## 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 Master of Science in Computer Science is a 30 credit-hour program with an optional thesis track. All students must complete 12-credits of core courses.

**Tracks**

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

- **Thesis Track:** Students in the thesis track may choose to take a 6-credit thesis sequence or a 9-credit thesis sequence. Their remaining 9 or 6 credits may be additional core courses and/or electives.
- **Non-Thesis Track:** Students choosing the non-thesis track must take 18 additional credits of elective or core courses, 6 credits of which must be classified as project intensive.

**Algorithms Core**

- All students must complete a 3 credit Algorithms Core Course

**Common Core**

- All students must complete 9-credits of common core courses.

Rowan University undergraduates majoring in the Bachelor of Science in Computer Science program can apply to the Combined Advanced Degree program allowing them to earn both the Bachelor of Science and Master of Science degrees in five years.

**Program Requirements**

**Required Course in Algorithms** 3 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| CS 07540 | Advanced Design & Analysis of Algorithms | 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 there (3) 600-level courses.

| Course # | Course Title | S.H. |
|---|---|---|
| | 600-level courses can be selected from the Non-Thesis Track Courses below or from the five 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.

| Course # | Course Title | S.H. |
|---|---|---|
| CS 07530 | Computer Science Thesis I | 3 |
| CS 07531 | Computer Science Thesis II | 3 |
| CS 07532 | Computer Science Thesis III *(optional)* | 3 |

**Non-Thesis Track Elective Courses** 9 s.h.

Non- thesis track students may not take CS 07530, CS 07531, and CS 07532. They will take nine (9) credits of electives. Students may take approved graduate electives from graduate programs in the field of Electrical and Computer Engineering, Mathematics, Management Information Systems, Data Analytics, or Bioinformatics. Only three (3) credits from the graduate program in Management Information Systems could be counted towards electives for a graduate degree in Computer Science. Before signing up for these classes please discuss and confirm all choices with your academic advisor.

| Course # | Course Title | S.H. |
|---|---|---|
| CS 01541 | Bioinformatics – Advanced Computational Aspects | 3 |
| CS 02570 | Information Visualization | 3 |
| CS 02605 | Data Mining II | 3 |
| CS 02620 | Data Warehousing | 3 |
| CS 02625 | Data Quality and Web Text Mining | 3 |
| CS 02630 | Advanced Topics in Database Systems | 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 04623 | Advanced Software Engineering | 3 |
| CS 04670 | Advanced Object-Oriented Design | 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 07622 | Advanced Theory of Computing | 3 |
| CS 07645 | Advanced Robotics | 3 |
| CS 07650 | Concepts in Artificial Intelligence | 3 |
| CS 07652 | Cryptographic Algorithms | 3 |
| CS 07655 | Natural Language Processing | 3 |
| CS 07656 | Machine Learning II | 3 |
| CS 08560 | Computer Graphics | 3 |
| CS 08680 | Computer Animation | 3 |
| CS 09605 | Wireless Networks and Systems | 3 |
| CS 09612 | Network Security | 3 |
| CS 09675 | Advanced TCP/IP And Internet Protocols And Technologies | 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. Students not meeting all of these criteria may be accepted into the Master of Science but required to complete one or two Computer Science bridge courses before enrolling into other Computer Science graduate courses. These courses are:

- CS 01501 Essentials of Computer Science I (3 s.h.)
- CS 01502 Essentials of Computer Science II (3 s.h.)
- 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**
**856.256.4500**
**hos@rowan.edu**

## Master of Science in Cyber Security (M.S.)

The Master of Science in Cyber Security 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 MS in Cyber Security 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** | | 6 s.h. |
|---|---|---|
| **Course #** | **Course Title** | **S.H.** |
| CS 01501 | Essentials of Computer Science I | 3 |
| CS 01502 | Essentials of Computer Science II | 3 |

| **Cyber Security Required Core Courses** | | 9 s.h. |
|---|---|---|
| **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** | | 6 s.h. |
|---|---|---|
| **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 |

**Cyber Security Elective Courses** 9 s.h.

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 |
| **Total Required Credits for the Program** | | 30 s.h. |

**Foundation Courses**

None

**Graduation/Exit, Benchmark, and Thesis Requirements** None

**Minimum Required Grades and Cumulative GPA**

The Master of Science in Cyber Security 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**
**856-256-2805 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 area 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 and a total of 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.** |
| DA 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** | | 18 s.h. |
|---|---|---|
| **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 |
| 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**

## Certificate of Graduate Study in Computational Data Science (COGS)

The Certificate of Graduate Study (COGS) in Computational Data Science is intended for tech savvy industry managers who need to take advantage of big data opportunities. As a result of this program, students will be able to apply data analytics in any area of specialization. Students will be prepared to use algorithms, statistics, and technology to extract business intelligence from massive amounts of data, to manage streamed data or data stored in massive data warehouses and to visually analyze and present information.

