

Master of Science in Computer Science (M.S.)

The Master of Science in Computer Science will provide individuals with the opportunity to acquire an excellent graduate level education in Computer Science that prepares them to work in a variety of computer related fields, including education, industry, research, business, and government.

The M.S. in Computer Science is designed for individuals with a B.S. in Computer Science who are looking to expand their knowledge and opportunities. Students with a bachelor's degree in another discipline may also apply for the M.S. in Computer Science after meeting certain eligibility criteria. This degree can be completed as a full-time or part-time student. Most classes are offered in the evening to enable students to complete their degree while working.

Rowan University undergraduates majoring in the Bachelor of Science in Computer Science program may apply to the Combined Advanced Degree (4+1) program which allows them to earn both the Bachelor of Science and Master of Science degrees in five years instead of six.

The M.S. in Computer Science is a 30 credit-hour program with an optional thesis track. Ten distinct courses must be taken to fulfill the Master's Degree. Any course taken that belongs in multiple categories cannot double count. Up to two courses may be taken from other, appropriate graduate programs subject to advisor approval, provided all requirements for this M.S. degree are fulfilled.

Tracks

The program includes two tracks - a thesis track and a non-thesis track.

- **Non-Thesis Track:** Students choosing the non-thesis track take 30 credits of traditional (non-thesis) courses.
- **Thesis Track:** Students choosing the thesis track will also take 30 credits, but they will substitute between 6 to 9 credits of thesis courses for traditional (non-thesis) courses.

Algorithms Core

- All students must complete a 3 credit Algorithms Core course.

Common Core

- All students must complete nine (9) credits of Common Core courses.

Advanced Courses

- All students must complete nine (9) credits of advanced (600 level) courses. Thesis II and Thesis III courses will fulfill this requirement for thesis-track students.

Program Requirements

Required Course in Algorithms

3 s.h.

(s.h.: semester hours/credit hours)

Course

CS 07540

Course Title

Advanced Design & Analysis of Algorithms

S.H.

3

Common Core Courses

9 s.h.

(s.h.: semester hours/credit hours)

Course

Course Title

S.H.

Students are required to complete at least one (1) course from any three (3) Common Core Areas listed below.

Algorithms and Theory

CS 07510

Mathematical Foundations of Computer Science

3

CS 07556

Machine Learning I

3

CS 07622

Advanced Theory of Computing

3

CS 07650

Concepts in Artificial Intelligence

3

CS 07652

Cryptographic Algorithms*

3

CS 07656

Machine Learning II

3

Software Design

CS 04515

Embedded Systems Programming

3

CS 04524

Agile Software Engineering

3

CS 04563

Concurrent Programming – Theory and Practice

3

CS 04623

Advanced Software Engineering

3

CS 04670

Advanced Object-Oriented Design

3

Cyber Security

CS 03551

Advanced Cyber Security: Principles & Applications

3

CS 03570

Cyber Defense of Operating Systems and Networks

3

CS 03580	Cloud Computing and the Internet of Things – Architectures and Security*	3
CS 07652	Cryptographic Algorithms*	3
CS 09612	Network Security*	3

Data Management and Analytics

CS 02505	Data Mining I	3
CS 02530	Advanced Database Systems: Theory & Programming	3
CS 02605	Data Mining II	3
CS 02620	Data Warehousing	3
CS 02625	Data Quality & Web Text Mining	3
CS 02630	Advanced Topics in Database Systems	3

Computer Networks

CS 03580	Cloud Computing and the Internet of Things – Architectures and Security*	3
CS 09510	Computer Networks	3
CS 09605	Wireless Networks & Systems	3
CS 09612	Network Security*	3
CS 09675	Advanced TCP/IP & Internet Protocols & Technologies	3

*Course may count for one of two core areas but cannot count for both core areas.

Advanced Elective Courses 9 s.h.

In addition to the 12 credits in the Core Areas, students must complete three (3) 600-level courses.

<u>Course #</u>	<u>Course Title</u>	<u>S.H.</u>
	600-level courses can be selected from the Non-Thesis Track Courses below or from the five (5) Core Areas listed above	9

Thesis Track Courses 6-9 s.h.

Thesis Track students may take either six (6) credits of thesis and one (1) elective or they may take nine (9) credits of thesis.

