PROFESSIONAL COMPUTER SCIENCE, MASTER OF COMPUTER SCIENCE (MCS)

This Professional Master's degree is intended primarily for working professionals.

Once a student enters the professional workforce, it can be difficult to complete a traditional master's degree. This degree is earned by demonstrating competency in three areas of specialization through the completion of three certificates. Packaged as individual certificates this delivery method enhances accessibility. Each certificate project is intended to be comprehensive of the two specialty courses in that certificate. In totality, the three certificate projects are comprehensive of all speciality courses taken for the master's degree.

Each stand-alone certificate contains pre-admission requirements, not included in the total credits.

Program Requirements–complete three of the following graduate certificates		36
Big Data		
CSCD 529	DATA MINING	
CSCD 530	BIG DATA ANALYTICS	
CSCD 601	RESEARCH REPORT	
Computer Graphics and Visualization		
CSCD 570	3D COMPUTER GRAPHICS PRINCIPLES	
CSCD 577	VIRTUAL REALITY AND DATA VISUALIZATION	
CSCD 601	RESEARCH REPORT	
Embedded Systems		
CSCD 561	EMBEDDED SYSTEMS	
CSCD 562	EMBEDDED REAL-TIME CONTROL	
CSCD 601	RESEARCH REPORT	
Modeling and Simulation		
CSCD 580	INTELLIGENT SYSTEMS	
CSCD 583	MODELING AND SIMULATION	
CSCD 601	RESEARCH REPORT	
Network Security		
CSCD 533	ADVANCED NETWORKING CONCEPTS	
CSCD 534	NETWORK SECURITY	
CSCD 601	RESEARCH REPORT	
Parallel and Cloud Computing		
CSCD 545	GPU COMPUTING	
CSCD 567	PARALLEL AND CLOUD COMPUTING	
CSCD 601	RESEARCH REPORT	
Total Credits		**36**

Students who successfully earn an MCS in Professional Computer Science from EWU should be able to do the following:

Big Data, Graduate Certificate

- apply advanced knowledge of computing and information systems applications to areas such as networking, database, security and privacy, and Web technologies;
- apply contemporary techniques for managing, mining, and analyzing big data across multiple disciplines;
- be better prepared for career advancement in all areas of data science and information technology;
- communicate their ideas and findings persuasively in written, oral and visual form and to work in a diverse team environment;
- use computation and computational thinking to gain new knowledge and to solve real-world problems of high complexity.

Embedded Systems, Graduate Certificate

- a microcontroller or microprocessor;
- actuators such as solenoids and relays;
- analog to Digital and Digital to Analog converters (ADC and DAC);
- asynchronous interrupts and Interrupt Service Routines;
- custom circuits designed with a Hardware Description Language and implemented in Field Programmable Gate Arrays (FPGA);
- embedded component communications such as I2C and SPI;
- environmental sensors such as temperature, light, proximity;
- PID Feedback Control;
- priority-driven pre-emptive multi-tasking;
- pulse Width Modulation (PWM);
- real-time deadlines for periodic and aperiodic tasks;
- timer circuits and real-time clocks.

Graphics and Visualization, Graduate Certificate

- demonstrate an understanding of basic and advanced concepts of computer graphics and use OpenGL as a renderer;
- demonstrate an understanding of the fundamentals of geometric modeling;
- develop applications and analyze scientific data with Visualization Tool Kit (VTK);
- give visual insights to a large amount of information using software tools like R;
- model and animate a 3D environment with the basic and advanced concepts of transformation, projection, texture, lighting and shading.;
- use force feedback-based virtual devices like Geomagic's Phantom that can make virtual objects tangible and develop applications using such devices.

Modeling & Simulation, Graduate Certificate

Understand a breadth and depth of topics, tools, and techniques in computational modeling, simulation, visualization, and analysis (MSVA):

- develop and investigate what if decision-making processes;
- employ scientific and engineering thinking and doing for disciplined problem solving;
- evaluate and report on proposed or actual decisions;
- experience a broad spectrum of real-world applications and examples;
- interconnect and holistically interrelate other computer science and engineering topics;
- select, justify, and apply appropriate modeling and simulation techniques;
- understand and connect the real world to the virtual world and vice versa.

Understand the foundation of artificial intelligence (AI) and intelligent systems (IS):

- Apply AI/IS programming techniques and software architectures;
- consider AI/IS roles in smart and mobile devices;
- devise and carry out a practical project for an AI/IS/MSVA topic of your choice;
- examine search strategies;
- investigate knowledge representation;
- model reasoning processes;
- understand AI/IS crossovers to other CS domains.

Network Security, Graduate Certificate

- create security policies for protection of network assets;
- demonstrate knowledge of network security techniques in order to secure networks;
- explain the use of cryptographic protocols to help secure the network;
- identify how hackers, hacktivists and highly skilled cyber criminals attack networks including the tools they use and techniques;
- use tools such as vulnerability scanners, traffic analysis tools and port scanners.

Parallel and Cloud Computing, Graduate Certificate

- apply GPU parallel patterns to real-world problems, such as sorting, reduction, prefix sum and stencil computing algorithms;
- apply the features of a cloud system in designing real-world information systems, including high availability, fault tolerance and high scalability;
- develop applications using Amazon AWS, including Amazon EC2, Amazon S3, Amazon DynamoDB, Lambda, Amazon Elastic MapReduce, Elastic Load Balancer and Auto Scaling Group etc;
- implement their own Remote Procedure Call using TCP Socket, synchronizations between client and server and typical failure handler on server;
- solve real-world problems using MapReduce framework, such as frequent itemset mining problem;
- understand different types of GPU memory and know how to effectively use shared memory and constant memory to further improve performance;
- understand the concepts of Cloud computing and Distributed Computing, and in particular use Hadoop and MapReduce to store and process large datasets;
- understand the issues and challenges in writing correct and efficient shared-memory threaded programs;
- understand the principles and the design of the Hadoop and MapReduce framework.
- use CUDA C to parallelize real-world applications, such as text processing, image processing and scientific computing on GPUs;
- use underlying concepts to identify factors that limit performance, so that they can write efficient and high-performance parallel programs on GPUs.