**Program Requirements**

**Required Courses** 6 s.h.

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

| Course # | Course Title | S. H. |
|---|---|---|
| DA 02510 | Visual Analytics | 3 |
| CS 02505 | Data Mining I | 3 |

**Elective Courses** 6 s.h.

Choose 6 s.h.

| Course # | Course Title | S.H. |
|---|---|---|
| CS 02620 | Data Warehousing | 3 |
| STAT 02515 | Applied Multivariate Data Analysis | 3 |
| STAT 02514 | Decision Analysis | 3 |
| CS 02605 | Data Mining II | 3 |
| CS 02570 | Information Visualization | 3 |
| CS 02530 | Advanced Database Systems: Theory and Programming | 3 |
| CS 02630 | Advanced Topics in Database Systems | 3 |
| CS 07556 | Machine Learning I | 3 |
| CS 02625 | Data Quality and Web/Text Mining | 3 |
| ECE 09555 | Advanced Topics In Pattern Recognition | 3 |

**Total Required Credits** 12 s.h.

**Foundation Courses**

None

**Graduation/Exit, Benchmark, and Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The COGS in Computational 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**

## Certificate of Graduate Study in Cyber Security Architecture (COGS)

The Certificate of Graduate Study (COGS) in Cyber Security Architecture is designed to offer students the opportunity of a specialized study to provide students with experience in key courses of this discipline at the graduate level.

**Program Requirements**

**Coursework**

The Certificate of Graduate Study in Cyber Security Architecture consists of 12 s.h. of coursework.

Students seeking this COGS will be required to take one (1) required course and three (3) restricted electives. The COGS is a stackable certificate, and students can apply their certificate credits toward the MS in Computer Science. Students may also apply some of their certificate credits toward the MS in Cyber Security. Students should consult with the program advisor for additional information. All courses are three (3) semester hours.

**Program Requirements**

**Required Courses** 3 s.h.

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

| Course # | Course Title | S. H. |
|---|---|---|
| CS 03551 | Advanced Cyber Security: Principles & Applications | 3 |

**Restricted Elective Courses** 9 s.h.

Choose 9 s.h.

| Course # | Course Title | S.H. |
|---|---|---|
| CS 03570 | Cyber Defense of Operating Systems and Networks | 3 |
| CS 03580 | Cloud Computing and the Internet of Things Architecture and Security | 3 |
| CS 07652 | Cryptographic Algorithms | 3 |
| CS 09510 | Computer Networks | 3 |
| CS 09612 | Network Security | 3 |
| ECE 09585 | Advanced Engineering Cyber Security | 3 |

**Total Required Credits for the Program** 12 s.h.

**Foundation Courses**

None

**Graduation/Exit, Benchmark, and/or Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The Certificate of Graduate Study in Cyber Security Architecture 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**
**856.256.4805 ext. 53548**
**heydari@rowan.edu**

## Certificate of Graduate Study in Cyber Security Principles (COGS)

The Certificate of Graduate Study (COGS) in Cyber Security Principles is designed to prepare students with the knowledge and skills needed to understand key issues along with present and emerging cyber threats to information systems.

Students will be able to articulate the core concepts of cyber security, asset protection and cyber defense, learn specific techniques for vulnerability analysis and security risk assessment, and understand how to build a technical architecture which includes security considerations and analyze technical policies and processes.

**Program Requirements**

**Coursework**

Students seeking this COGS will be required to complete any four (4) of the following 3 s.h. courses. None of the courses have prerequisites.

**Required Courses** 12 s.h.

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

Choose four (4) from the following options.

| 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 |
| CS 03580 | Cloud Computing and the Internet of Things: Architectures and Security | 3 |
| CS 03551 | Advance Cybersecurity Principles and Applications | 3 |

| **Total Required Credits** | 12 s.h. |
|---|---|

**Foundation Courses**

Please contact program coordinator for additional details.

**Graduation/Exit, Benchmark, and Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The COGS in Cyber Security Principles 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**
**856.256.4805 ext. 53548**
**heydari@rowan.edu**

## Certificate of Graduate Study in Health Data Management (COGS)

The Certificate of Graduate Study (COGS) in Health Data Management is designed to offer students the opportunity to understand how to handle health-related data and design and analyze experiments as they relate to health data. It is intended for researchers, statisticians, or data analysts who would like to play a part in the healthcare industry.

