MATHEMATICS: MATHEMATICS FOR PROGRAMMING AND COMPUTING

REQUIREMENTS

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The Mathematics for Programming and Computing program requires 10 distinct courses for at least 30 credits as described below. While a single courses may be used to fulfill more than one requirement, it will 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)		
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 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	
MATH 467	Introduction to Number Theory	
Advanced Mathematics Requirement (complete 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	
MATH 541	Modern Algebra	
MATH/ PHILOS 571	Mathematical Logic	
MATH Elective to reach required minimum of six courses for at least 18 credits		*6-12*
At least one course must be from: [1]		
MATH/ COMP SCI 513	Numerical Linear Algebra	
MATH/ COMP SCI 514	Numerical Analysis	
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 567	Modern Number Theory	
MATH 570	Fundamentals of Set Theory	
MATH/ PHILOS 571	Mathematical Logic	
MATH 605		
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	
Select remaining courses from:		
MATH/STAT 310	Introduction to Probability and Mathematical Statistics II	
MATH 319	Techniques in Ordinary Differential Equations	
or MATH 376	Topics in Multi-Variable Calculus and Differential Equations	
MATH 321	Applied Mathematical Analysis	
MATH 322	Applied Mathematical Analysis	
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/STAT 431	Introduction to the Theory of Probability	
or MATH/ STAT 309	Introduction to Probability and Mathematical Statistics I	
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	
Programming and Computations Requirement (Four Courses distinct from the above for at least 12 credits) [2]		
COMP SCI 300	Programming II	3
COMP SCI 400	Programming III	3
Elective [3]		6-8
COMP SCI 412	Introduction to Numerical Methods	
COMP SCI/I SY E/ MATH 425	Introduction to Combinatorial Optimization	
COMP SCI/E C E/ MATH 435	Introduction to Cryptography	
COMP SCI/ STAT 471	Introduction to Computational Statistics	
COMP SCI/ MATH/STAT 475	Introduction to Combinatorics	
COMP SCI/ MATH 513	Numerical Linear Algebra	
COMP SCI/ MATH 514	Numerical Analysis	
COMP SCI 520	Introduction to Theory of Computing	
COMP SCI/E C E/ I SY E 524	Introduction to Optimization	
COMP SCI/I SY E/ MATH/STAT 525	Linear Optimization	
COMP SCI/ I SY E 526	Advanced Linear Programming	
COMP SCI/E C E/ M E 532	Matrix Methods in Machine Learning	
COMP SCI/ E C E 533	Image Processing	
COMP SCI 534	Computational Photography	
COMP SCI 538	Introduction to the Theory and Design of Programming Languages	
COMP SCI/E C E/ M E 539	Introduction to Artificial Neural Networks	
COMP SCI 540	Introduction to Artificial Intelligence	
COMP SCI/I SY E/ M E 558	Introduction to Computational Geometry	
COMP SCI 559	Computer Graphics	
COMP SCI/ B M I 567	Medical Image Analysis	
COMP SCI/ B M I 576	Introduction to Bioinformatics	
COMP SCI 577	Introduction to Algorithms	
COMP SCI/ I SY E 635	Tools and Environments for Optimization	
COMP SCI 642	Introduction to Information Security	
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. This course must be distinct from the advanced mathematics requirement.
2. Courses below may have prerequisites outside of the requirements for this named option.
3. Any MATH course from the elective list above may be used in lieu of any of the following courses.
4. This includes any course with a MATH prefix (including those cross-listed with MATH) regardless of major program as well as only those non-MATH course explicitly listed in the tables above.
5. This includes any course with a MATH prefix (including those cross-listed with MATH) numbered 307 and above as well as only those non-MATH courses which appear in the tables above and carry the advanced LAS designation.
6. This includes only those courses with a MATH prefix (or crosslisted with MATH).

FOUR-YEAR PLAN

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This Four-Year Plan is only one way a student may complete an L&S degree with this major. Many factors can affect student degree planning, including placement scores, credit for transferred courses, credits earned by examination, and individual scholarly interests. In addition, many students have commitments (e.g., athletics, honors, research, student organizations, study abroad, work and volunteer experiences) that necessitate they adjust their plans accordingly. Informed students engage in their own unique Wisconsin Experience by consulting their academic advisors, Guide, DARS, and Course Search & Enroll for assistance making and adjusting their plan.

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	Required Intermediate MATH	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
Intermediate MATH	3	Intermediate MATH	3
COMP SCI 300	3	COMP SCI 400	3
Social Sciences Breadth	3	L&S Breadth - Social Science	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	3
Elective Programming/ Computations Course	3	Elective Programming/ Computations 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 the major upon the successful completion of this course