



# Mathematics

## 2020-2021 Majors Advising Guide

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# Mathematics Major

## Learning Outcomes

### Knowledge Outcome

- Mathematics graduates display a depth and breadth of mathematical knowledge in both pure and applied areas.

### Skill Outcomes

- Mathematics graduates analyze data and model real-world problems, using technology as appropriate.
- Mathematics graduates provide effective rationale and coherent mathematical arguments to support their conclusions.
- Mathematics graduates effectively communicate complex mathematical concepts orally and in writing.

### Dispositional Outcomes

- Mathematics graduates learn independently.
- Mathematics graduates value their mathematical achievements as well as express an appreciation for mathematics itself.

## Course Requirements

### Lower Division Core (26 credits)

- Elementary Statistics (MTH 243)
- Single-Variable Calculus (MTH 251, 252, and 253)
- Multivariable Calculus (MTH 281)
- Linear Algebra (MTH 261)
- Mathematical Perspectives (MTH 290)

### Upper Division Sequences (39-41 credits)

- Foundations*: Number Structures (MTH 311) and Geometry (MTH 411)
- Analysis*: Introduction to Real Analysis (MTH 331) and one topic in Analysis (MTH 431)
- Abstract Algebra*: Introduction to Algebraic Systems (MTH 341) and one topic in Abstract Algebra (MTH 441)
- Probability and Statistics*: Probability (MTH 361) and Statistics (MTH 461)
- Applied Area*: Differential Equations (MTH 321) AND  
Any *one* topic in Applied Mathematics (MTH 421)  
or any *two* distinct topics in Middle School and High School Mathematics (MTH 481)

### Capstone (8 credits)

- Senior Colloquium (MTH 490)

### Associated Requirements (3-4 credits)

- Computer Programming (MTH 271, CS 256, CS 257, CH 371, PH 380 or approved substitution)

### Grade Policies

- *All classes required for the major must be taken for a grade.*
- *No more than 2 requirements may be met with a grade below C-.*

**Prospective Middle School and High School Mathematics Teachers:** Students who complete the Mathematics Major *and choose the two MTH 481 topics for their fifth sequence* also meet the course prerequisites for the Advanced Mathematics Endorsement.

# Course Planning for a Math Major

## Recommended Schedule of Courses

	Fall	Winter	Spring
<b>Year 1 (Sophomore)</b>	Single-variable Calculus (all year)		
	Elementary Statistics*	Computer Language	Linear Algebra
<b>Year 2 (Junior)</b>	Multivariable Calculus	Abstract Algebra Sequence	
	Mathematical Perspectives	Probability and Statistics Sequence OR Applied Area Sequence	
	Number Structures		
<b>Year 3 (Senior)</b>	Analysis Sequence		Capstone
	Axiomatic Geometry	Probability and Statistics Sequence OR Applied Area Sequence	

\*This course is offered every term and may be taken any term during year 1.

## Standard Schedules (May change)

### 2019/20 Standard Schedule

Fall	Winter	Spring
251	251	251
252	252	252
253	253	253
281	271	261
290	321	321
311	341	421 (Modeling)
331	361	441 (Groups)
411	431 (Metric Sp)	461
481(Prob/Stat)	481 (Calculus)	481 (Geometry)
)	490 (part 1)	490 (part 2)

### 2020/21 Standard Schedule

Fall	Winter	Spring
251	251	251
252	252	252
253	271	253
281	321	261
290	341	321
311	361	421 (PDE)
331	431 (Infinite Series)	441 (Rings)
411	481 (History)	461
481(Curriculum)	490 (part 1)	481 (Prob Solv)
		490 (part 2)

