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		Honors Mathematics A-E2		
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This course provides opportunities to learn mathematics in more depth for highly motivated students. It supplements and combines Calculus A and Linear Algebra A, while takes these basic courses as starting point to treat more advanced related topics.

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In addition to learning advanced mathematics and proofs, students can learn how to discuss and present mathematical topics in English through this course.

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Below is a list of themes that may be covered.
The actual topics of the lecture will be determined upon investigating the interests and level of the participating students. The selected topics will be covered during 15 lectures, including one feedback session.
1. Topics in set theory (tentatively 5 ~ 9 weeks)
1.1 Sets and their operations
1.2 Sets and maps
1.3 Equinumerous sets and cardinality
2. Fundamental theory of real numbers (tentatively 3 ~ 6 weeks)
2.1 Dedekind cut and construction of real numbers
2.2 Continuity and completeness of real numbers
2.3 Real numbers and infinity
3. Fundamental fractional calculus (tentatively 2 ~ 4 weeks)
3.1 Some special functions and their properties
3.2 Riemann-Liouville integral operator
3.3 Caputo and Riemann-Liouville derivatives
4. Numerical linear algebra (tentatively 2 ~ 5 weeks)
4.1 Normed linear spaces and matrix norms
4.2 QR decomposition and singular value decomposition
4.3 Linear least square problems
4.4 Iterative methods for linear systems

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Calculus A and Linear Algebra A. Students are strongly encouraged to take Calculus B and Linear Algebra B in parallel (or prior) to this course.

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The evaluation of the course will take into account the following criteria:
(1) homework and presentation of students during the lectures (about 50%)
(2) final examination (about 50%)
The method of evaluation will be made precise at the first lecture.

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Paul R. Halmos   Naive set theory   Springer, 1974   ISBN:978-0-387-90092-6
Other references will be announced during the class according to the selected topics.

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As in every mathematics course, students should read notes carefully and repeatedly after the class, solve exercise problems and try to find alternative proofs, counterexamples, etc. After many hours of such practice, one may get an intuitive understanding of the materials covered.

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Students are welcome to ask questions during or at the end of the class. The schedule of office hours will be announced in the first lecture.