TOPICS FOR MATHEMATICS 133, FALL 2007

Preface

I. Topics from linear algebra

1. Dot products
2. Cross products
3. Linear varieties
4. Barycentric coordinates
5. Some examples

I I. Vector algebra and Euclidean geometry

1. Approaches to Euclidean geometry
2. Synthetic axioms of order and separation
3. Measurement axioms
4. Congruence, superposition and isometries
5. Euclidean parallelism

I I I. Basic Euclidean concepts and theorems

1. Perpendicular lines and planes
2. Basic theorems on triangles
3. Convex polygons
4. Concurrence theorems
5. Similarity
6. Circles and classical constructions
7. Areas and volumes

I V. Projective geometry   [**NOT COVERED IN THE COURSE**]

1. Perspective images
2. Adjoining ideal points
3. Homogeneous coordinates
4. Duality
5. Theorems of Desargues and Pappus
6. Projective collineations and cross ratios

V. Introduction to hyperbolic geometry

1. Facts from spherical geometry
2. Attempts to prove Euclid's Fifth Postulate
3. Neutral geometry
4. Angle defects and related phenomena
5. Further topics in hyperbolic geometry
6. Subsequent developments
7. Non – Euclidean geometry in modern mathematics