Students seeking this COGS will be required to take two (2) required courses and two (2) restricted electives. The COGS is a stackable certificate, and students can apply their certificate credits toward the MS in Data Science. Students may also apply some of their certificate credits toward the MS in Computer Science. Students should consult with the program advisor for additional information. All courses are three (3) semester hours.

**Program Requirements**

The Certificate of Graduate Study in Health Data Management consists of 12 s.h. of coursework

**Coursework**

The following courses are required to complete the COGS in Health Data Management

- **Required Courses:** 6 s.h.
- **Restricted Elective Courses:** 6 s.h.

**Required Courses** 6 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| DA 03510 | Patient Data Understanding | 3 |
| CS 02625 | Data Quality and Web/Text Mining | 3 |

**Restricted Elective Courses** 6 s.h.

Choose 6 s.h. from the following options.

| Course # | Course Title | S.H. |
|---|---|---|
| DA 03511 | Patient Data Privacy & Ethics | 3 |
| DA 03520 | Healthcare Management | 3 |
| STAT 02525 | Design and Analysis of Experiments | 3 |

| **Total Required Credits for the Program** | 12 s.h. |
|---|---|

**Foundation Courses**

A sufficient computing and mathematics background evidenced by courses in Statistics, Linear Algebra, Object-Oriented Programming, and Data Structures and Algorithms.

**Graduation/Exit, Benchmark, and/or Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The Certificate of Graduate Study in Health Data Management 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**

## Certificate of Graduate Study in Networks (COGS)

The Certificate of Graduate Study (COGS) in Networks is designed to offer students the opportunity of a specialized study to provide students with experience in key courses of this discipline at the graduate level.

**Program Requirements**

**Coursework**

Students seeking this COGS will be required to take one (1) required course and three (3) restricted electives. The COGS is a stackable certificate, and students can apply their certificate credits toward the MS in Computer Science. Students may also apply some of their certificate credits toward the MS in Cybersecurity. Students should consult with the program advisor for additional information. All courses are three (3) semester hours.

**Required Courses** 3 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| CS 09510 | Computer Networks | 3 |

**Restricted Elective Courses** 9 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| CS 03580 | Cloud Computing and the Internet of Things Architectures and Security | 3 |
| CS 09605 | Wireless Networks & Systems | 3 |
| CS 09612 | Network Security | 3 |
| CS 09675 | Advanced TCP/IP & Internet Protocols & Technologies | 3 |

**Total Required Credits for the Program** 12 s.h.

**Foundation Courses**

None

**Graduation/Exit, Benchmark, and/or Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The Certificate of Graduate Study in Networks 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**

## Certificate of Graduate Study in Software Engineering (COGS)

The Certificate of Graduate Study (COGS) in Software Engineering is designed to offer students the opportunity of a specialized study to provide students with experience in key courses of this discipline at the graduate level.

**Program Requirements**

The Certificate of Graduate Study in Software Engineering consists of 12 s.h. of coursework.

**Coursework**

Students seeking this COGS will be required to take one (1) required course and three (3) restricted electives. The COGS is a stackable certificate, and students can apply their certificate credits toward the MS in Computer Science. All courses are three (3) semester hours.

**Required Courses** 3 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| CS 04524 | Agile Software Engineering | 3 |

**Restricted Electives** 9 s.h.

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

| Course # | Course Title | S.H. |
|---|---|---|
| CS 02530 | Advanced Database Systems: Theory and Programming | 3 |
| CS 02630 | Advanced Topics in Database Systems | 3 |
| CS 04515 | Embedded Systems Programming | 3 |
| CS 04548 | Programming Languages: Theory, Implementation & Application | 3 |
| CS 04563 | Concurrent Programming Theory and Practice | 3 |
| CS 04670 | Advanced Object Oriented Design | 3 |
| CS 04623 | Advanced Software Engineering | 3 |

**Total Required Credits for the Program** 12 s.h.

**Foundation Courses**

None

**Graduation/Exit, Benchmark, and/or Thesis Requirements**

None

**Minimum Required Grades and Cumulative GPA**

The Certificate of Graduate Study in Software Engineering is a Category 3 program.

*For details regarding satisfactory academic progress and graduation requirements, please visit University Policies.*

**Program Coordinator/Advisor Contact Information**

**Jack Myers**
**Robinson Hall, Room 330H**
**856.256.4500 ext. 53278**
**myersjac@rowan.edu**