Mathematics: Mathematics for Data Science

Introduction to Combinatorial

MATH/

Credits

1

MATHEMATICS: MATHEMATICS FOR DATA SCIENCE

REQUIREMENTS

Code

COMP SCI 514 MATH 443

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).

Title

| Core Math Requirer MATH courses for a | nent (minimum of six distinct t 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 Mathematione) | atics Requirement (complete at least | 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 optimize one) | ration methods (complete at least | 3 |
| MATH/ COMP SCI 513 | Numerical Linear Algebra | |
| MATH/ COMP SCI/I SY E/ STAT 525 | Linear Optimization | |
| MATH/ | Numerical Analysis | |

Applied Linear Algebra

| | COMP SCI/ I SY E 425 | Optimization | |
|------------|--|---|-----|
| M | athematics of data | | 3 |
| | MATH 535 | Mathematical Methods in Data Science | |
| Ac | dvanced Electives (c | omplete 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/ISYE/ OTM/STAT 632 | Introduction to Stochastic Processes | |
| | ectives to reach requ MATH ¹ | uired six courses for at least 18 credits | 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/ | Introduction to Stochastic | |
| | OTM/STAT 632 | | |
| | ata Science Requii : least 12 credits) ² | rement (at least four courses for | 12 |
| | · | entals (choose one) | |
| <i>D</i> (| STAT 340 | Data Science Modeling II | |
| | COMP SCI 320 | Data Science Programming II | |
| Re M | | by be selected from below or from the | |
| | | 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/BMI 642 | Statistical Methods for Epidemiology | |
| STAT/B M I 642 ECON 400 | | |
| , | Epidemiology Introduction to Applied | |
| ECON 400 | Epidemiology Introduction to Applied Econometrics | |
| ECON 400 | Epidemiology Introduction to Applied Econometrics Introductory Econometrics Fundamentals of Data Analytics for | |
| ECON 400 ECON 410 ECON 570 | Epidemiology Introduction to Applied Econometrics Introductory Econometrics Fundamentals of Data Analytics for Economists Fundamentals of Industrial Data | |

Total Credits 27-33

RESIDENCE AND QUALITY OF WORK

- \cdot 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.