### 2021/22 Standard Schedule

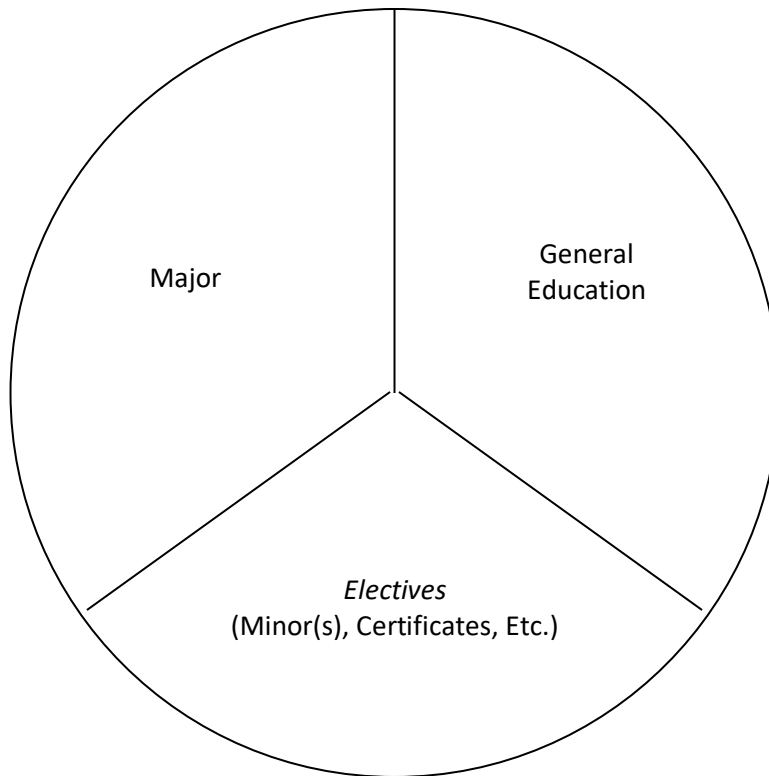
Fall	Winter	Spring
251	251	251
252	252	252
253	271	253
281	321	261
290	341	321
311	361	421 (Modeling)
331	431 (Metric Sp)	441 (Groups)
411	481 (?)	461
481(?)	490 (part 1)	481 (?)
		490 (part 2)

### 2022/23 Standard Schedule

Fall	Winter	Spring
251	251	251
252	252	252
253	271	253
281	321	261
290	341	321
311	361	421 (PDE)
331	431 (Metric Sp)	441 (Rings)
411	481 (?)	461
481(?)	490 (part 1)	481 (?)
		490 (part 2)

## Planning your College Education

180 credits total  
(includes 60 credits at 300/400-level)



### Things to Keep in Mind

1. *Minimum Credits*: Earn at least 180 credits, including 60 upper division credits (300/400-level)
2. *BA/BS Requirements*: Mathematics majors and co-majors automatically meet the BS requirements
3. *Major Requirements*: Go over regularly with your major advisor
4. *Minor Requirements*: Go over regularly with an advisor in your minor area(s)
5. *General Education Requirements*: Transfers need a GE evaluation from Academic Support Programs

## Financial Mathematics Co-Major (As of 2019-2020)

### Learning Outcomes

#### Knowledge Outcome

- Financial Mathematics graduates display a depth and breadth in fundamental financial theory and related mathematical methods.

#### Skill Outcomes

- Financial Mathematics graduates analyse financial data and model real-world problems, using technology as appropriate.
- Financial Mathematics graduates effectively communicate effective rationale and coherent financial arguments orally and in writing.

#### Dispositional Outcomes

- Financial Mathematics graduates learn independently.
- Financial Mathematics graduates value their ability to use mathematics in financial areas.

Many sectors of business require strong quantitative analytical training. The Financial Mathematics comajor provides students with training in both areas.

Students should plan their programs carefully with advisors from both the Department of Mathematics and the School of Business.

### Requirements for the Major (102 credits)

Complete the requirements specified for both mathematics and business as shown below. No more than two of the math requirements may be met with a grade below C-. Financial Mathematics comajors are required to maintain a 2.5 GPA in all business courses.