<u>Course #</u>	<u>Course Title</u>	<u>S.H.</u>
CS 07530	Computer Science Thesis I	3
CS 07631	Computer Science Thesis II	3
CS 07632	Computer Science Thesis III (<i>optional</i>)	3

Non-Thesis Track Elective Courses 9 s.h.

Students must take nine (9) credits of electives; they may not take any thesis courses. Electives can be chosen from the core banks as well.

<u>Course #</u>	<u>Course Title</u>	<u>S.H.</u>
CS 01541	Bioinformatics – Advanced Computational Aspects	3
CS 02570	Information Visualization	3
CS 04548	Programming Languages: Theory, Implementation & Application	3
CS 04564	Compiler Design Theory	3
CS 04565	System Programming	3
CS 04571	Advanced Topics in Mobile Programming	3
CS 04590	Computer Game Design & Development	3
CS 04605	Advanced Web Programming	3
CS 06520	Topics in Computer Architecture	3
CS 06560	Design & Implementation of Operating Systems	3
CS 07565	Computer Vision	3
CS 07595	Advanced Topics in Computer Science	3
CS 07645	Advanced Robotics	3
CS 07655	Natural Language Processing	3
CS 08560	Computer Graphics	3
CS 08680	Computer Animation	3

Total Required Credits for the Program 30 s.h.

Foundation Courses

Students accepted into the program are expected to be well versed in programming, discrete mathematics, computer organization/architecture, direct interactions with operating systems, data structures, and algorithmic thinking either

through undergraduate course work or work experience. At the discretion of the Program Coordinator, students not meeting all of these criteria *may* be accepted into this master's program but will be required to complete one or two computer science bridge courses before enrolling into other computer science graduate courses. These courses are:

- CS 01501 Essential of Computer Science I*
- CS 01502 Essentials of Computer Science II*

*CS 01501 and CS 01502 will not count toward the 30 graduate credits needed for degree completion.

Graduation/Exit, Benchmark, and/or Thesis Requirements

If thesis track is chosen, students must successfully complete and defend Master's Thesis.

Minimum Required Grades and Cumulative GPA

The Master of Science in Computer Science is a Category 3 program.

For details regarding satisfactory academic progress and graduation requirements, please visit [University Policies](#).

Program Coordinator/Advisor Contact Information

Shen-Shyang Ho

Robinson Hall, Room 328Q

856.256.4805

hos@rowan.edu

Master of Science in Cybersecurity (M.S.)

The Master of Science in Cybersecurity is designed to prepare students with the knowledge and skills need to understand key issues along with present and emerging cyber threats to information systems.

Program Requirements

The M.S. in Cybersecurity is a 30 credit-hour program. All students must complete 6 credits of foundation courses (2 courses) and 9 credits of core courses (3 courses). The credits for this program are structured as follows:

Computer Science Foundation Courses

Course #	Course Title	S.H.
CS 01501	Essentials of Computer Science I	3
CS 01502	Essentials of Computer Science II	3

Cybersecurity Required Core Courses

Course #	Course Title	S.H.
CS 03500	Foundations of Cybersecurity	3
CS 03506	Cybersecurity Management, Policy, and Risk	3
CS 03570	Cyber Defense of Operating Systems and Networks	3

Students will be required to take one 3-credit course in strategic writing and one of 3 additional course options.

Business Skills for IT Professionals

Course #	Course Title	S.H.
MAPR 01547	Graduate Strategic Writing	3

Choose one (1) from the following options.

Course #	Course Title	S.H.
MAPR 01561	Graduate Strategic Writing II	3
MGT 06521	Leadership Theory and Practice	3
MGT 07600	Predictive Analytics	3

Cybersecurity Elective Courses

Choose three (3) from the following options.

Course #	Course Title	S.H.
CS 03580	Cloud Computing and the Internet of Things – Architectures and Security	3
CS 03551	Advanced Cybersecurity Principles and Applications	3
CJ 09515	Law and Society	3
CS 09612	Network Security	3
CS 07652	Cryptographic Algorithms	3
CS 09510	Computer Networks	3

CS 03695	Advanced Topics in Cybersecurity	3
MIS 02530	Information Security for Managers	3
<u>Total Required Credits for the Program</u>		30 s.h.

Foundation Courses

None

Graduation/Exit, Benchmark, and Thesis Requirements None**Minimum Required Grades and Cumulative GPA**

The Master of Science in Cybersecurity is a Category 3 program.

