Math 462/472: Algebraic Structures I

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Office Hours: Mods 2,3,5 Class Room: A150
Office: A157 Class Time: Mod 6, ABCD days

Course Description

This course concentrates on the theory of simultaneous linear equations. Gaussian elimination is used as a tool to solve linear systems and to investigate the subspace structure of a matrix (kernel, range, etc.) Extensions of these ideas include orthogonality and least squares. Determinants are examined from several perspectives. Eigenvalues and eigenvectors are introduced, including a discussion of special matrices (symmetric, unitary, normal, etc.). Applications may include Singular Value Decomposition and Jordan Canonical Form.

Required Materials

- Text: Strang, Gilbert. Introduction to Linear Algebra, 4th ed. Wellesley-Cambridge Press. Wellesley, MA. 2015

- Access to Google Classroom: course code **mi2b9x**.

Course Structure

Class Structure/Course Expectations

This course will be taught similar to a university-level mathematics course. Homework assignments will be given weekly, and it is up to the students to determine if additional practice is necessary to be prepared for quizzes and exams. To get students prepared for collegiate mathematics, there will be more direct instruction than in a typical IMSA math course. It is an expectation that students are taking detailed notes and reading in the text to remain fully comfortable with the material.

Assessments

Homework will be given weekly, consisting of problems from the text and occasional supplemental problems. Students are expected to use precise mathematical language and reasoning. The lowest homework grade will be dropped. Therefore, **no late homework will be accepted**. Homework will be posted in advance and it is up to the student to set aside enough time to complete each assignment. Homework assignments will be posted on Google Classroom.

There will be approximately 3-4 exams depending on the amount of material that is covered. Exams will be announced at least a week ahead of time. There are no retakes for any exams.

For each unit, there will be approximately 1-2 quizzes. These quizzes are weighted less than exams, and are designed to give students an idea of what to expect on exams. There are no retakes for any quizzes.

Final Exam

The final exam will be on **Monday, December 16, 2019**.

Grading Policy

Your semester grade will be calculated under the following guidelines, the quarter grade percentages are given in the parenthesis. Your lowest homework grade will be dropped.

- **15%** of your grade will be determined by weekly homework assignments (20% for Q1).
- **10%** of your grade will be determined by quizzes (13% for Q1)
- **50%** of your grade will be determined by exams (67% for Q1)
- **25%** of your grade will be determined by the final exam.

Course Policies

During Class

Please refrain from using cell phones or listening to music during class as it hinders the learning of you and the students around you.

Policies on Late Assignments

Late work is not accepted in this class, as it is rarely accepted at the university level. Please check Google Classroom for the most recent updates.

Schedule and weekly learning goals

The course will be broken down into 3 large units. These units are not finalized and are subject to change:

Unit 1: Vectors, Matrix Arithmetic, Solving Systems by Elimination, Matrix Factorization, Vector Spaces and Subspaces, Column and Nullspaces of a matrix.

Unit 2: General Systems, Basis, Dimension, Fundamental Subspaces, Linear Transformations, Change of Basis, Orthogonality, Least Squares, Gram-Schmidt, Determinants

Unit 3: Eigenvalues, Eigenvectors, Diagonalization, Applications. Extra topics may include Jordan Canonical Form, Singular Value Decomposition, Extensions to Complex Numbers, Normal Matrices.

Disclaimer

The instructor reserves the right to make changes to the syllabus. Please consult Google Classroom for any updates.