# PARALLEL AND CLOUD COMPUTING CERTIFICATE, GRADUATE

Certificates are intended primarily for working professionals, and provide a "bite-sized" chunk of graduate coursework. See Professional Master of Computer Science (MCS) (http://catalog.ewu.edu/science-technology-engineering-mathematics/computer-science/computer-science-mcs/) for additional information.

**Required Certificate Prerequisites—must be completed prior to admission.**

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| CSCD 240 | C AND UNIX PROGRAMMING | |
| or CSCD 255 | C PROGRAMMING FOR ENGINEERS | |
| CSCD 300 | DATA STRUCTURES | |
| **Certificate Requirements** | | |
| CSCD 506 | RESEARCH METHODS IN COMPUTER SCIENCE | 4 |
| CSCD 545 | GPU COMPUTING | 4 |
| CSCD 567 | PARALLEL AND CLOUD COMPUTING | 4 |
| CSCD 601 | RESEARCH REPORT | 4 |
| Total Credits | | 16 |

Students who successfully earn a Parallel and Cloud Computing, Graduate Certificate from EWU should be able to do the following:

- 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.