### Required Mathematics Courses: 34 credits

MTH 243 - Introduction to Statistical Methods (4 credits)  
MTH 251 - Calculus I (4 credits)  
MTH 252 - Calculus II (4 credits)  
MTH 253 - Calculus III (4 credits)  
MTH 281 - Calculus IV (4 credits)  
MTH 290 - Mathematical Perspectives (2 credits)  
MTH 321 - Differential Equations (4 credits)  
MTH 361 - Statistical Methods I (4 credits)  
MTH 461 - Statistical Methods II (4 credits)

### Required Business Courses: 40 credits

BA 131 - Business Computer Applications (4 credits)  
BA 211 - Accounting Information I (4 credits)  
BA 213 - Accounting Information II (4 credits)  
BA 330 - Principles of Marketing (4 credits)  
BA 374 - Principles of Management (4 credits)  
BA 385 - Principles of Finance (4 credits)

- BA 470 - Financial Markets and Institutions (4 credits)
- BA 471 - Financial Management (4 credits)
- BA 472 - Investments (4 credits)
- BA 473 - International Financial Management (4 credits)

## Required Economics Courses: 12 credits

- EC 201 - Principles of Microeconomics (4 credits)
- EC 202 - Principles of Macroeconomics (4 credits)
- EC 376 - Intermediate Macroeconomics (4 credits)

## Required Electives: 16 credits

Choose One Course from:

- BA 285 – Advanced Business Applications: Excel (4 credits)
- MTH 261 – Linear Algebra (4 credits)
- MTH 421 – A Topic in Applied Mathematics (4 credits)

Choose One Course from:

- EC 332 – Quantitative Methods and Its Applications (4 credits)\*
- EC 358 – Intermediate Microeconomics (4 credits)
- BA 497 - Advanced MIS: Business Analytics (4 credits)
- MTH 421 – A Second Topic in Applied Mathematics (4 credits)

Choose one of the following capstone options:

- MTH 401- Research (4 credits) in winter **and** MTH 405 Thesis (4 credits) in spring
- BA 499 - Business Planning (4 credits)
- MTH 490 - Senior Colloquium (4 credits in Winter **and** 4 credits in Spring)

EC 332\* will not be counted twice for the Financial Math Major and the Applied Statistics Minor.

Prerequisites of MTH 40: MTH 461 (Statistics II), BA 470 (Financial Markets and Institution), BA 472 (Investments), BA 473 (International Financial Management). BA 470 can be taken concurrently with MTH 405.

## Honors in Mathematics

### Application — Submit during year 2 — preferably by the end of Winter Term

Students interested in pursuing Honors in Mathematics should alert their advisor as soon as possible and talk to faculty about potential mentors. Honors graduates must have a 3.25 GPA in mathematics and a 3.00 overall GPA.

### Additional Coursework (8 credits)

Complete a second topic in any two of the following four topics courses: Applied Mathematics (MTH 421), Analysis (MTH 431), Abstract Algebra (MTH 441), or Statistics (MTH 461)

### Senior Project (12 credits)

Work one-on-one with a faculty mentor independently studying an advanced mathematics topic and preparing an expository thesis. Completion of the Senior Project meets the capstone requirement for the major (earn 8 credits of MTH 401 plus 4 credits of MTH 403 instead of 4-8 credits of MTH 490).

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## Mathematics Minor Requirements

### Lower Division Courses (14 credits)

Differential and Integral Calculus (MTH 251 and 252)  
Linear Algebra (MTH 261)  
Mathematical Perspectives (MTH 290)

### Upper Division Courses (12-14 credits)

Any upper division math courses. Some may have additional prerequisites. Two 481 topics may substitute for one of the three classes usually taken to satisfy the upper division requirement.

*(All courses must be taken for a grade, and no more than 1 of these upper division requirements may be met with a grade below C–.)*

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## Applied Statistics Minor Requirements

### Lower Division Courses (16 credits)

One introductory statistics course (MTH 243)  
Second lower-division applied statistics course (choose from: MTH 244, BA 282, or PSY 229)  
Differential and Integral Calculus (MTH 251 and 252)

### Upper Division Courses (11-12 credits)

Probability (MTH 361)  
Statistics (MTH 461)  
Second upper-division statistics course (choose from: EC 332, ES 386, OAL 425, PE 412, or SOAN 327)  
EC 332 cannot be double counted with a Financial Math degree

*(All courses must be taken for a grade, and no more than 1 of these upper division requirements may be met with a grade below C–.)*

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## Mathematics Education Minor Requirements

### Lower Division Courses (12 credits)

Fundamentals of Elementary Mathematics I, II, and III (MTH 211, 212, and 213)

NOTE: Math majors who successfully apply for and complete a 4 credit MTH 409 Practicum, assisting an instructor in one of MTH 211, 212, or 213, automatically meet the lower-division requirements. (They substitute MTH 409 plus two of MTH 251, 252, 253, 261, and 281 for the 12-credit lower division requirement.)

