

University Mathematics Crash Course

Delivered by Adriel Ong Sylvester II Institute

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This course aims to prepare students for graduate studies in Mathematical fields, or professions with Mathematical content. The content covers a standard university Mathematics curriculum, with selected additions. This course would benefit students going into the following fields:

- Mathematics
- Physics
- Computer Science
- Economics
- Statistics
- Data Science
- Engineering

Course content is structured into 16 weeks, with 5 hours every week. It is recommended to take this course with no other academic obligations. This course also assumes knowledge of elementary algebra and trigonometry.

1 Set Theory, Formal Logic, Countability, and the Axiom of Choice

- Truth values
- Rules of inference

2 Linear Algebra

- The Determinant
- Vector Spaces

3 Real Analysis

- $\varepsilon - \delta$ proving

4 Multivariable Analysis

5 Point-set Topology

6 Analysis on Manifolds

7 Differential Forms

8 Differential Geometry

9 Elementary Geometry

10 Complex Analysis

11 Abstract Algebra

12 Measure Theory and Lebesgue Integration

13 Fourier Analysis

14 Differential Equations

15 Probability Theory

16 Algorithms