MATHEMATICS: MATHEMATICS FOR DATA SCIENCE

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 only one course from each of the following groupings may be used to fulfill the minimum course and credit requirement (i.e.: requirements: 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 340	Elementary Matrix and Linear Algebra	
or MATH 320	Linear Algebra and Differential Equations	
or MATH 341	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/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/ 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/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	
Total Credits		**27-33**

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.