MATHEMATICS: MATHEMATICS FOR DATA SCIENCE

REQUIREMENTS

REQUIREMENTS

The Mathematics for Data Science program requires 10 distinct courses for at least 30 credits as described below. Note that while some courses may be used to fulfill more than one requirement it is still considered only a single course and may only contribute once to the total course count. Finally, at most one course from each of the following groupings may be used to fulfill the minimum course and credit requirement (i.e.: minimum of ten courses and at least 30 credits): Intro Linear Algebra (MATH 320, MATH 340, MATH 341, MATH 375), Intro Differential Equations (MATH 319, MATH 320 or MATH 376), and and Intro Probability (MATH/STAT 309 or MATH/STAT 431).

Code	Title	Credits
Core Math Requirement (minimum of six distinct MATH courses for at least 18 credits)		
Linear Algebra		*3-5*
MATH 341	Linear Algebra	
or MATH 320	Linear Algebra and Differential Equations	
or MATH 340	Elementary Matrix and Linear Algebra	
or MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
Intermediate Mathematics Requirement (complete at least one)		*0-6*
MATH 421	The Theory of Single Variable Calculus	
MATH 341	Linear Algebra	
MATH 321 & MATH 322	Applied Mathematical Analysis and Applied Mathematical Analysis	
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
Probability (complete at least one)		*3*
MATH/STAT 431	Introduction to the Theory of Probability	
or MATH/ STAT 309	Introduction to Probability and Mathematical Statistics I	
MATH 531	Probability Theory	
Numerical and optimization methods (complete at least one)		*3*
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI/I SY E/ STAT 525	Linear Optimization	
MATH/ COMP SCI 514	Numerical Analysis	
MATH 443	Applied Linear Algebra	
MATH/ COMP SCI/ I SY E 425	Introduction to Combinatorial Optimization	
Mathematics of data		*3*
MATH 535	Mathematical Methods in Data Science	
Advanced Electives (complete at least one):		*0-3*
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI 514	Numerical Analysis	
MATH 521	Analysis I	
MATH/ COMP SCI/I SY E/ STAT 525	Linear Optimization	
MATH 531	Probability Theory	
MATH 540	Linear Algebra II	
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction	
MATH/I SY E/ OTM/STAT 632	Introduction to Stochastic Processes	
Electives to reach required six courses for at least 18 credits in MATH [1]		*0-6*
MATH/STAT 310	Introduction to Probability and Mathematical Statistics II	
MATH/ COMP SCI/ I SY E 425	Introduction to Combinatorial Optimization	
MATH 443	Applied Linear Algebra	
MATH 444	Graphs and Networks in Data Science	
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI 514	Numerical Analysis	
MATH 521	Analysis I	
MATH/ COMP SCI/I SY E/ STAT 525	Linear Optimization	
MATH 531	Probability Theory	
MATH 540	Linear Algebra II	
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction	
MATH/I SY E/ OTM/STAT 632	Introduction to Stochastic Processes	
Data Science Requirement (at least four courses for at least 12 credits) [2]		**12**
Data Science Fundamentals (choose one)		
STAT 340	Data Science Modeling II	
COMP SCI 320	Data Science Programming II	
Remaining courses may be selected from below or from the MATH elective lists above. [3]		
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI/ E C E 533	Image Processing	

COMP SCI/E C E/ M E 539	Introduction to Artificial Neural Networks
COMP SCI 540	Introduction to Artificial Intelligence
COMP SCI/ E C E 561	Probability and Information Theory in Machine Learning
COMP SCI/ B M I 567	Medical Image Analysis
COMP SCI/ B M I 576	Introduction to Bioinformatics
STAT 351	Introductory Nonparametric Statistics
STAT 421	Applied Categorical Data Analysis
STAT/M E 424	Statistical Experimental Design
STAT 433	Data Science with R
STAT 443	Classification and Regression Trees
STAT 453	Introduction to Deep Learning and Generative Models
STAT 456	Applied Multivariate Analysis
STAT 461	Financial Statistics
STAT/ COMP SCI 471	Introduction to Computational Statistics
STAT/B M I 641	Statistical Methods for Clinical Trials
STAT/B M I 642	Statistical Methods for Epidemiology
ECON 400	Introduction to Applied Econometrics
ECON 410	Introductory Econometrics
ECON 570	Fundamentals of Data Analytics for Economists
I SY E 412	Fundamentals of Industrial Data Analytics
I SY E 612	Information Sensing and Analysis for Manufacturing Processes
M E 536	Data Driven Engineering Design
Total Credits	**30**

RESIDENCE AND QUALITY OF WORK

- 2.000 GPA on all MATH courses and courses eligible for the major.[4]
- 2.000 GPA on at least 15 credits of upper level credit in the major.[5]
- 15 credits in MATH in the major taken on the UW-Madison campus.[6]

FOOTNOTES

[1] Elective courses must be distinct from those used to fulfill the above requirements.

[2] Courses below may have prerequisites outside of this program.

[3] MATH courses must be distinct from any used to fulfill an above requirement.

[4] This includes any course with a MATH prefix (or crosslisted with MATH) regardless of its appearance in the tables above and any non-MATH class explicitly listed in the tables above.

[5] This includes any MATH course (including those crosslisted with MATH) numbered 307 and above, regardless of its appearance in the tables above, as well as only those non-MATH classes which appear in the tables above and have the advanced LAS attribute.

[6] This includes any MATH course (and those crosslisted with MATH) numbered 307 and above.

FOUR-YEAR PLAN

SAMPLE FOUR-YEAR PLAN

This Sample Four-Year Plan is a tool to assist students and their advisor(s). Students should use it—along with their DARS report, the Degree Planner, and Course Search & Enroll tools—to make their own four-year plan based on their placement scores, credit for transferred courses and approved examinations, and individual interests. As students become involved in athletics, honors, research, student organizations, study abroad, volunteer experiences, and/or work, they might adjust the order of their courses to accommodate these experiences. Students will likely revise their own four-year plan several times during college.

In general, your four year plan in mathematics should be organized along the following sequence:

1. Calculus
2. Linear Algebra
3. Required Intermediate level course
4. Additional intermediate level courses as needed
5. Required advanced level course
6. Additional advanced level courses

Freshman

Fall	Credits	Spring	Credits
MATH 221	5	MATH 222	4
Literature Breadth	3	Literature Breadth	3
Communication A	3	Ethnic Studies	3
Foreign Language	4	Foreign Language	4
	15		**14**

Sophomore

Fall	Credits	Spring	Credits
MATH 234	4	MATH Required Linear Algebra	3
Humanities Breadth	3	MATH Required Probability	3
Communication B	3	Humanities Breadth	3
Prerequisite for Data Science Fundamentals course	3	Physical Science Breadth	3
Elective	3	Elective	3
	16		**15**

Junior

Fall	Credits	Spring	Credits
Required Intermediate MATH	3	MATH Elective	3
Data Science Fundamentals Course	3	Data Science Elective	3
Social Sciences Breadth	3	Social Science Breadth	3
Biological Sciences Breadth	3	Biological Sciences Breadth	3

Elective		3 Elective	3
	15		**15**

Senior

Fall	**Credits**	**Spring**	**Credits**
MATH 535	3	Advanced MATH elective	3
Data Science Elective	3	Data Science Elective	3
Social Science Breadth	3	Social Science Breadth	3
Electives	6	Electives	6
	15		**15**

Total Credits 120