Master of Data Science (MDS) Degree

Program Learning Outcomes for the MDS Degree

Upon completing the MDS degree, students will be able to:

1. Develop a graduate-level understanding of the computational and statistical foundations of Data Science.
2. Through in-depth study, obtain mastery of either one of the core methods of Data Science or one application area of Data Science.
3. Apply Data Science techniques to solve difficult, real world problems, beginning with raw and dirty data, and ending with actionable insights that are effectively communicated to a lay client.

Requirements for the MDS Degree

The MDS degree is a non-thesis master's degree. For general university requirements, please see Non-Thesis Master’s Degrees. For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students. Students pursuing the MDS degree must complete:

- A minimum of 10-13 courses (31-35 credit hours), depending on course selection, to satisfy degree requirements.
- A minimum of 31 credit hours of graduate-level study (graduate semester credit hours, coursework at the 500-level or above).
- A minimum of 24 graduate semester credit hours credit hours must be taken at Rice University.
- A minimum of 24 graduate semester credit hours must be taken in standard or traditional courses (with a course type of lecture, seminar, laboratory, lecture/laboratory).
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A maximum of 2 courses (6 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies tab.
- The requirements for one area of specialization (see below for areas of specialization). The MDS degree program offers four areas of specialization:
  - Business Analytics (p. 2), or
  - Image Processing (p. 2), or
  - Machine Learning (p. 2), or
  - Breadth (p. 2). (Breadth is an area of specialization comprised of electives from the other areas of specialization.)
- A 10-week to 6 month internship to facilitate professional development (p. 2).
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum program GPA of 2.67 or higher in all Rice coursework that satisfies requirements for the non-thesis master’s degree.

The courses listed below satisfy the requirements for this degree program. In certain instances, courses not on this official list may be substituted upon approval of the program's academic advisor, or where applicable, the department or program's Director of Graduate Studies. Course substitutions must be formally applied and entered into Degree Works by the department or program's Official Certifier. Additionally, these must be approved by the Office of Graduate and Postdoctoral Studies. Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the MDS Degree</td>
<td>31-35</td>
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Degree Requirements

Core Requirements

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td>Select 1 course from the following:</td>
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<tr>
<td></td>
<td>COMP 543                          GRADUATE TOOLS AND MODELS - DATA SCIENCE</td>
<td>3</td>
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<td></td>
<td>COMP 553                          BIG DATA MANAGEMENT FOR DATA SCIENCE</td>
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<td>COMP 643                          BIG DATA</td>
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<td></td>
<td>Data Visualization</td>
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<tr>
<td></td>
<td>COMP 665                          DATA VISUALIZATION</td>
<td>3</td>
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<td></td>
<td>Machine Learning</td>
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<td></td>
<td>Select 1 course from the following:</td>
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<tr>
<td></td>
<td>COMP 642                          MACHINE LEARNING</td>
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<td></td>
<td>ELEC 578                         INTRODUCTION TO MACHINE LEARNING</td>
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<td></td>
<td>Programming</td>
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<tr>
<td></td>
<td>COMP 614                          COMPUTER PROGRAMMING FOR DATA SCIENCE</td>
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<td></td>
<td>Statistics</td>
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</tr>
<tr>
<td></td>
<td>COMP 680                          STATISTICS FOR COMPUTING AND DATA SCIENCE</td>
<td>3</td>
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Elective Requirements

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<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td></td>
<td>Select 1 course from the following:</td>
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<td></td>
<td>COMP 566                          AI ETHICS</td>
<td>3-4</td>
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<tr>
<td></td>
<td>COMP 580                          PROBABLISTIC ALGORITHMS AND DATA STRUCTURE</td>
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<td>COMP 582                          GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS</td>
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<td>ELEC 512                         ALGORITHMS</td>
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<td></td>
<td>COMP 621                          SYSTEMS SOFTWARE</td>
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<td></td>
<td>COMP 622                          DATA ETHICS</td>
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<td>COMP 628                          CYBERSECURITY</td>
<td></td>
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<td></td>
<td>COMP 644                          DATA PRIVACY &amp; SECURITY</td>
<td></td>
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<tr>
<td></td>
<td>COMP 682                          PRINCIPLES OF ALGORITHMS AND SOFTWARE AREA</td>
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Area of Specialization

Select 1 from the following Areas of Specialization (see Areas of Specialization below):

- Business Analytics
- Image Processing
Machine Learning

Professional Development

Select 1 from the following:

A Professional Development course (see course list below)

An internship 10 weeks to 6 months in length. Students are responsible for obtaining and selecting an internship that best aligns with their career goals.

Capstone

DSCI 535 / COMP 549 APPLIED MACHINE LEARNING AND DATA SCIENCE PROJECTS 4

Total Credit Hours 31-35

Footnotes and Additional Information

Students in either program (online or on-campus) will be allowed to take up to 9 credit hours in the other modality (on-campus or online) with permission from the program advisors.

Areas of Specialization

Students must complete a minimum of 3 courses (minimum of 9 credit hours) from one Area of Specialization.

