Distributed Database Applications (3)

Students will implement the distributed database developed in COSC 5040. Emphasis will be on good design techniques and proper documentation. Students will implement a database project in this course. Prerequisite: COSC 5040.

COSC 5060 Systems Concepts (3)

Students will study the mathematical basis of connected systems. Topics will include queues, graphs, matrices, and finite state machines. Prerequisite: COSC 5000 and college algebra.

COSC 5110 Network Architecture (3)

Students will study the fundamental concepts of computer networks. Topics will include network topologies, protocols, and network operating systems. The OSI model will be used to evaluate and compare systems. Prerequisite: COSC 5000.

COSC 5120 Data Communication (3)

Students will study the internetworking standards and common carrier services. Emphasis will be placed on the analysis and design of systems using current communication technologies. Prerequisite: COSC 5110.

COSC 5130 Computer Security and Reliability (3)

Students will study hardware and software reliability and security using currently available technology. Emphasis will be placed on security analysis of the system, physical threats to systems, virus protection, system recovery, and encryption. Prerequisite: COSC 5110.

COSC 5140 Network Design and Management (3)

Students will study the design of a distributed system. The emphasis will be on systems with multiple topologies and protocols. Prerequisite: COSC 5110.

COSC 5150 Distributed Application Development (3)

Students will be introduced to the creation of Web-based applications. This course will also cover the components of Web design and incorporate various languages to enhance Web documents. Prerequisite: COSC 5050.

COSC 6000 Distributed Systems Project (3) (Capstone Course)

Students will design and implement a major system distributed information system that integrates the learning experiences gained in the previous courses. Prerequisite: completion of 30 credit hours of the required and elective COSC courses in this program.

Graduate Certificate in Decision Support Systems

This certificate will provide information technology professionals and managers with the skills needed to develop and analyze decision support systems in large-scale data warehouses. Students will have hands-on experience in the design and management of data warehouses. Students will learn about data modeling, data management, data mining, OLAP (online analytical processing), and business intelligence. Students will also study successful data warehouse installations.

Students seeking the graduate certificate in decision support systems should hold a baccalaureate degree from an institution accredited by one of the regional accrediting agencies. Students entering this program should have a basic understanding of computer systems and possess good mathematical skills. The 18 credit hours required for the graduate certificate in decision support systems include the following courses:

CSIS 5300 Database Systems
CSIS 5310 Introduction to Decision Support Systems
CSIS 5400 Data Warehousing
CSIS 5410 Introduction to Data Mining
CSIS 5420 Data Mining
CSIS 5600 Decision Support Systems

Program Learning Outcomes for Graduate Certificate in Decision Support Systems

- Students will demonstrate critical thinking skills.
- Students will demonstrate the ability to solve problems related to the program content.
- Students will analyze and evaluate data for use in a business environment.
- Students will be able to summarize and compare the fundamental concepts and techniques of decision support systems.
- Students will recommend data manipulation and analysis algorithms for management decision making.

Course Descriptions

CSIS 5300: Database Systems (3)

This course will provide a foundation for understanding database technology by examining the way databases are used, designed and managed. The course will introduce fundamental concepts related to databases with an emphasis on the relational model. The course will cover the principles of designing databases and provide students with introductory experience in developing and using database applications. Management of databases in the workplace and the responsibilities of database administrators will be covered. This course requires a software package, Microsoft Access, for use as the database management system (DBMS) in hands-on activities. Also, as for all internet courses, the student must be disciplined and self-motivated. Prerequisites: Basic knowledge of computer and information technology. BUSN 6080 Business Information Systems or equivalent would provide sufficient background.

CSIS 5310: Introduction to Decision Support Systems (3)

In this course will teach fundamental concepts of information as well as decision support systems. The course will study information systems terminologies, decision-making process, data management, access, and visualizations, constructing a Decision Support Systems. The course will briefly discuss Executive Information Systems and networks role in a Decision Support System. Prerequisites: There are no formal prerequisites to CSIS 5310. However, it is assumed the student has adequate writing, mathematical, and analytical skills. Also, as for all internet courses, the student must be disciplined and self-motivated.

