

Data Intensive Computing

Department of Computer Science and Engineering

Data-intensive Computing Certificate
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Overview

Data-intensive computing is a collective solution to address the data deluge that has been brought about by tremendous advances in distributed systems and Internet-based computing. There is tremendous need for analyzing the data to discover knowledge, to understand behaviors, and to mine for patterns. These discoveries and patterns of data are expected to impact a wide range of applications from the social sciences to medical sciences. The scale, the complexity and the types of the data to be managed has given rise to newer data models and algorithms. Data-intensive computing deals with these newer data and computational models and related algorithms and data structures. This newly created certificate program aims to improve the preparedness of our students for data-intensive computing.

This data-intensive computing certificate program is relevant and useful in any discipline with large data-analysis needs. Any Computer Science and Engineering (CSE) student can choose the appropriate electives and project work to be awarded the certificate. The program is equally available to students in other fields of study. The program consists of a total of five courses: three required CSE courses, one elective course from the major discipline of the student and a capstone project course that applies the concepts in the earlier courses of the certificate. The program requires just 1-3 credits (for the capstone project) more than a regular minor in CSE. It creatively integrates the computational needs of the student's chosen discipline with the data-intensive computing solutions, methods and tools offered by the CSE courses. Thus the certificate program offers a pathway into computing for non-CSE students through its curriculum and its achievable design.

About our Degrees

The Data Intensive Computing certificate program is comprised of courses that will enable students to learn the foundational concepts, data and computational models and algorithms of data intensive computing. This undergraduate certificate program addresses the increasing need for workforce personnel who are competent in data intensive computing and other closely related technologies such as grid computing, parallel computing, and cloud computing. The timely introduction of these concepts to our undergraduate students is important for them to remain competitive in a fast-moving global environment.

The curriculum also aims to provide students with practical, real-world, hands-on application development experience in their chosen fields of interest. It accomplishes this aim by featuring a capstone project course that explores the application of foundational concepts in solving a significant problem in the student's chosen discipline.

Finally, it aims to offer an accessible pathway for non-CSE students to acquire competency in the application of data intensive computing technology.

Acceptance Information

Applicants should complete [CSE 115](#), [CSE 116](#) or equivalent courses with 2.5 GPA average.

Students must maintain a minimum of 2.5 GPA average in the required and elective courses in order to remain in the program and be awarded the certificate.

Application deadlines

Students can apply anytime after completing [CSE 115](#) and [CSE 116](#), the minimum requirement for enrolling into the certificate program. Please contact Prof. Bina Ramamurthy (bina@buffalo.edu)

About our Facilities

In addition to the excellent computing facilities offered by the Computer Science and Engineering department (wiki.cse.buffalo.edu/services),

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students enrolled in this certificate program will also work on cloud computing resources such as Amazon web services Elastic Compute Cloud (EC2) and Google App Engine (GAE).

Practical Experience and Special Academic Opportunities

The certificate program has been created with the help of a National Science Foundation (NSF) Grant and there 12 scholarships of \$1000 each available for under-represented minority students and non-traditional students.

Career Information and Further Study

Career Information and Further Study: Data-intensive computing has been hailed as the fourth paradigm after experimental, theoretical and computational sciences. In the popular literature data-intensive computing is closely associated with another emerging technology, namely, cloud computing. The skills and competencies learned in this certificate program are highly sought after by a wide range of industries from scientific research to stock market analytics.

Career Choices

Data intensive computing is a collective solution to address the data deluge that has been brought about by tremendous advances in distributed systems and Internet-based computing. The need to deal with huge volumes of data is being felt across industry, government, and academia. This includes the analysis needs of intelligence agencies for data from satellite imagery, signal intercepts, sensors, etc.; medical agencies analyzing images, genetic and other diagnostic data; environmental agencies with sensor-collected data on air, water, and meteorological conditions; and organizations in general needing to exploit the massive document databases on the world wide web (several hundred trillion bytes of text); among others. There are excellent opportunities for using the certificate for finding employment in many fields that require data analytics.

Salary Information

Salaries depend on the major study of the student. But the data-intensive computing and cloud computing skills are in great demand. We expect the salaries to be greater than \$50,000

Career Hints

The choice of the capstone project and working on a real data intensive problem beyond the disciplinary boundaries will help students broaden their skills and knowledge. Students can also seek industry collaboration for their capstone projects.

Degrees Offered

Undergraduate: Certificate

Links to Further Information About this Program

- [Undergraduate Catalog](#)
- [Undergraduate Admissions](#)
- [Graduate Admissions](#)
- [Department of Computer Science and Engineering](#)
- [School of Engineering and Applied Sciences](#)

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Acceptance Criteria

Minimum average GPA of 2.5 in [CSE 115](#) and [CSE 116](#).

Advising Notes

Minimum average GPA of 2.5 in all the electives and core courses within the certificate program is required to earn the certificate.

Required Courses

[CSE 250](#) Data Structures and Algorithms, or equivalent
[CSE 486](#) Distributed Systems
[CSE 487](#) Data Intensive Computing

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Any 300 or 400 level course with data intensive content in the major area of the student Capstone project in the major area of the student

Prerequisites

[CSE 115](#) Introduction to Computer Science I

[CSE 116](#) Introduction to Computer Science II