# Mathematics 131

## Linear Algebra I

**Text:**  *Linear Algebra, Third Edition*, by J. Fraleigh and R. Beauregard

**Instructor:** Zhuang-dan Daniel Guan

**Class:** TR 3.40–5.00pm, PHY 2104

**First Class:** Jan. 8, Tuesday

**Office Hours:** F 1.30–3.00pm, Surge 237 or by appointment

An introduction to vector spaces, matrices, and solutions of systems of linear equations. Only one of Math 113 and 131 may be taken for credit.

## Outline for Mathematics 131

We plan to cover the following sections and expect your eager and sincere participations:

<table>
<thead>
<tr>
<th>Topics</th>
<th>Suggested No. of Weeks’ Coverage</th>
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| Vectors, matrices and systems of linear equations | 3  
(§§ 1.1–1.6)                  |
| Dimension, rank and linear transformations   | 1  
(§§ 2.1–2.4)                  |
| Vector spaces                                | 3  
(§§ 3.1–3.5)                  |
| Determinants                                 | 2  
(§§ 4.1–4.4)                  |

- Euclidean vectors, norm and dot product, matrices and their algebra, solving systems of linear equations, inverses of square matrices, homogeneous systems, their solution subspaces and bases for the latter.
- Independence and dimension, the rank of a matrix, linear transformations of Euclidean spaces, specialization to the plane.
- The abstract notion of a vector space, generalization of linear algebraic concepts from ordinary vector algebra, coordinatization of vectors, linear transformations, inner product spaces.
- $2 \times 2$ and $3 \times 3$ determinants and their relations to areas, volumes and cross products, the determinant of a general square matrix, computations of determinants and Cramer’s rule.

**Tests:** Midterm on the seventh week; Final: Mar. 19, 3–6pm.

**Homework:** Homework assigned each Tuesday is due to the following Tuesday. Homework is important; it counts for 10% of the total credit.

**Quizzes:** There will be two quizzes in the discussion sections, one on the fourth week and the other on the ninth week.

Quizzes are also important; they count for another 10% of the total credit.

Midterm counts 30%, and Final counts 50%.