

# MATHEMATICS: MATHEMATICS FOR ECONOMICS AND FINANCE

## REQUIREMENTS

### REQUIREMENTS

The Mathematics Major with Economics and Finance focus 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 |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|---------|
| <b>Core Math Requirement (minimum of six distinct MATH courses for at least 18 credits)<sup>1</sup></b> |                                                                 |         |
| <i>Linear Algebra</i>                                                                                   |                                                                 | 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            |         |
| <i>Differential equations</i>                                                                           |                                                                 | 0-5     |
| MATH 319                                                                                                | Techniques in Ordinary Differential Equations                   |         |
| or MATH 320                                                                                             | Linear Algebra and Differential Equations                       |         |
| or MATH 322                                                                                             | Applied Mathematical Analysis                                   |         |
| or MATH 376                                                                                             | Topics in Multi-Variable Calculus and Differential Equations    |         |
| or MATH 415                                                                                             | Applied Dynamical Systems, Chaos and Modeling                   |         |
| or MATH 519                                                                                             | Ordinary Differential Equations                                 |         |
| <i>Intermediate Mathematics Requirement (complete at least one)</i>                                     |                                                                 | 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                          |         |
| <i>Analysis Requirement</i>                                                                             |                                                                 | 3       |
| MATH 521                                                                                                | Analysis I                                                      |         |
| <i>Electives to reach required six courses for at least 18 credits of MATH</i>                          |                                                                 | 6-9     |
| <i>At least one course must be selected from:</i>                                                       |                                                                 |         |

|                                               |                                                                   |
|-----------------------------------------------|-------------------------------------------------------------------|
| MATH/<br>COMP SCI 513                         | Numerical Linear Algebra                                          |
| MATH/<br>COMP SCI 514                         | Numerical Analysis                                                |
| MATH 519                                      | Ordinary Differential Equations                                   |
| MATH 522                                      | Analysis II                                                       |
| MATH/<br>COMP SCI/ISY E/<br>STAT 525          | Linear Optimization                                               |
| MATH 531                                      | Probability Theory                                                |
| MATH 535                                      | Mathematical Methods in Data Science                              |
| MATH 540                                      | Linear Algebra II                                                 |
| 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/ISY E/<br>OTM/STAT 632                   | Introduction to Stochastic Processes                              |
| MATH 635                                      | An Introduction to Brownian Motion and Stochastic Calculus        |
| <i>Remaining courses/credits may be from:</i> |                                                                   |
| MATH/STAT 310                                 | Introduction to Probability and Mathematical Statistics II        |
| 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/<br>COMP SCI/<br>ISY E 425               | Introduction to Combinatorial Optimization                        |
| MATH/STAT 431                                 | Introduction to the Theory of Probability                         |
| or MATH/<br>STAT 309                          | Introduction to Probability and Mathematical Statistics I         |
| MATH 443                                      | Applied Linear Algebra                                            |
| MATH 444                                      | Graphs and Networks in Data Science                               |
| MATH/<br>COMP SCI/<br>STAT 475                | Introduction to Combinatorics                                     |

**Economics/Finance Requirement (Four Courses distinct from the above for at least 12 credits)<sup>1</sup>**

|                                                            |                                                                                                                   |     |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----|
| <i>Select one of the following introductory sequences:</i> |                                                                                                                   | 6-8 |
| ECON 311 & ECON 312                                        | Intermediate Microeconomic Theory - Advanced Treatment and Intermediate Macroeconomic Theory - Advanced Treatment |     |

