Graduate Programs in Data Science and Engineering
University of Maine

Online Model Curricula

Numerous course paths exist for earning the ***MS in Data Science and Engineering***. Many course selection variations exist based on the specific backgrounds and interests of each student and whether prerequisites have been met through previous coursework.

The model curriculum listed below was developed using courses that are currently available online. If a course is offered online, it is typically offered simultaneously on-campus. That is, a student may enroll typically in either the online or on-campus section of the same course. Thus, all of the courses listed here are also available for on-campus students.

Further, in the model curriculum below, the listing does not include online courses that require prerequisites that would be met typically by students only with specific undergraduate degrees. The model curriculum is suggested as a starting point for those that have the minimum qualifications to successfully pursue a graduate degree in data science and engineering. It also assumes the student will be pursuing an all coursework degree rather than a thesis.

It is highly recommended that you plan out all ten courses you intend to include in your MS Program of Study prior to starting your graduate course work. Do this with your faculty adviser. This will help ensure that the courses you desire to take will be available when you want them and any prerequisites have been met. Courses may be planned out and approved in advance using the Master's and CAS Program of Study

Those with undergraduate degrees in computer science, engineering or math likely qualify to take a much broader range of courses than are listed in the following limited model curriculum. To select from all on-campus and online courses for which you may qualify and that you may desire to take, consult the full listing of courses. Further, also consider the full range of both research-based and coursework-only DSE graduate programs.

Graduate students accepted into the program, whether participating online or on-campus, may also want to consider applying for and earning one or more graduate certificates as focus areas within their master's degree program. Courses typically double count for both graduate credentials if appropriately selected. Courses may be planned out and approved in advance using the Certificate Program of Study.

Requirements for the MS Data Science and Engineering
(Coursework Only Option)

The candidate must complete 30 credits consisting of:

(a) **Required Course:** DSE 510 Practicum in Data Science and Engineering (3cr)
(b) 12 course credits from at least four of the five **Theme Areas**
(c) 15 further course credits from within the **Foundation Courses**, **Theme Areas**, or **Domain Specializations**
(d) At least one course must include a **substantial practical experience**. Options include SIE 589 Graduate Project, SIE 590 Information Systems Internship, or a course from an approved list.

Model Curriculum for the MS Data Science and Engineering

(Coursework Only Option pursued Online in Entirety)

The prerequisites listed in the tables below are summaries. Please consult the course descriptions at https://umaine.edu/dse/graduate-programs/dse-program-course-descriptions/ for the detailed prerequisites. For all courses it is assumed that the student has been formally admitted into the MSDSE or Graduate Certificate in DSE program.

*** - indicates course is offered online in Spring semester 2021

(1) Foundation Courses
Take these courses early if you need them and as recommended by your adviser. These will count toward the ten graduate courses required.

Fall	Summary Prereq	**Spring**	Summary Prereq
DSE 501 Statistical Foundations of Data Science and Engineering	college level statistics	DSE 503 (ECE 598) Systems Foundations for Data Science and Engineering ***	SIE 507
SIE 507 Information Systems Programming	none		

(2) Required Courses
Take DSE 510 in the Spring of your first year and take the Practical Experience course near the end of your program or after completion of a minimum of nine credits in the program

Fall	Summary Prereq	**Spring**	Summary Prereq
		DSE 510 (SIE 598) Practicum in Data Science ***	SIE 507
SIE 589 Graduate Project **or** SIE 590 Information Systems Internship **or** other approved practical experience course	9 previous program credits	SIE 589 Graduate Project **or** SIE 590 Information Systems Internship **or** other approved practical experience course	9 previous program credits

(3) Theme Area Courses

Take a minimum of 1 course in at least 4 out of the 5 theme areas.

Theme 1: Data Collection Technologies
Theme 2: Data Representation and Management
Theme 3: Data Analytics
Theme 4: Data Visualization and Human Centered Computing
Theme 5: Data Security, Preservation, and Reuse