*For details regarding satisfactory academic progress and graduation requirements, please visit [University Policies](#).***Program Coordinator/Advisor Contact Information****Vahid Heydari****Robinson Hall, Room 328J****856.256.4500, ext.53548****heydari@rowan.edu****Master of Science in Data Science (M.S.)**

The Master of Science in Data Science at Rowan University is designed for individuals with a Bachelor's degree in a STEM related field who are looking to expand their knowledge and opportunities in Data Science. The program has a strong background in Data Mining, Modeling, Statistical and Machine learning, but also includes potential concentrations in Health Data Analytics or Business Data Analytics for students with those interests. If no concentration is chosen, there are a variety of electives so that students can increase their knowledge of Computer Science, Statistics, or Visual Analytics.

The program is based on industry needs, as well as guidelines of the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) and of the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). Students will be prepared to use algorithms, statistics, and technology to make informed decisions from massive amounts of data, to manage streamed data or data stored in massive data warehouses, and to visually analyze and present information. Courses are designed to provide expertise in the data sciences and train students to solve problems with complex sets of structured and unstructured data commonly found in any industry.

Program Requirements

The Master of Science in Data Science program consists of 10 courses totaling 30 graduate semester hours (s.h.). Students may enroll in this program part-time or full-time.

Coursework

The following courses make up the Master of Science in Data Science program.

- **Required Courses:** 12 semester hours (s.h.)
- **Concentration and Elective Courses:** 18 semester hours (s.h.)

Required Courses 12 s.h.*(s.h.: semester hours/credit hours)*

Course #	Course Title	S.H.
DS 02510	Visual Analytics	3
CS 02620	Data Warehousing	3
CS 02505	Data Mining I	3
STAT 02515	Applied Multivariate Data Analysis	3

Health Data Analytics Leading Concentration Courses 18 s.h.

Course #	Course Title	S.H.
CS 02625	Data Quality and Web/Text Mining	3
DA 03510	Patient Data Understanding	3
DA 03520	Healthcare Management	3
DA 01505	Data Analytics Capstone Practicum	3
	Choose 2 courses from Elective Bank below	6

Business Data Analytics Concentration 18 s.h.

Course #	Course Title	S.H.
STAT 02525	Design and Analysis of Experiments	3
MGT 07500	Managerial Decision-Making Tools	3

MGT 07600	Predictive Analytics	3
DA 01505	Data Analytics Capstone Practicum	3
	Choose 2 courses from Elective Bank below	6

No Concentration

Students who do not wish to declare a concentration in Data Science must take the Data Science Capstone Experience and five (5) courses from the elective bank.

Course #	Course Title	S.H.
DA 01505	Data Analytics Capstone Practicum	3
	Choose 5 courses from Elective Bank below	15

Elective Bank

Course #	Course Title	S.H.
CS 02630	Advanced Topics in Database Systems	3
CS 02530	Advanced Database Systems: Theory and Programming	3
CS 07540	Advanced Design and Analysis of Algorithms	3
CS 07556	Machine Learning	3
CS 02570	Information Visualization	3
CS 02605	Data Mining II	3
CS 02625	Data Quality and Web/Text Mining	3
DA 03510	Patient Data Understanding	3
DA 03511	Patient Data Privacy & Ethics	3
DA 03520	Healthcare Management	3
DS 02695	Advanced Topics in Data Science	3
ECE 09555	Advanced Topics in Pattern Recognition	3
MGT 07500	Managerial Decision-Making Tools	3
MGT 07600	Predictive Analytics	3
STAT 02514	Decision Analysis	3
STAT 02525	Design and Analysis of Experiments	3
STAT 02530	Applied Survival Analysis	3

Total Required Credits for the Program 30 s.h.

Foundation Courses

Applicants must have successfully completed the following courses (or their equivalents) at an accredited institution: Calculus II, Probability and Statistical Inference for Computing Systems, Linear Algebra, Introduction to Object-Oriented Programming or Computer Science and Programming, and Data Structures and Algorithms or Data Structures for Engineers.

Graduation/Exit, Benchmark, and/or Thesis Requirements

A four (4) credit Capstone Practicum is required as part of the coursework.

Minimum Required Grades and Cumulative GPA

The Master of Science in Data Science is a Category 3 program.

For details regarding satisfactory academic progress and graduation requirements, please visit [University Policies](#).

Program Coordinator/Advisor Contact Information

Anthony Breitzman

Robinson Hall, Room 328P

breitzman@rowan.edu