|                                                               |                                                                         |           |
|---------------------------------------------------------------|-------------------------------------------------------------------------|-----------|
| ECON 301 & ECON 302                                           | Intermediate Microeconomic Theory and Intermediate Macroeconomic Theory |           |
| ECON/ FINANCE 300 & ECON/ FINANCE 320                         | Introduction to Finance and Investment Theory                           |           |
| Economics/Finance Elective (choose at least two) <sup>2</sup> |                                                                         | 6-8       |
| ECON 400                                                      | Introduction to Applied Econometrics                                    |           |
| ECON 410                                                      | Introductory Econometrics                                               |           |
| ECON/A A E 421                                                | Economic Decision Analysis                                              |           |
| ECON 435                                                      | The Financial System                                                    |           |
| ECON 441                                                      | Analytical Public Finance                                               |           |
| ECON 442                                                      | Macroeconomic Policy                                                    |           |
| ECON 448                                                      | Human Resources and Economic Growth                                     |           |
| ECON 450                                                      | Wages and the Labor Market                                              |           |
| ECON 451                                                      | The Economic Approach to Human Behavior                                 |           |
| ECON 455                                                      | Behavioral Economics                                                    |           |
| ECON 458                                                      | Industrial Structure and Competitive Strategy                           |           |
| ECON 460                                                      | Economic Forecasting                                                    |           |
| ECON 461                                                      | International Macroeconomics                                            |           |
| ECON 464                                                      | International Trade                                                     |           |
| ECON 468                                                      | Industrial Organization and Imperfect Competition                       |           |
| ECON 475                                                      | Economics of Growth                                                     |           |
| ECON/ FINANCE 503                                             | Markets with Frictions                                                  |           |
| ECON 521                                                      | Game Theory and Economic Analysis                                       |           |
| ECON/A A E 526                                                | Quantitative Methods in Agricultural and Applied Economics              |           |
| ECON 621                                                      | Markets and Models                                                      |           |
| ECON 661                                                      | Issues in International Macroeconomics                                  |           |
| ECON 664                                                      | Issues in International Trade                                           |           |
| ECON 666                                                      | Issues in International Finance                                         |           |
| FINANCE 305                                                   | Financial Markets, Institutions and Economic Activity                   |           |
| FINANCE 325                                                   | Corporation Finance                                                     |           |
| FINANCE 330                                                   | Derivative Securities                                                   |           |
| FINANCE 340                                                   | Fixed Income Securities                                                 |           |
| FINANCE/ INTL BUS 445                                         | Multinational Business Finance                                          |           |
| <b>Total Credits</b>                                          |                                                                         | <b>30</b> |

## RESIDENCE AND QUALITY OF WORK

- 2.000 GPA on all MATH courses and courses eligible for the major.<sup>3</sup>
- 2.000 GPA on at least 15 credits of upper level credit in the major.<sup>4</sup>
- 15 credits in MATH in the major taken on the UW-Madison campus.<sup>5</sup>

## FOOTNOTES

- <sup>1</sup> Some courses which follow may have prerequisites outside of the courses approved for this named option.
- <sup>2</sup> Any MATH course from the elective list above may be used in lieu of any of the following courses.
- <sup>3</sup> This includes any MATH courses (and those cross-listed with MATH) regardless of appearing in the tables above as well as only those non-MATH courses which are explicitly listed in the tables above.
- <sup>4</sup> This includes any MATH courses (and those cross-listed with MATH) numbered 307 and above, regardless of appearing in the tables above, as well as only those non-MATH course explicitly listed in the tables above which carry the advanced LAS designation.
- <sup>5</sup> This includes any MATH courses (and courses cross-listed with MATH) numbered 307 and above regardless of appearing in the tables 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 <sup>if required</sup> | 4 Foreign Language (if required) | 4       |

15

14

**Sophomore**

| <b>Fall</b>              | <b>Credits Spring</b>         | <b>Credits</b> |
|--------------------------|-------------------------------|----------------|
| MATH 234 <sup>1</sup>    | 4 MATH Linear Algebra         | 3              |
| Humanities Breadth       | 3 MATH Differential Equations | 3              |
| Communication B          | 3-5 Humanities Breadth        | 3              |
| Physical Science Breadth | 3 Physical Science Breadth    | 3              |
| Elective                 | 3 Elective                    | 3              |
|                          | <b>16</b>                     | <b>15</b>      |

**Junior**

| <b>Fall</b>                       | <b>Credits Spring</b>                | <b>Credits</b> |
|-----------------------------------|--------------------------------------|----------------|
| MATH Required Intermediate Course | 3 MATH Elective                      | 3              |
| Economics/ Finance intro course 1 | 3-4 Economics/Finance intro course 2 | 3-4            |
| Biological Sciences Breadth       | 3 Biological Sciences Breadth        | 3              |
| Social Science Breadth            | 3 Physical Science Breadth           | 3              |
| Elective                          | 3 Elective                           | 3              |
|                                   | <b>15</b>                            | <b>15</b>      |

**Senior**

| <b>Fall</b>            | <b>Credits Spring</b>     | <b>Credits</b> |
|------------------------|---------------------------|----------------|
| MATH 521               | 3 Advanced MATH Elective  | 3              |
| Econ/Finance Elective  | 3-4 Econ/Finance elective | 3-4            |
| Social Science Breadth | 3 Social Science Breadth  | 3              |
| Elective               | 3 Elective                | 3              |
| Elective               | 3 Elective                | 3              |
|                        | <b>15</b>                 | <b>15</b>      |

**Total Credits 120**

Students must declare a major by the time they reach Senior standing (86 credits).

Please refer to the Requirements tab in Guide for additional College of Letters & Science Breadth and Degree Requirements as well as Residence and Quality of Work requirements for the major.

<sup>1</sup> Students should declare the math major upon successful completion of this course