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 (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 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 five areas of specialization:
    - Business Analytics (p. 2), *or*
    - Energy Transition and Sustainability (p. 2), *or*
    - Image Processing (p. 2), *or*
    - Machine Learning (p. 2), *or*
    - Sport Analytics (p. 3).
- A Professional Development (p. 3) 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.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the MDS Degree		31-35

Degree Requirements

Code	Title	Credit Hours
Core Requirements [1]		
Big Data		
Select 1 course from the following:		*3*
COMP 543	GRADUATE TOOLS AND MODELS - DATA SCIENCE	
COMP 553	BIG DATA MANAGEMENT FOR DATA SCIENCE	
COMP 643	BIG DATA	
Data Visualization		
COMP 665	DATA VISUALIZATION	3
Machine Learning		
Select 1 course from the following:		*3*
COMP 642	MACHINE LEARNING	
ELEC 578	INTRODUCTION TO MACHINE LEARNING	
Programming		
COMP 614	COMPUTER PROGRAMMING FOR DATA SCIENCE	3
Statistics		
COMP 680	STATISTICS FOR COMPUTING AND DATA SCIENCE	3
Elective Requirements [1]		
Select 1 course from the following:		*3-4*
COMP 510	COMPUTER ETHICS	
COMP 566	AI ETHICS	
COMP 580	PROBABILISTIC ALGORITHMS AND DATA STRUCTURE	
COMP 582 / ELEC 512	GRADUATE DESIGN AND ANALYSIS OF ALGORITHMS	
COMP 621	SYSTEMS SOFTWARE	
COMP 622	DATA ETHICS	
COMP 628	CYBERSECURITY	
COMP 644	DATA PRIVACY & SECURITY	
COMP 682	PRINCIPLES OF ALGORITHMS AND SOFTWARE AREA	
Area of Specialization [1]		
Select 1 from the following Areas of Specialization (see Areas of Specialization below):		*9*
Business Analytics		
Energy Transition and Sustainability		

	Image Processing	
	Machine Learning	
	Sport Analytics	
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. Students are responsible for obtaining and selecting an internship that best aligns with their career goals.	
	Current or past post-baccalaureate relevant work experience of at least 10 weeks.	
Capstone [1]		
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

Code	Title	Credit Hours
Select a minimum of 3 courses (minimum of 9 credit hours) from the following:		*9*
BUSI 711 & BUSI 712	DATA-DRIVEN MARKETING I and DATA-DRIVEN MARKETING II [1]	
BUSI 721 & BUSI 722	DATA-DRIVEN FINANCE I and DATA-DRIVEN FINANCE II [2]	
BUSI 731 & BUSI 732	FOUNDATIONS OF OPERATIONS MANAGEMENT and QUANTITATIVE OPERATIONS [3]	
INDE 545	PRESCRIPTIVE ANALYTICS	
INDE 546	COMPUTATIONAL PRESCRIPTIVE ANALYTICS	
INDE 567	OPTIMIZATION METHODS IN FINANCE	
STAT 649	QUANTITATIVE FINANCIAL RISK MANAGEMENT	
STAT 682	QUANTITATIVE FINANCIAL ANALYTICS	
Total Credit Hours		**9**

Footnotes and Additional Information

[1]   The course BUSI 711 can only be counted towards the Area of Specialization: Business Analytics if the course BUSI 712 is also counted towards the Area of Specialization: Business Analytics.

[2]   The course BUSI 721 can only be counted towards the Area of Specialization: Business Analytics if the course BUSI 722 is also counted towards the Area of Specialization: Business Analytics.

[3]   The course BUSI 731 can only be counted towards the Area of Specialization: Business Analytics if the course BUSI 732 is also counted towards the Area of Specialization: Business Analytics.

Area of Specialization: Energy Transition and Sustainability

Code	Title	Credit Hours
Select a minimum of 3 courses (minimum of 9 credit hours) from the following:		*9*
CHBE 614	ADVANCED COMPUTATIONAL METHODS FOR ENERGY	
EEPS 583	DATA MANAGEMENT AND DATA GOVERNANCE	
EEPS 585	COMPUTATIONAL AND DATA SCIENCE IN THE ENERGY INDUSTRY	
EEPS 651	GEOPHYSICAL DATA ANALYSIS: INVERSE METHODS	
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:		*9*
COMP 646	DEEP LEARNING FOR VISION AND LANGUAGE	
ELEC 542	GENERATIVE AI FOR IMAGE DATA	
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:		*9*
COMP 514	OPTIMIZATION: ALGORITHMS, COMPLEXITY, AND APPROXIMATIONS	
COMP 552	REINFORCEMENT LEARNING	
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	
ELEC 515	MACHINE LEARNING FOR RESOURCE-CONSTRAINED PLATFORMS	
ELEC 542	GENERATIVE AI FOR IMAGE DATA	
ELEC 570	DISTRIBUTED METHODS FOR OPTIMIZATION AND MACHINE LEARNING	
ELEC 573	NETWORK SCIENCE AND ANALYTICS	
ELEC 575	LEARNING FROM SENSOR DATA	
ELEC 576 / COMP 576	A PRACTICAL INTRODUCTION TO DEEP MACHINE LEARNING	

ELEC 631	ADVANCED MACHINE LEARNING	
Total Credit Hours		**9**

Area of Specialization: Sport Analytics

Code	Title	Credit Hours
Select a minimum of 3 courses (minimum of 9 credit hours) from the following:		9
SMGT 530	INTRODUCTION TO SPORT ANALYTICS	
SMGT 531	ADVANCED SPORT ANALYTICS	
SMGT 532	SOCCER ANALYTICS	
SMGT 535	BASEBALL ANALYTICS	
SMGT 590	SEMINAR IN SPORTS ANALYTICS	
Total Credit Hours		**9**

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 internship10-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
Select up to 1 course from the following:		0-3
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 ENGINEERING 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/2024_25/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. Requests for transfer credit must be approved for Rice equivalency by the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content) and by the Office of Graduate and Postdoctoral Studies (GPS). 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 courses must be comparable in content and depth to the corresponding course at Rice and must not have counted toward another degree.

Additional Information

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