Fall			Spring		
Theme Area	Course	Summary Prereq	Theme Area	Course	Summary Prereq
1	SIE 559 Geosensor Networks	Progrmng	1	BUA 682 Data Pre-processing for Business Analytics	Stats & progrmng
2	BUA 681 Data Management & Analyt	Stats & progrmng	2	SIE 557 Database Systems Applications ***	
	SIE 550 Design of Information Systems				
3	EHD 573 Statistical Methods in Education 1		3	BUA 684 Business Data Mining and Knowledge Discovery ***	Stats & progrmng
				COS 575 (COS 598) Machine Learning ***	MAT 126, MAT 127, STS 232
				EHD 573 Statistical Methods in Education 1 ***	
4	SIE 515 Human Computer Interaction		4	BUA 683 Information Visualization ***	Stats & progrmng
	SIE 517 Spatial Interaction Design				
5	COS 535 Information Privacy Engineering	IT knwldg & softwre engr	5	DIG 510 Metadata Systems	SUMMER
	DIG 500 Introduction to Digital Curation			SIE 525 Information Systems Law ***	
	CYB 501 Cybersecurity Fndmtls	(UMA)		CYB 501 Cybersecurity Fndmtls ***	(UMA)
	CYB 520 Cybersecurity Policy and Risk Managemnt	(UMA)			
	CYB 551 Cybersecurity Investigations	(UMA)			

(4) Domain Courses

The remainder of the ten required courses may consist of any course above not yet taken or selected from among any of the following domains.

Domain A: Spatial Informatics
Domain B: Bioinformatics / Biomedicine
Domain C: Business Information
Domain D: Social and Behavioral Data Science
Domain E: Engineering Analytics

Some of the listings below may require a course to be completed first in one of the above previous categories.

Fall			**Spring**		
Domain	Course	Summary Prereq	Domain	Course	Summary Prereq
A	SIE 509 Principles of Geographic Information Systems		A	SIE 505 Formal Foundations for Information Science	SIE 550
	SIE 512 Spatial Analysis	Intro statistics		SIE 510 GIS Applications ***	SIE 509
	SIE 555 Spatial Database Systems	SIE 550		SIE 516 Interactive Technologies for Solving Real World Problems ***	
	SIE 558 Real-time Sensor Data Streams	Progrmng		CIS 461 Spatial-Temporal Info Sci	Prev GIS (UMA)
	ANT 521 Geographic Info Systems 1	(UMM)		GEO 605 Remote Sensing ***	(USM)
	ANT 522 Geographic Info Systems 2	Previous GIS (UMM)		ANT 521 Geographic Info Systems 1 ***	(UMM)
				ANT 522 Geographic Info Systems 2 ***	Previous GIS (UMM)
				GIS 428 Web-Based Maps, Applications & Services ***	Previous GIS (UMM)
B	None offered		B	BMB 502 Introduction to Bioinformatics (Synchronous) ***	Molecular & Cellular Biology
				SIE 505 Formal Foundations for Information Science	SIE 550
C	BUA 680 Foundations of Business Intelligence	Intro statistics	C	BUA 680 Foundatns of Business Intelligence ***	Intro statistics
	BUA 685 Problem Solving and Decision Analysis	Stats,ecn princpls & progrmng		BUA 684 Business Data Mining & Kowldg Discovery ***	Stats & progrmng

				BUA 686 Predictive Analytics & Business	Stats & progrmng SUMMER
D	None		D	HTY 665 Digital and Spatial History	
E	Some online courses for ECE students		E	ECE 584 Estimation Theory	SUMMER

ADDITIONAL ONLINE COURSES FOR THOSE WITH SPECIALTY BACKGROUNDS

The online courses listed below may be appropriate for students possessing substantial ***specialty prerequisite courses*** prior to entering the *MS Data Science and Engineering* program. Such candidates may be able to choose from among the following without pursuing substantial additional prerequisite work. These courses fit various ***Theme Areas*** and ***Domains*** as listed at https://umaine.edu/dse/graduate-programs/graduate-courses/

Fall		**Spring**	
Course	Summary Prereq	Course	Summary Prereq
ECE 515 Random Variables and Stochastic Processes	ECE 316 or equivalent	ECE 585 Foundations of Wireless Communications	ECE 484
ECE 583 Coding and information Theory	ECE 515	EHD574 Statistical Methods in Education II ***	EHD 573
SIE 585 Formal Ontologies: Principles and Practice	SIE 505	DIG 550 Digital Preservation ***	DIG 500, 510, & 540
SVT 437 Practical GPS	SVT 341	SVT 532 Survey Strategies in Use of Lidar ***	SVT 331
SVT 531 Advanced Digital Photogrammetry	SVT 331		
GIS 420 Remote Sensing & Image Analysis (UMM)	ANT 522		
GIS 426 Community Applications of GIS (UMM)	ANT 522		
CIS 450 Data Mining (UMA)	CIS 225, 352, 360, or 449		