

Choosing Intro Courses in Mathematics and Statistics

A Guide to 100- and 200- Level Courses in Calculus, Linear Algebra, and Statistics

This document provides guidance on choosing some math and stats courses at CC. If you need further information, please contact any faculty member in the Department of Mathematics and Computer Science. We'd be happy to talk to you!

The document is organized around three areas of mathematics: Calculus (five courses), Linear Algebra (two courses), and Statistics (three courses).

Calculus

MA125: Precalculus and Calculus 1

This is a two-block version of Calculus 1, which allows for more moderate pacing and a review of important content from precalculus and trigonometry. By the end, it covers all the content from MA126, and it satisfies any prerequisite or major requiring Calculus 1.

Do take MA125 if:

- You need to satisfy a Calculus 1 or GenEd FRL requirement, and
- You have never taken any calculus before, and
- You did not have a great experience in precalculus (you did not feel confident in your mastery of the material at the time).

Do not take MA125 if:

- You have already taken some calculus, or
- You have never taken calculus, but you were comfortable with most precalculus and trigonometry topics at the time you learned them, even if you don't remember all the details now (in this case you should take MA126 instead).

MA126: Calculus 1

This is our standard first course in calculus. It is intended for students who have never seen calculus before, but who have a solid foundation in precalculus. Most of the course covers derivatives, while integrals are briefly introduced near the end. Some students who took Calculus 1 in high school choose to take MA126 at CC, while some choose to go straight into MA129 (Calculus 2). *We strongly recommend that you consult with a faculty member in the department before deciding between these options.*

Do take MA126 if:

- You need to satisfy a Calculus 1 or GenEd FRL requirement, and
- You have never taken any calculus before and you were comfortable with most precalculus and trigonometry topics at the time you learned them, even if you don't remember all the details now, or

- You have taken some calculus before but you did not have a great experience (you did not feel confident in your mastery of derivatives at the time).

Do not take MA126 if:

- You have not taken any calculus before, and you did not have a great experience in precalculus (in this case you should consider MA125 instead), or
- You have already taken Calculus 1 elsewhere (including AP or IB), and you felt comfortable with calculating and interpreting derivatives at the time, even if you don't remember all the details now (in this case you should consider MA129 instead).

MA129: Calculus 2

This is our second course in calculus. It is intended for students who have a solid foundation in Calculus 1, either from CC or elsewhere (including AP or IB). The course focuses on methods and applications of integrals, as well as an introduction to differential equations. Some students who took Calculus 1 in high school choose to take MA126 (Calculus 1) at CC, while some choose to go straight into MA129. *We strongly recommend that you consult with a faculty member in the department before deciding between these options.*

Do take MA129 if:

- You need to satisfy a Calculus 2 or GenEd FRL requirement, and
- You have not taken Calculus 2 before and you were comfortable with most topics from Calculus 1 at the time you learned them, even if you don't remember all the details now, or
- You have taken Calculus 2 before but you did not have a great experience (you did not feel confident in your mastery of integrals at the time).

Do not take MA129 if:

- You took Calculus 1 before coming to CC, and you did not have a great experience (in this case you should consider MA126 instead), or
- You have already taken Calculus 2 elsewhere (including AP or IB), and you felt comfortable with calculating and interpreting integrals at the time, even if you don't remember all the details now (in this case you should consider MA204, MA275, or other options instead).

MA204: Calculus 3

This is our introduction to multivariable calculus, in which functions can have multiple input and/or output variables. It is intended for students who have a solid foundation in Calculus 1 and 2, either from CC or elsewhere (including AP or IB). Note that MA204 and MA275 can be taken in either order.

Do take MA204 if:

- You need to satisfy a Calculus 3 or GenEd FRL requirement, and
- You have not taken multivariable calculus before and you were comfortable with most topics from Calculus 1 and 2 at the time you learned them, even if you don't remember all the details now, or
- You have taken multivariable calculus before but you did not have a great experience (you did not feel confident in your mastery of most topics at the time).

Do not take MA204 if:

- You took Calculus 2 before coming to CC, and you did not have a great experience (in this case you should consider MA129 instead), or
- You have already taken multivariable calculus elsewhere and you felt comfortable with most topics at the time, even if you don't remember all the details now (in this case you should consider MA275 or other options instead).

MA275: Sequences and Series

This is an introduction to some of the deeper issues and applications involving limits. We will study convergence of sequences and series (including power series), which are covered in many Calculus 2 courses (but not in our MA129). However, we will study these in more depth than is typically done in Calculus 2, and we will explore a variety of related topics (including Fourier series, types of infinity, and complex variables). This class provides an important foundation for many upper-level math courses. Note that MA204 and MA275 can be taken in either order.

