

LIFE BEYOND CALCULUS

2011-2012 Pre-registration Information

There are several options for students who complete a year of calculus and wish to study more mathematics. Here is a brief description of each of the basic post-calculus courses and sequences that will be offered in the Department of Mathematics. For details see Diane Herrmann (office Eckhart 212; email diane@math.uchicago.edu) or John Boller (office Ryerson 354; email oller@math.uchicago.edu).

The following courses are required by some majors; none of them may be used to satisfy mathematics major requirements.

Math 19520 This course emphasizes the utility of multivariable calculus in applications to the social sciences. All the basic tools of multivariable calculus are introduced and are illustrated by many examples. Theoretical and computational aspects of the subject are given equal consideration. Offered Autumn-Winter at 8:30 MWF, 11:30 MWF and 12:30 MWF. Offered Winter-Spring 11:30 MWF and 12:30 MWF. Offered Spring-Autumn 11:30 MWF and 12:30 MWF.

Math 19620. This course emphasizes the utility of linear algebra in applications. All the basic tools of linear algebra are introduced and are illustrated by many examples. Theoretical and computational aspects of the subject are given equal consideration. Offered Autumn-Winter at 8:30 MWF, 11:30 MWF and 12:30 MWF. Offered Winter-Spring 11:30 MWF and 12:30 MWF. Offered Spring-Autumn 11:30 MWF and 12:30 MWF.

Math 20000-20100. This analysis sequence is designed for students intending to major in the physical sciences (other than mathematics). If a student who has taken this sequence wishes to concentrate in mathematics, he or she must also complete the sequence Mathematics 20300-20400-20500. Offered 8:30 MWF, 3-4:20 TuTh Autumn and Winter. There is also one section of Math 20000-20100 offered Winter-Spring 12:30 MWF.

Math 22000. This course is designed for students intending to major in physics. Math 22000 is offered in the Spring to prospective physics concentrators who are also taking Physics 13100-13200-13300. Offered 10:30 MWF Spring.

The following courses may all be used to fulfill mathematics major requirements.

Math 19900. This one-quarter course covers the fundamentals of theoretical mathematics and prepares students for upper level mathematics courses beginning with Math 20300. This course is especially intended for students making the transition from Math 15300 to Math 20300, or for those who need more preparation in learning to read and write proofs. Topics include: the construction of the real numbers, completeness and the least upper bound property, the topology of the real line, the structure of finite-dimensional vector spaces over the real and complex numbers. Offered Autumn, Winter, Spring.

Math 20300-20400-20500. Students who intend to concentrate in mathematics, or who require a rigorous treatment of analysis in several dimensions, will take Mathematics 20300-20400-20500. This sequence is the basis for all advanced courses in analysis and topology. Here, both the theoretical and problem solving aspects of multivariable calculus and some linear algebra are treated carefully. This course has a prerequisite of Math 16300 or Math 19900. Students must be familiar with proof techniques using axioms for the real numbers in order to begin this sequence. Students who have completed Math 13300 or Math 15300 must complete Math 19900 before registering for Math 20300.

- Offered 10:30 MWF, 11:30 MWF and 12:30 MWF. (Three sections of this course begin in the Winter Quarter, and one begins in the Spring Quarter.)
- There will be two sections beginning in the Autumn (section 31 at 10:30 MWF and section 41 at 11:30 MWF) for highly qualified students who do not meet the requirements for admission to Honors Analysis.
- One section (31) will be taught using Inquiry Based Learning (IBL) methods; this section would meet at 10:30 TuTh. Students wishing to take the IBL section of Analysis should fill out an application and return it by June 3. Applications are available in E 211 and E 212 and on line.

Summary: Prerequisite for Math 20300 is Math 16300 or Math 19900. Autumn 20300 sections 31/41 for highly qualified students not taking honors. Autumn 20300 section 30 will be IBL and requires an application for admission.

Math 20700-20800-20900. This is a highly theoretical sequence in analysis, which is reserved for the most able students. Admission is by invitation only. Students who wish to enter this sequence must earn high grades (A's and A-'s) in Mathematics 16100-16200-16300, and receive a strong recommendation from the instructor(s) in these courses. Admission may also be gained by exceptional performance on the Calculus Placement Test. This sequence covers the real number system, metric spaces, basic functional analysis, the Lebesgue integral, and other topics. Offered 10:30 MWF.

Math 25400-25500-25600. This is the department's regular algebra sequence. Although the prerequisite is only Math 16300 or Math 19900, students traditionally take this sequence after they have had a sequence in analysis. Therefore, students who take algebra immediately after calculus often find themselves less prepared for the depth of the material than their fellow students. Two quarters of this sequence are required of all mathematics majors. Abstract linear algebra is covered in the second quarter of the sequence. Offered 8:30 MWF and 10:30 MWF. One section of this course also begins in the Winter Quarter, although students should realize that the Math 25600 is only offered in the Spring.

Math 25700-25800-25900. This is a highly theoretical sequence in algebra, which is intended for the most able students. Unlike admission to Honors Analysis, admission to this sequence is by student choice. Offered 10:30 MWF. There is no difference in intended syllabus for the two sections offered 2011- 2012. Students who have been in Math 19900 or Math 20300-20400-20500 and who are considering Honors Algebra should speak with John Boller or Diane Herrmann before registering for Honors Algebra.