Area of Specialization: Business Analytics

Code Title Credit Hours

Select all of the following:

BUSI 711 DATA-DRIVEN MARKETING I 1.5
BUSI 712 DATA-DRIVEN MARKETING II 1.5
BUSI 721 FOUNDATIONS OF FINANCE 1.5
BUSI 722 QUANTITATIVE FINANCE 1.5
BUSI 731 FOUNDATIONS OF OPERATIONS MANAGEMENT 1.5
BUSI 732 QUANTITATIVE OPERATIONS 1.5

Total Credit Hours 9

Area of Specialization: Image Processing

Code Title Credit Hours

Select a minimum of 3 courses (minimum of 9 credit hours) from the following:

COMP 646 DEEP LEARNING FOR VISION AND LANGUAGE
ELEC 542 NEURAL METHODS FOR IMAGE SYNTHESIS
ELEC 546 / COMP 546 INTRODUCTION TO COMPUTER VISION
ELEC 549 COMPUTATIONAL PHOTOGRAPHY

Total Credit Hours 9

Area of Specialization: Machine Learning

Code Title Credit Hours

Select a minimum of 3 courses (minimum of 9 credit hours) from the following:

COMP 514 OPTIMIZATION: ALGORITHMS, COMPLEXITY, AND APPROXIMATIONS
COMP 559 MACHINE LEARNING WITH GRAPHS

COMP 631 INTRODUCTION TO INFORMATION RETRIEVAL
COMP 641 GRADUATE SEMINAR ON INTERACTIVE MACHINE LEARNING
COMP 646 DEEP LEARNING FOR VISION AND LANGUAGE
ELEC 515 MACHINE LEARNING FOR RESOURCE-CONSTRAINED PLATFORMS
ELEC 573 NETWORK SCIENCE AND ANALYTICS
ELEC 575 LEARNING FROM SENSOR DATA
ELEC 576 / COMP 576 A PRACTICAL INTRODUCTION TO DEEP MACHINE LEARNING

Total Credit Hours 9

Area of Specialization: Breadth

Select a minimum of 3 courses (minimum of 9 credit hours) from any of the areas of specialization listed above.

Please Note:

• The course BUSI 711 can only be counted towards the Area of Specialization: Breadth specialization if BUSI 712 is also counted towards the Breadth specialization.

• The course BUSI 721 can only be counted towards the Area of Specialization: Breadth specialization if BUSI 722 is also counted towards the Breadth specialization.

• The course BUSI 731 can only be counted towards the Area of Specialization: Breadth specialization if BUSI 732 is also counted towards the Breadth specialization.

Professional Development

Code Title Credit Hours

Select up to 1 course from the following (or complete a 10-week to 6 month internship):

RCEL 501 ENGINEERING MANAGEMENT & LEADERSHIP THEORY AND APPLICATION
RCEL 502 ENGINEERING PROJECT MANAGEMENT
RCEL 503 ENGINEERING PRODUCT MANAGEMENT IN INDUSTRY 4.0
RCEL 504 ETHICAL-TECHNICAL LEADERSHIP
RCEL 505 ENGINEERING ECONOMICS FOR LEADERS

Policies for the MDS Degree

Department of Computer Science Graduate Program Handbook

The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, the department of Computer Science publishes a graduate program handbook, which can be found here: https://gradhandbooks.rice.edu/2022_23/Computer_Science_Graduate_Handbook.pdf

Financial Aid

No financial aid is available from Rice University or the Computer Science Department for students in the MDS degree program.
Transfer Credit
For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer). Some departments and programs have additional restrictions on transfer credit. Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines
Students pursuing the MDS degree should be aware of the following departmental transfer credit guidelines:

• No more than 2 courses (6 credit hours) of credit from another U.S. or international universities of similar standing as Rice may apply towards the degree. Transferred courses must be comparable in content and depth to the corresponding course at Rice, and must not have counted toward another degree.

• Request for transfer credit will be considered by the Computer Science Graduate Committee Chair, and the instructor of the equivalent Rice course.

Additional Information
For additional information, please see the Graduate Programs website at https://www.cs.rice.edu/academics/graduate-programs (https://www.cs.rice.edu/academics/graduate-programs/) or contact the department at gradapp@rice.edu.

Opportunities for the MDS Degree
Fifth-Year Master’s Degree Option for Rice Undergraduate Students
In certain situations and with some terminal master’s degree programs, Rice students have an option to pursue a master’s degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master’s degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master’s degree program. A plan of study will need to be approved by the student’s undergraduate major advisor and the master’s degree program director.

As part of this option and opportunity, Rice undergraduate students:

• must complete the requirements for a bachelor’s degree and the master’s degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).

• should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).

• more information on this Undergraduate - Graduate Concurrent Enrollment opportunity, including specific information on the registration process can be found here (https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/).

Rice undergraduate students completing studies in science and engineering may have the option to pursue the Master of Data Science (MDS) degree. For additional information, students should contact their undergraduate major advisor and the MDS program director.

Additional Information
For additional information, please see the Graduate Programs website at https://www.cs.rice.edu/academics/graduate-programs (https://www.cs.rice.edu/academics/graduate-programs/) or contact the department at gradapp@rice.edu.