CSIS 5400: Data Warehousing (3)

Data warehouses were once unique technological advantages for the corporations that had them. Now they are a relatively common corporate decision support tool used by many organizations to better understand their business. This course will provide a foundation to understand data warehouse technology by examining the way they are designed, managed, and used. The course will explore the fundamental concepts related to data warehouses. Some of the topics of interest that are covered in this course are the business justification of a data warehouse, management of a data warehouse project, the design, construction, and operation of a data warehouse, issues of data quality and performance, and using the data warehouse. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5310 - Introduction to Decision Support Systems

CSIS 5410: Intro to Data Mining (3)

Many businesses are discovering that stored within their corporate data repositories are the elements to understanding and controlling the components of their business processes. Data warehousing, mining, and visualization are tools that can provide access to these elements.

This course will provide a foundation to understand data warehouse technology, data mining methods, and data visualization techniques by examining how these three technologies interact and depend on one another. The course will review the fundamental concepts related to data warehouses. It will also introduce data mining techniques and have the student experiment with data mining applications. Finally, the course will explain how data visualization can allow managers to quickly access large data repositories and make clear decisions based on integrated information structures. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5400 - Data Warehousing

CSIS 5420: Data Mining (3)

Data mining is the process of finding useful patterns in data. The objective of data mining is to use discovered patterns to help explain current behavior or to predict future outcomes.

This course will explore some data mining methods with a primary focus on model building and testing, as well as on interpreting and validating results. Model building is both an art and a science that is best understood from the perspective of learning by doing and this course will supplement the text with exercises with a data mining tool that will enable the student to experimentally build and test data mining models. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5410 - Introduction to Data Mining.

CSIS 5600: Decision Support Systems (3)

This course will require you to demonstrate your ability to create Enterprise Resource Planning (ERP) and decision support solutions for specific business requirements in an evolving scenario. Each week you will develop a project proposal utilizing the skills learned in this certificate program that meets a specified business need or initiative. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5420 - Data Mining.

M.B.A. with an Emphasis in Decision Support Systems

The M.B.A. with an emphasis in decision support systems requires a minimum of 48 credit hours consisting of the following courses:

M.B.A. Prerequisite Courses (if necessary):

BUSN 5000 Business

BUSN 5600 Accounting Theory and Practice

BUSN 5620 Current Economic Analysis

M.B.A. Common Core Courses (27 credit hours):

BUSN 5760 Applied Business Statistics

MRKT 5000 Marketing

MNGT 5590 Organizational Behavior

FINC 5000 Finance

FINC 5880 Advanced Corporate Finance

BUSN 6070 Management Accounting

BUSN 6110 Operations and Project Management

BUSN 6120 Managerial Economics

BUSN 6200 Strategy and Competition

M.B.A. Elective Courses to be used as follows (9 credit hours):

CSIS 5300 Database Systems (DSS Certificate Curriculum)

CSIS 5310 Introduction to Decision Support Systems (DSS Certificate Curriculum)

CSIS 5400 Data Warehousing

Completion of the DSS Certificate Curriculum (9 credit hours):

CSIS 5410 Introduction to Data Mining

CSIS 5420 Data Mining

CSIS 5600 Decision Support Systems

Course Descriptions

CSIS 5300: Database Systems (3)

This course will provide a foundation for understanding database technology by examining the way databases are used, designed and managed. The course will introduce fundamental concepts related to databases with an emphasis on the relational model. The course will cover the principles of designing databases and provide students with introductory experience in developing and using database applications. Management of databases in the workplace and the responsibilities of database administrators will be covered. This course requires a software package, Microsoft Access, for use as the database management system (DBMS) in hands-on activities. Prerequisites: Basic knowledge of computer and information technology. BUSN 6080 Business Information Systems or equivalent would provide sufficient background.