Do take MA275 if:

- You are thinking about majoring or minoring in mathematics or majoring in mathematical economics, or
- You want to learn some fascinating things about infinity and convergence.

Do not take MA275 if:

- Just kidding – we can't think of a single reason why anyone wouldn't want to take this class. If you have a solid foundation in Calculus 1 and 2, come check it out! However, other great math courses at this level are MA201, MA221, and MA251.

Linear Algebra

At Colorado College we offer two courses in linear algebra: MA120 Applied Linear Algebra and MA221 Advanced Linear Algebra. MA221 is a more advanced course, with MA120 as a prerequisite. If you are thinking about minoring in mathematics, you will need to take MA120. If you are planning to major in mathematics, you will need to take both courses.

MA120: Applied Linear Algebra

This is an introduction to systems of linear equations and matrix algebra. The emphasis will be on interpretation and applications. Note that in many disciplines, linear algebra is replacing calculus as the essential mathematics that people should know.

Do take MA120 if:

- You want to meet the GenEd FRL requirement or sample a college-level math course that isn't calculus, or
- You are a first-year student thinking about majoring or minoring in mathematics or majoring in mathematical economics, or
- You are thinking about majoring in some other discipline that has a math requirement. It may be the case that they would accept MA120 instead of MA221 or Calculus 1, for example. We are happy to discuss this with advisors or department chairs as needed.

Do not take MA120 if:

- You already have a solid understanding of Gaussian elimination, matrix algebra, and eigenvalues (consider MA221 instead), or
- You aren't interested in learning about the mathematics behind machine learning, quantum physics, age-structured population models, multivariate statistics, computer graphics, etc.

MA221: Advanced Linear Algebra

This is a second course in linear algebra, with MA120 as a prerequisite. The emphasis is in abstract vector spaces and in learning methods of proof in algebra

Do take MA221 if:

- You are a sophomore or junior thinking about majoring or minoring in mathematics, computer science or majoring in mathematical economics and has taken MA120 or have a solid understanding of Gaussian elimination, matrix algebra, and eigenvalues.

Do not take MA221 if:

- This is another great mathematics course at the 200-level, required for math majors. However, students in other majors looking for a 200-level course may in addition consider MA201, MA251, or MA275 as possible options.

Statistics

We offer two introductory courses in statistics: MA117 and MA217. Both are intended to be a first course in statistics; the difference is whether or not we assume some background in

calculus. We also offer a second course in statistics, MA237, for students who have already taken some statistics and want to continue studying the subject.

MA117: Elementary Probability and Statistics

This is a first course in probability and statistics, with no calculus prerequisite.

Do take MA117 if:

- You want to meet the GenEd FRL or SA requirement or sample a college-level math course that isn't calculus, and
- You have not previously taken calculus, and
- You have not already taken a first course in statistics, or
- You have taken a first course in statistics but you did not have a great experience in it (you didn't feel comfortable with many of the topics at the time)

Do not take MA117 if:

- You want to take a first course in statistics that uses some basic calculus (take MA217 instead), or
- You have already taken introductory statistics and had a good experience (consider taking MA237)

MA217: Introduction to Probability and Statistics

This is a first course in probability and statistics, with a prerequisite of Calculus 1. This allows us to express important statistical concepts in their true mathematical form (especially integrals). Basic comfort with derivatives and integrals is expected; you do not need to remember every detail from Calculus 1.

Do take MA217 if:

- You want to meet the GenEd FRL or SA requirement or get an introduction to statistics, and
- You have previously taken Calculus 1 (including AP or IB), and
- You have not already taken a first course in statistics, or
- You have taken a first course in statistics but you did not have a great experience in it (you didn't feel comfortable with many of the topics at the time)

Do not take MA217 if:

- You want to take a first course in statistics that avoids expressing the ideas in terms of calculus (take MA117 instead), or
- You have already taken introductory statistics and had a good experience (consider taking MA237)

MA237: Statistical Methods I

This is a second course in statistics, building on the material from MA117 or MA217 (or equivalent). We explore further topics in parameter estimation and hypothesis testing, for situations that aren't covered by the simpler methods learned earlier.

Do take MA237 if:

- You have taken an introductory statistics class and Calculus 1, and
- You enjoyed your introductory statistics class and want to learn more techniques

Do not take MA237 if:

- You believe you can handle every data-driven situation you will ever encounter using only the methods you learned in your introductory statistics class. Good luck with that!