MATHEMATICS: MATHEMATICS FOR STATISTICAL ANALYSIS AND RISK ASSESSMENT

The mathematics named option programs allow students to develop a deep understanding of how the subject relates to other areas of human inquiry. The requirements for these programs feature mathematics courses with topics inspired by and commonly applied to problems in these associated fields. Though often paired with a second major in a related area, these programs function well alone and are suited to any mathematics student with a variety of interests. Students interested in a named option program are recommended to meet with an advisor to navigate the various plans and courses available to them. Advising information can be found on the BA or BS pages (http://guide.wisc.edu/undergraduate/letters-science/mathematics/mathematics-ba/#advisingandcareerstext).

The named options do not support honors in the major.

REQUIREMENTS

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The Mathematics for Statistical Analysis and Risk Assessment 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 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) [1]		
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	
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	
Statistics [1]		*3*
MATH/STAT 310	Introduction to Probability and Mathematical Statistics II (Statistics)	
Intermediate Mathematics Requirement (complete at least one)		*0-6*
MATH 321 & MATH 322	Applied Mathematical Analysis and Applied Mathematical Analysis	
MATH 341	Linear Algebra	
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	
MATH 421	The Theory of Single Variable Calculus	
Advanced Mathematics Requirement (select one)		*3*
MATH/ COMP SCI 514	Numerical Analysis	
MATH 521	Analysis I	
MATH 531	Probability Theory	
MATH 535	Mathematical Methods in Data Science	
MATH 540	Linear Algebra II	
Electives to reach required six courses for at least 18 credits in MATH		*3-6*
At least one elective must come from: [2]		
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI 514	Numerical Analysis	
MATH 519	Ordinary Differential Equations	
MATH 521	Analysis I	
MATH 522	Analysis II	
MATH/ COMP SCI/I SY E/ STAT 525	Linear Optimization	
MATH 531	Probability Theory	
MATH 535	Mathematical Methods in Data Science	
MATH 540	Linear Algebra II	
MATH 541	Modern Algebra	
MATH 542	Modern Algebra	
MATH 605	Stochastic Methods for Biology	
MATH 616	Data-Driven Dynamical Systems, Stochastic Modeling and Prediction	
MATH 619	Analysis of Partial Differential Equations	
MATH 627	Introduction to Fourier Analysis	
MATH 629	Introduction to Measure and Integration	
MATH/I SY E/ OTM/STAT 632	Introduction to Stochastic Processes	
MATH 635	An Introduction to Brownian Motion and Stochastic Calculus	
Remaining courses/credits may be selected from:		
MATH 319	Techniques in Ordinary Differential Equations	
MATH 321	Applied Mathematical Analysis	
MATH 322	Applied Mathematical Analysis	

MATH 376	Topics in Multi-Variable Calculus and Differential Equations
MATH 415	Applied Dynamical Systems, Chaos and Modeling
MATH 421	The Theory of Single Variable Calculus
MATH/ COMP SCI/ I SY E 425	Introduction to Combinatorial Optimization
MATH/ COMP SCI/ E C E 435	Introduction to Cryptography
MATH 443	Applied Linear Algebra
MATH 444	Graphs and Networks in Data Science
MATH 467	Introduction to Number Theory
MATH/ COMP SCI/ STAT 475	Introduction to Combinatorics

Statistics/Risk Requirement (Four Courses distinct from the above for at least 12 credits) [3]

Select a distinct introduction course or sequence:		*3-6*
Actuarial Sciences:		
ACT SCI 303	Theory of Interest	
Statistics:		
STAT 333 & STAT/M E 424	Applied Regression Analysis and Statistical Experimental Design	
Data Science:		
STAT 340 & STAT/M E 424	Data Science Modeling II and Statistical Experimental Design	
Select remaining courses/credits from: [4]		*6-14*
ACT SCI 650	Fundamentals of Long-Term Actuarial Modeling	
ACT SCI 651	Advanced Long-Term Actuarial Modeling	
ACT SCI 652	Fundamentals of Short-Term Actuarial Modeling	
ACT SCI 653	Advanced Short-Term Actuarial Modeling	
ACT SCI 654	Regression and Time Series for Actuaries	
ACT SCI 655	Health Analytics	
GEN BUS 656	Machine Learning for Business Analytics	
STAT 349	Introduction to Time Series	
STAT 351	Introductory Nonparametric Statistics	
STAT 411	An Introduction to Sample Survey Theory and Methods	
STAT 421	Applied Categorical Data Analysis	
STAT 451	Introduction to Machine Learning and Statistical Pattern Classification	
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/COMP SCI/ MATH 475	Introduction to Combinatorics	
STAT/COMP SCI/ I SY E/MATH 525	Linear Optimization	
STAT 575	Statistical Methods for Spatial Data	
STAT/I SY E/ MATH/OTM 632	Introduction to Stochastic Processes	
STAT/B M I 641	Statistical Methods for Clinical Trials	
STAT/B M I 642	Statistical Methods for Epidemiology	
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.[5]
- 2.000 GPA on at least 15 credits of upper level credit in the major.[6]
- 15 credits in MATH in the major taken on the UW-Madison campus.[7]

FOOTNOTES

1 Students taking STAT 312 to satisfy the Statistics requirement will not be able to use this course towards the six courses/18 credits of MATH courses.

2 This course must be distinct from the advanced mathematics requirement.

3 The courses which follow may have prerequisites outside of this program.

4 Any MATH course from the elective list above may be used in lieu of any of the following courses.

5 This includes any course with a MATH prefix (or cross-listed with MATH) regardless of its appearance in the tables above and any non-MATH course explicitly listed in the tables above.

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

7 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 if required	4	Foreign Language (if required)	4
	15		**14**

Sophomore

Fall	Credits	Spring	Credits
MATH 234[1]	4	MATH Required Linear Algebra	3
Humanities Breadth	3	MATH required Probability	3
Communication B	3	Humanities Breadth	3
Physical Science Breadth	3	Physical Science Breadth	3
Elective	3	Elective	3
	16		**15**

Junior

Fall	Credits	Spring	Credits
MATH required Statistics	3	Required Intermediate MATH	3
Data/Risk course	3	Data/Risk course	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
Required Advanced MATH	3	Advanced MATH Elective	3
Data/Risk course	3	Data/Risk course	3
Social Science Breadth	3	Social Science Breadth	3
Elective	3	Elective	3
Elective	3	Elective	3
	15		**15**

Total Credits 120

[1] Students should declare their major upon the successful completion of this course