CSIS 5310 : Introduction to Decision Support Systems (3)

In this course will teach fundamental concepts of information as well as decision support systems. The course will study information systems terminologies, decision-making process, data management, access, and visualizations, constructing a Decision Support Systems. The course will briefly discuss Executive Information Systems and networks role in a Decision Support System. Prerequisites: There are no formal prerequisites to CSIS 5310. However, it is assumed the student has adequate writing, mathematical, and analytical skills. Also, as for all internet courses, the student must be disciplined and self-motivated.

CSIS 5400: Data Warehousing (3)

Data warehouses were once unique technological advantages for the corporations that had them. Now they are a relatively common corporate decision support tool used by many organizations to better understand their business. This course will provide a foundation to understand data warehouse technology by examining the way they are designed, managed, and used. The course will explore the fundamental concepts related to data warehouses. Some of the topics of interest that are covered in this course are the business justification of a data warehouse, management of a data warehouse project, the design, construction, and operation of a data warehouse, issues of data quality and performance, and using the data warehouse. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5310 - Introduction to Decision Support Systems

CSIS 5410: Intro to Data Mining (3)

Many businesses are discovering that stored within their corporate data repositories are the elements to understanding and controlling the components of their business processes. Data warehousing, mining, and visualization are tools that can provide access to these elements.

This course will provide a foundation to understand data warehouse technology, data mining methods, and data visualization techniques by examining how these three technologies interact and depend on one another. The course will review the fundamental concepts related to data warehouses. It will also introduce data mining techniques and have the student experiment with data mining applications. Finally, the course will explain how data visualization can allow managers to quickly access large data repositories and make clear decisions based on integrated information structures. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5400 - Data Warehousing

CSIS 5420: Data Mining (3)

Data mining is the process of finding useful patterns in data. The objective of data mining is to use discovered patterns to help explain current behavior or to predict future outcomes.

This course will explore some data mining methods with a primary focus on model building and testing, as well as on interpreting and validating results. Model building is both an art and a science that is best understood from the perspective of learning by doing and this course will supplement the text with exercises with a data mining tool that will enable the student to experimentally build and test data mining models. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5410 - Introduction to Data Mining.

CSIS 5600: Decision Support Systems (3)

This course will require you to demonstrate your ability to create Enterprise Resource Planning (ERP) and decision support solutions for specific business requirements in an evolving scenario. Each week you will develop a project proposal utilizing the skills learned in this certificate program that meets a specific business need or initiative. Prerequisites: Basic knowledge of computer and information technology and completion of CSIS 5420 - Data Mining.

Graduate Certificate in Web Services

This certificate program will provide information systems professionals and managers with the skills needed to understand, develop, analyze, and implement Web services within their company. Courses will explore how companies can use Web services to improve productivity and enhance their business; present case studies that describe how specific companies are employing Web services to integrate and improve communication within the company, with clients, and with company partners; delve into technical topics, including explanations of core Web services technologies and standards; explore various technologies for locating Web services on a network; identify tools and products that best fit Web service requirements; provide a detailed analysis of Web service security issues; and explore working examples of Web services and Web service clients built using the standards and tools discussed in the certificate program. Students seeking the graduate certificate in Web services should hold a baccalaureate degree from an institution accredited by one of the regional accrediting agencies.

The certificate program will be a six-course program of study from the following courses:

COAP 5000 Introduction to Web Services
COAP 5010 Web Development Technologies (XHTML)
COAP 5020 Principles of Data Exchange (Basics of XML)
COAP 5030 Web Services Protocols (UDDI, SOAP, WSDL)
COAP 5040 Databases in Web Services (.NET, Java)
COAP 5050 Web Services Security

Program Learning Outcomes for Graduate Certificate in Web Services

- Students will demonstrate critical thinking skills.
- Students will demonstrate the ability to solve problems related to the program content.
- Students will be able to explain the concepts and features necessary for successful Web Services development and deployment.
- Students will evaluate Web Services tools, platforms, vendors, and strategies.
- Students will design and build Web Services.
- Students will be able to document a Web Service application including both user and technical documentation.