### Upper Division Courses (15 credits)

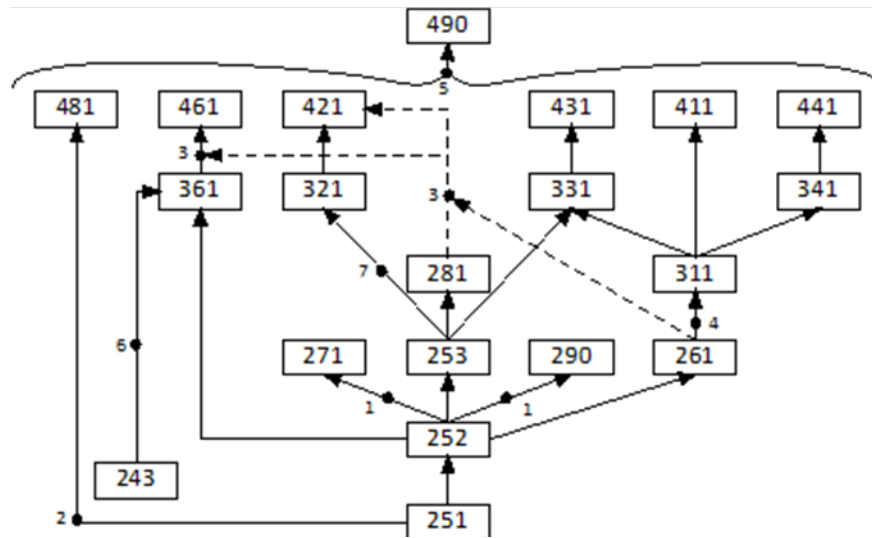
Five distinct topics in Middle School and High School Mathematics (MTH 481)

**Prospective Elementary and Middle School Mathematics Teachers:** Students who complete the Mathematics Education Minor also meet the course prerequisites for the Foundational Mathematics Endorsement in the MAT program. *(To satisfy prerequisites, all course grades should be C– or better.)*



## Additional Planning Information

### Prerequisite Flowchart:



#### Footnotes:

1. May be taken concurrently
2. See catalog — MTH 481 prerequisite may also be met by taking a combination of MTH 211, 212, and/or 213 (exact combination varies by topic)
3. See catalog — some MTH 421 and 461 topics have additional prerequisites
4. USEM 103 or Wr 122 is also a prerequisite
5. MTH 490 prerequisites are senior standing in the mathematics major, MTH 311, and completion of at least 2 of the upper division sequences required for the major
6. May replace MTH 243 prerequisite with Soc 327
7. May replace MTH 253 prerequisite with Ph 371

#### Brief titles for courses above:

- |                                      |  |
|--------------------------------------|--|
| MTH 243 — Elementary Statistics      | MTH 321/421 — Applied Mathematics      |
| MTH 251, 252, 253 and 281 — Calculus | MTH 331/431 — Analysis                 |
| MTH 261 — Linear Algebra             | MTH 341/441 — Abstract Algebra         |
| MTH 271 - Programming                | MTH 361/461 — Probability & Statistics |
| MTH 290 — Mathematical Perspectives  | MTH 481 — Mathematics Education        |
| MTH 311/411 — Proof/Geometry         | MTH 490 — Capstone                     |

#### Terms when Mathematics Courses Are Normally Offered:

Fall			Winter			Spring			Summer		
60	243	311	65	243	321	95	243	321	243	251	
65	251	331	95	244	341	105	244	421		252	
95	252	411	105	251	361	111	251	441			
105	253	481	111	252	431	112	252	461			
111	281		112	271	481	211	253	481			
112	290		211		490A	212	261	490B			
211			212			213					
212			213								

See page 3 to determine which topics are scheduled for 400-level courses.