DATA SCIENCE, CERTIFICATE IN (POST-BACCALAUREATE CERTIFICATE)

The Certificate in Data Science will train students in computer methods for analyzing big datasets generated by industry, research and government entities. Students will learn techniques for transforming the data into knowledge; developing algorithms for constructing computer systems that automatically learn from data; and tracking and evaluating new techniques and approaches in data science. The program will prepare graduates for entry into jobs as specialists in data science for industry and the public sector.

Student learning outcomes

1. **Data science foundations:** Graduates will demonstrate a solid understanding of the foundational concepts underlying data science.
2. **Data science specialization:** Graduates will demonstrate the ability, knowledge and technical skills to process and analyze data in order to extract new insights.

VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (http://www.graduate.vcu.edu/) and academic regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

Visit the academic regulations section for additional information on academic regulations for graduate students. (https://bulletin.vcu.edu/academic-regs/)

Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the academic regulations section for additional information on graduation requirements. (https://bulletin.vcu.edu/academic-regs/grad/graduation-info/)

Apply online today. (https://www.vcu.edu/admissions/apply/graduate/)

Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
Certificate	Fall (preferred)	Jun 1	TOEFL required for all international students
	Spring	Nov 1	

Admission criteria

The admission requirements outlined below apply to all students. All applicants to post-baccalaureate certificate programs are required to submit the online application form to VCU Undergraduate Admissions.

The Department of Computer Science also requires the following additional materials:

- Official undergraduate transcripts from all schools attended
- A resume stating relevant work experience
- A statement of purpose outlining career goals
- Three letters of recommendation – professional and/or academic

To be considered for admission to the certificate program, all candidates must satisfy the following requirements:

- Applicants must already have a bachelor's degree. A bachelor's degree in computer science or in a closely related discipline is highly preferred.
- Applicants will be considered on a case-by-case basis, however, candidates should present an undergraduate minimum GPA of 3.0 and have completed at least one semester of calculus and one semester of discrete mathematics (VCU MATH 211 or equivalent), both with minimum grades of B.

Non-native English speakers will provide evidence of proficiency in English by one of the following methods:

- A Test of English as a Foreign Language minimum composite score of 100 for the Internet-based test or score of 600 for the paper-based test

  or

- An International English Language Testing System minimum score of 6.5 on the academic exam

Acceptance of an applicant is based upon the recommendation of the computer science graduate committee with approval of its director and the associate dean for graduate studies.

Students may transfer up to three credits from outside of the program to fulfil the program requirements. The transfer must be approved by the computer science graduate committee.

Degree requirements

The focus of the curriculum is centered on the two required courses, which together provide the foundation for more advanced graduate-level elective courses. The main strength of the curriculum is the combination of deep knowledge in machine learning methods and tools with the option to explore the breadth of data-oriented training opportunities

provided by the electives, allowing the students to tailor their plan of study toward their professional interests.

Course	Title	Hours
Required courses		
CMSC 535	Introduction to Data Science	3
STAT 534	Statistical Data Science I	3
Restricted CMSC elective (choose one)		**3**
CMSC 502	Parallel Algorithms	
CMSC 510	Regularization Methods for Machine Learning	
CMSC 516	Advanced Natural Language Processing	
CMSC 603	High Performance Distributed Systems	
CMSC 606	Introduction to Machine Learning	
CMSC 635	Knowledge Discovery and Data Mining	
CMSC 636	Artificial Neural Networks and Deep Learning	
Restricted SSOR elective (choose one)		**3**
STAT 545	Applied Bayesian Statistics	
STAT 625	Applied Multivariate Analysis	
STAT 636	Machine Learning Algorithms	
STAT 641	Applied Data Analysis	
STAT 642	Design and Analysis of Experiments I	
STAT 643	Applied Linear Regression	
STAT 675	Time Series Analysis I	
Total Hours		**12**

The minimum number of credit hours required for this certificate is 12.

Contact

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Program website: computer-science.egr.vcu.edu/graduate (https://egr.vcu.edu/departments/computer/academics/graduate/)