M.B.A. with an Emphasis in Web Services

The M.B.A. with an emphasis in web services requires a minimum of 48 credit hours consisting of the following courses:

M.B.A. Prerequisite Courses (if necessary):

BUSN 5000 Business
BUSN 5600 Accounting Theory and Practice
BUSN 5620 Current Economic Analysis

M.B.A. Common Core Courses (27 credit hours):

BUSN 5760 Applied Business Statistics
MRKT 5000 Marketing
MNGT 5590 Organizational Behavior
FINC 5000 Finance
FINC 5880 Advanced Corporate Finance
BUSN 6070 Management Accounting
BUSN 6110 Operations and Project Management
BUSN 6120 Managerial Economics
BUSN 6200 Strategy and Competition

M.B.A. Elective Courses to be used as follows (9 credit hours):

COAP 5000 Introduction to Web Services
COAP 5010 Web Development Technologies (XHTML)
COAP 5020 Principles of Data Exchange (Basics of XML)

Completion of the Web Services Certificate Curriculum (9 credit hours):

COAP 5030 Web Services Protocols (UDDI, SOAP, WSDL)
COAP 5040 Databases in Web Services (.NET, Java)
COAP 5050 Web Services Security

Course Descriptions

Courses in the program will be taught in traditional classroom as well as online.

COAP 5000 Introduction to Web Services (3)

This course is designed to be a literacy course that explains Web services, explores the benefits they provide to businesses, and discusses key concepts related to the technology. The course provides a broad overview of new technologies that are involved in the implementation of Web services, introduces Web service strengths and weaknesses, and examines the protocols and technologies involved in Web services.

COAP 5010 Web Development Technologies (3)

This is a course to cover Web design and development topics for students of management information systems (MIS) and business administrators that are interested in developing Web services. The course covers the practical aspects of XHTML, JavaScript, CGI scripts, file sizes, and file formats. Ideas of human computer interface (HCI) psychology and how information is perceived by a site visitor are also addressed. The study of Web graphic design, technology and aesthetics, and how to target an audience in the best and most effective manner is covered.

COAP 5020 Principles of Data Exchange (3)

This course guides the student through the process of creating XML documents and displaying them on the Web. Hands-on exercises are used to learn the essential techniques of handling XML data on the Web. The student will learn how to use data binding and XML Document Object Model scripts to display XML in HTML Web pages. Prerequisite: COAP 5010.

COAP 5030 Web Services Protocols (3)

This course examines the key standards that form the foundation for Web services, XML, WSDL, SOAP, UDDI. The course introduces the main ideas and concepts behind core and extended Web service technologies, and summarizes the major architectural approaches to Web services, .NET and J2EE. Prerequisite: COAP 5020.

COAP 5040 Databases in Web Services (3)

This course is designed to provide examples of database use in a variety of Web services. The student will have the opportunity to use a variety of tools to create Web Services, including one or more of the following toolkits: ASP.NET, Visual Studio.NET, the J2EE platform, IBM Toolkit, JDeveloper. Students will have the opportunity to work with various database platforms as they create a series of professional projects. Prerequisite: COAP 5020.

COAP 5050 Web Services Security (3)

This course explains how to implement secure Web services and includes coverage of trust, confidentiality, cryptography, authentication, authorization, and Kerberos. Details on Security Assertion Markup Language (SAML), XML Key Management Specification (XKMS), XML Encryption, Hypertext Transfer Protocol-Reliability (HTTP-R) are also discussed. Prerequisites: COAP 5000 and COAP 5010.