Reed College Mathematics:
A guide for new students

[**Note:** New students interested in taking math courses at Reed should attend one of the math department open hours during Orientation Week.]

Students at Reed can take a number of mathematics, statistics, and computer science courses when entering the college. The purpose of this document is to help them and their advisers navigate their choices and self-select into an engaging course appropriate for their background. The material here should be referenced in parallel with the official course descriptions available at https://www.reed.edu/math/courses.html. Please note that the mathematics department is happy to assist if students or advisers have questions.

Math 111: Calculus. Math 111 covers both differential and integral single-variable calculus. It can be appropriate for students with or without prior exposure to calculus in high school, though students should note that with an AP score of 5 on the AB exam or 4 or 5 on the BC exam, they may skip this course and receive one unit of credit. (See https://www.reed.edu/apply/guide-to-applying/first-year/ap-guide.html for information on IB credit.) Students without AP or IB credit but who have significant calculus preparation should contact Angélica Osorno aosorno@reed.edu, David Perkinson davidp@reed.edu, or Jerry Shurman jerry@reed.edu for placement.

Math 112: Introduction to Analysis. This course introduces the properties of the real and complex number systems that provide the foundational underpinnings of calculus; it also serves as a first introduction to rigorous mathematical reasoning and proof. It has Math 111 or equivalent as a prerequisite and is foundational for the material covered in Math 201: Linear Algebra and Math 202: Vector Calculus. In rare circumstances (e.g., prior college-level mathematics coursework involving significant experience writing proofs and some analysis), some students may be able to skip this course after conferring with one of the math department faculty listed in the Math 111 course description, above.

Math 113: Discrete Structures. Despite its numbering, Math 113 is independent of Math 111 and Math 112 and has no college prerequisites. The course focuses on problem-solving methods in combinatorics (advanced counting), number theory (properties of the integers), and probability (mathematical likelihood). Students looking for a non-calculus-based introduction to college-level mathematics are welcome in this course; it is also a requirement for math and computer science majors. Students intending to major in Mathematics, Mathematics with a Concentration in

Statistics, Computer Science/Mathematics, or Computer Science are advised to *take Math 113 before the spring semester of their sophomore year.* In particular, the Computer Science qualifying exam, also required for the Computer Science/Mathematics major, takes place in the second semester of the sophomore year and includes material from Math 113.

Math 141: Introduction to Probability and Statistics. This course provides a deep introduction to how data are used to reason about the world. It requires no previous experience with statistics, calculus, or computer science but even students who have received a 4 or 5 on the AP statistics exam find it useful (and AP credit in Statistics is not a substitute for Math 141). The course covers the elementary tools of data science and descriptive analysis as well as the statistical models starting with classical inference and extending to generalized linear models. Underpinning all of the work is the language of probability and the tools of computation, namely the R programming language.

Math 201: Linear Algebra. This is a proof-based course in linear algebra. It introduces abstract vector spaces over arbitrary fields. Topics include linear transformations, determinants, eigenvalues, eigenvectors, diagonalization. Geometry of inner product spaces is examined in the setting of real and complex fields. The course has Math 112 as a prerequisite and, thus, assumes that its incoming students possess strong proof-writing skills.

First-year schedule for Mathematics majors

The *typical* schedule for a first-year student who is interested in some version of the mathematics major takes one of two forms, depending on initial placement into either Math 111 or Math 112:

	Fall	**Spring**			**Fall**	**Spring**
	Hum 110	Hum 110			Hum 110	Hum 110
	Math 111	Math 112	or		Math 112	Math 201
	X	X			X	X

Here are some things to take into account when choosing the third course in each semester (marked with X, above):

- It is not necessary to take Math 113 during the first year, but it should be taken sometime during the first three semesters.

- Students who may pursue the Mathematics with a Concentration in Statistics major should consider taking Math 141 during the first year, but it is also fine to wait until the sophomore year. This course is often over-enrolled. So for students intending to take Math 141, it would be a good idea to select Math 141 as a preferred course (in the initial round of online class registration).

- Students who are considering a major in a natural science should take the introductory courses in that science during the first year.

- Some students decide to enroll in a fourth course for the spring semester. These students are then taking 4.5 units of courses in the spring—an especially demanding schedule. Such students should reconsider their spring schedules after completing the fall semester. (There is an opportunity to revise schedules during winter break.) It is also possible to drop a fourth course during the first month of the spring semester.

First-year schedule for Computer Science/Mathematics majors

Students intending to pursue the CS-Math interdisciplinary major should take the following courses during their first year:

- Hum 110

- Two of Math 111/112/113.

- One of CS 121/122/221. Placement is determined by the CS placement exam (consult with Jim Fix jimfix@reed.edu).

Some CS/Math students follow CS 121/122 with CS 221 or take three math courses during the first year. In general, it is better to err on the side of taking more math rather than more CS during the first year.