CALCULUS

Calculus - 2 subjects, 12 units each

Mathematics is the common language of science and engineering, and calculus is the part of mathematics that analyzes continuous processes. It is basic for further study in almost any department at MIT, and is necessary for an understanding of first-year physics.

The two-subject requirement can be fulfilled through various sequences or a combination of subjects and Advanced Placement or Advanced Standing credit. Your choice of a subject should be based on your mathematics background and interests.

18.01 - 18.02 Calculus I and II

Both offered fall and spring, 12 units each.

18.01 and 18.02 can be best described as traditional calculus subjects that have been adapted to the needs and abilities of MIT students. The approach is not proof based; however, for most theorems a proof or explanation is given, and proofs of some theorems are required.

18.01 covers differentiation and integration of functions of one variable. A variety of applications is given to such things as determining maxima and minima, areas, volumes, lengths, and work. The trigonometric, log, and exponential functions are introduced early and used throughout. The prerequisites for 18.01 are high school algebra and trigonometry.

18.02 covers the calculus of vectors and of functions of several variables. Vectors and vector functions are applied to geometry and motion in space. Partial differentiation and multiple integration are studied and applied to problems of maxima and minima in several variables, approximation, and such physical concepts as moments of inertia and gravitational attraction. Line integrals are used to study work in conservative force fields. This leads into vector integral calculus: the study of surface integrals and the theorems of Green, Gauss, and Stokes, which are fundamental in many applications of calculus to physics and engineering.

If you received a score of 5 on the Calculus BC exam, and you receive a sufficient score on the Math Diagnostic Placement Exam, given during Orientation week, you will be given credit for 18.01. You may also receive credit for 18.01 by transferring credit from a college course taken elsewhere, or by passing an Advanced Standing Exam at MIT. If you have credit for 18.01, you may begin with one of the two versions of 18.02 offered in the fall. Each uses a different text.

   *18.02 covers the material outlined above.
   *18.022 covers the material outlined above, but is somewhat more theoretical. It is described below.

18.022 Calculus

Fall only, 12 units.

This subject covers the material of 18.02, but at greater depth. Additional material is included in geometry, vector fields, and linear algebra that is relevant to physical theory and applications.

18.01A - 18.02A Calculus

18.01A fall only (six weeks).

18.02A fall (six weeks), plus IAP (four weeks) or spring (six weeks).

This sequence, intended for students who have had a full year of high school calculus, begins with 18.01A, a six-week review of one-variable calculus, emphasizing integration techniques and applications, polar coordinates, improper integrals, and infinite series. Prerequisite is a score of 5 on the Advanced Placement Calculus AB exam, or on the AB portion of the Calculus BC exam, or a passing grade on the first half of the 18.01 Advanced Standing exam, covering differentiation and elementary integration.

Most students completing 18.01A will continue directly into 18.02A, in which the remaining weeks of the fall term will be devoted to the material in the first half of Calculus II. 18.02A will be taught at the same pace as 18.02. Students

will then complete the second half of Calculus II either during Independent Activities Period (IAP) in January or during the second half of the spring term.

Credit Notes

Students opting for this sequence will register for both 18.01A and 18.02A in the fall term, and for 18.02A in IAP or the spring term. They will receive 12 units of credit upon completion of each subject, for a total of 24 units. Only 12 units (six for 18.01A and six for 18.02A) will be counted toward the fall term credit limit. Depending on when the second half of Calculus II is taken, six units will be applied toward the Independent Activities Period credit limit or the spring term credit limit.

Students with credit for 18.01 who decide to take 18.01A to review their calculus will lose the 12 units of 18.01 credit and instead receive three units of general elective credit.

Choosing Your Calculus Sequence

Some general advice about choosing the calculus option that is right for you if you have already had some calculus.

*If your calculus course in high school lasted less than a year, you should enroll in 18.01.

 *If you have had a full year of calculus but do not have credit for 18.01, consider 18.01A. You may also try to earn credit for 18.01 by taking the 18.01 Advanced Standing Examination. The first half of this exam satisfies the prerequisite for 18.01A.

*If you have had a full year of calculus and have 18.01 credit, you may elect to enroll in 18.02 or 18.022. If you feel in need of a review, you can take 18.01A.

All lectures in calculus are scheduled at the same time, so it is easy to switch from one sequence to another if the one you choose isn't suitable. However, with the exception of 18.01 and 18.01A, each subject sequence uses a different book.