MASTER OF DATA SCIENCE (MDS) DEGREE, ONLINE PROGRAM

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, Online Program

The MDS degree is a non-thesis master's degree. For general university requirements, please see Non-Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/).

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 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 (p. 3) 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 Professional Development (p. 2) requirement.
- 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 (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/). 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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 543</td>
<td>GRADUATE TOOLS AND MODELS - DATA SCIENCE</td>
<td>3</td>
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<tr>
<td>COMP 553</td>
<td>BIG DATA MANAGEMENT FOR DATA SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td>COMP 643</td>
<td>BIG DATA</td>
<td>3</td>
</tr>
<tr>
<td>COMP 665</td>
<td>DATA VISUALIZATION</td>
<td>3</td>
</tr>
<tr>
<td>COMP 642</td>
<td>MACHINE LEARNING</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 578</td>
<td>INTRODUCTION TO MACHINE LEARNING</td>
<td>3</td>
</tr>
<tr>
<td>COMP 614</td>
<td>COMPUTER PROGRAMMING FOR DATA SCIENCE</td>
<td>3</td>
</tr>
<tr>
<td>COMP 680</td>
<td>STATISTICS FOR COMPUTING AND DATA SCIENCE</td>
<td>3</td>
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Elective Requirements

Select 1 course from the following:

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>COMP 556</td>
<td>AI ETHICS</td>
<td>3</td>
</tr>
<tr>
<td>COMP 560</td>
<td>PROBABILISTIC ALGORITHMS AND DATA STRUCTURE</td>
<td>3</td>
</tr>
<tr>
<td>COMP 582</td>
<td>GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS</td>
<td>3</td>
</tr>
<tr>
<td>ELEC 512</td>
<td>SYSTEMS SOFTWARE</td>
<td>3</td>
</tr>
<tr>
<td>COMP 621</td>
<td>DATA ETHICS</td>
<td>3</td>
</tr>
<tr>
<td>COMP 628</td>
<td>CYBERSECURITY</td>
<td>3</td>
</tr>
<tr>
<td>COMP 644</td>
<td>DATA PRIVACY &amp; SECURITY</td>
<td>3</td>
</tr>
<tr>
<td>COMP 682</td>
<td>PRINCIPLES OF ALGORITHMS AND SOFTWARE AREA</td>
<td>3</td>
</tr>
</tbody>
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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: 0-3

A Professional Development course (see course list below)
A relevant internship 10 weeks to 6 months in length.
Current or past post-baccalaureate relevant work experience of at least 10 weeks.

Capstone

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

Total Credit Hours 31-35

Footnotes and Additional Information

1 Students admitted into 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

Select all of the following:

BUSI 711 & BUSI 712 DATA-DRIVEN MARKETING I and DATA-DRIVEN MARKETING II 3
BUSI 721 & BUSI 722 DATA-DRIVEN FINANCE I and DATA-DRIVEN FINANCE II 3
BUSI 731 & BUSI 732 FOUNDATIONS OF OPERATIONS MANAGEMENT and QUANTITATIVE OPERATIONS 3

Total Credit Hours 9

Area of Specialization: Image Processing

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

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
COMP 647 DEEP LEARNING
COMP 652 NATURAL LANGUAGE PROCESSING
COMP 653 STATISTICAL MACHINE LEARNING
COMP 659 MACHINE LEARNING WITH GRAPHS
COMP 670 NLP: COMBINATORIAL OPTIMIZATION
COMP 686 UNsupervised LEARNING WITH COLD DATA
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 if BUSI 712 is also counted towards the Area of Specialization: Breadth.
• The course BUSI 721 can only be counted towards the Area of Specialization: Breadth if BUSI 722 is also counted towards the Area of Specialization: Breadth.
• The course BUSI 731 can only be counted towards the Area of Specialization: Breadth if BUSI 732 is also counted towards the Area of Specialization: Breadth.

Professional Development

In order to fulfill the Professional Development requirement, students must select up to 1 course (up to 3 credit hours) from the following, or

• Complete a relevant internship 10 weeks to 6 months in length. Students are responsible for obtaining and selecting an internship that best aligns with their career goals, or
• Complete current or past post-baccalaureate relevant work experience of at least 10 weeks.

Code Title Credit Hours
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

Total Credit Hours 0-3
Policies for the MDS Degree, Online Program

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/2023_24/Computer_Science_Masters_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. Transfer coursework 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 or contact the department at gradapp@rice.edu.

Opportunities for the MDS Degree, Online Program

Additional Information

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