188 200
Discrete Mathematics and Linear Algebra
1st Semester 2009

Course Description: This course teaches two fundamental math topics: discrete mathematics and linear algebra. The course is divided equally into two parts. The first part is for discrete math that will covers propositional and predicate logic, methods of proof emphasizing mathematical induction, recursion, sets, functions and relations. The second part covers topics in linear algebra, including systems of equations, vector spaces, determinants, eigenvalues, linear transformation and their applications.

Prerequisites: 180120 ENGINEERING MATHEMATICS

Credit hours: 3.0

Lecture:
- Sec 1 Wednesday and Friday @ 10:30 - 12:00
- Sec 2 Tuesday and Thursday @ 10:30 – 12:00
- Thai Q&A session : TBA

Language: This cause will be taught in English. There will be one-hour Q&A session in Thai after each corresponding lecture to help any of you who need extra help with the course. Stop me anytime you feel you do not follow what I am saying or you need more time to digest. This is very important because it is the only way I will know I am going too quickly.

Instructor: Dr.Pattarawit Polpinit
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Office Hours: Tuesday and Thursday: 2:00 - 3:00 pm

Course Webpage: http://gear.kku.ac.th/~polpinit/classes/188200/

Required Text
- *Discrete Mathematics with Applications* by Susanna Epp.
- *Linear Algebra and Its Applications* by David Lay.

Objectives: The primary purpose of this course is twofold:
1. To enhance students' reasoning and problem-solving abilities, in both a general context and in terms of solving computing-related problems. Specifically, the course has the following objectives:
    - Familiarize students with the concepts and applications of computing - and engineering-related mathematics.

- Equip students with variety of mathematical tools that can be used to solve problems in discrete mathematics and other related fields.
- Teach students how to think mathematically and algorithmically.
- Introduce students to discrete structures and combinatorics.

2. To teach student to be able to solve linear algebra and other related problems.

Course Outline (tentative)

- Discrete Mathematics (first half of the course)
    - Logic
        - Propositional Logic
        - Predicate Logic
    - Method of Proof
        - Direct Proof
        - Indirect Proof
        - Prove Universal and Existential Statement
    - Sets Theory
        - Set Properties
        - Set Operations
        - Russell's Paradox and The Halting Problem
    - Sequences and Summations
        - Geometric and Arithmetic Sequence
        - Summation Properties
    - Induction
        - Basic Of Induction
        - Strong Induction
    - Counting
        - Basic of Counting
        - Permutations and Combinations
        - Probability Theory
    - Function
        - One-to-one and on-to function
        - Inverse Function and Composite of Functions
- Linear Algebra
    - System of Linear Equations
        - Introduction to System of Linear Equation
        - Row Reduction and Echelon Forms
    - Vector and Matrix Equations
        - Vectors
        - The Solution Set of Linear Systems
        - Linear Independence
        - Linear Transformation
    - Matrix Algebra
        - Matrix operations
    - Determinants
        - Properties of Determinants
    - Vector Spaces

        - Vector Space
        - Subspace
    - Eigenvalues and Eigenvector

Assessment:

- Attendance 10%: There will be random attendance checking. This is the easiest marks you will get in this course, try to get full marks.
- Quiz 10%: There will be two quizzes, one before midterm and the other before final.
- Assignments 10%: I will assign homework every two weeks. These home works are due in class, any late submission will receive 10% penalty per day on your grade on that assignment.
- Midterm 35%: The exam includes all the topic in discrete mathematics.
- Final 35%: All the topic in linear algebra.

Course Policies:

1. Lecture slides, homework assignments, lecture scripts and other useful information will be posted on the course web page. So I recommend you visit the site regularly.
2. You are responsible for printing your own slide to bring to class, except the first lecture and any other handouts that I couldn't put them up early enough for you to print them for lectures, I'll hand them out in class.
3. Discussion of the assignments is allowed and encouraged between students. However, each student would be expected to do his/her own work. Assignments which are too similar will receive a zero. Any late submission will receive 10% penalty per day on your grade on that assignment.

If You Need Help:

If you have difficulties or problems on the course, you can do one of the following (in the order of preference):

1. Come talk to me after class.
2. Go to the Thai session
3. Go to the office hour.
4. Send me an email for question that doesn't need a lot of elaboration.
5. Come see me at my office outside office hour: Please make sure you make an appointment by email first.

Do not hesitate to contact me if you have problem. Any problem is usually easier to fix if dealt with as soon as possible.

Reference:

- *Discrete Mathematics with Applications* by Susanna Epp.
- *Linear Algebra and Its Applications* by David Lay.
- *Discrete Mathematic and its Applications* by Keneth Rosen.