Course Title: **Discrete Structures**
Course Code: 210104
Semester: Second 2009/2010
Lecturer : Amin Witno
Office Room: 820 (Ext. 2228)
Office Hours: STR 10–11; MW 11–12
E-mail: awitno@gmail.com

I. Course Description:

This course is an introduction to Discrete Mathematics for Software Engineering majors, which covers main topics in number theory, propositional logic and proofs, set theory, combinatorics, and graph theory, with selected applications in computer algorithms.

II. Topics by the Week:

Week	Topics
1	Logic: logic operators AND, OR, IFF, XOR, truth table, tautology, equivalence
2	Normal forms, predicates and quantifiers
3	Methods of proof: direct proof, proof by contrapositive
4	Proof by induction
5	The integers: conversion between decimal, binary, and hexadecimal
6	Modulo operation, divisibility, GCD and LCM, the Euclidean algorithm
7	Sets and counting: set operations, set identities **First Exam will be held in this week.**
8	Power set, cardinality, cross product, power set, the Pigeonhole principle
9	Inclusion exclusion principle, permutations, combinations, permutation in multisets
10	Relations: properties of relations, representation by digraphs, equivalence relation
11	Partial order relation, total order, Hasse diagram
12	Zero-one matrices, transitive closures **Second Exam will be held in this week.**
13	Graph Theory: complete graphs, complete bipartite, degree sequence, directed graphs
14	Representations by adjacency matrix, incidence matrix, Euler and Hamiltonian path/circuits
15	Trees, traversal algorithms, spanning trees, planar graphs
16	**Final Exam will be held in this week.**

III. Learning Outcomes

Knowledge and understanding:

Students will have knowledge and understanding of:

- Conversion between various base number systems, particularly the binary, octal, and hexadecimal number systems.
- Basic number theoretical functions such as the mod function, GCD, and LCM.
- Boolean logic and techniques of mathematical proofs.
- Sets and relations.
- Basic counting techniques and discrete probability.
- Some important algorithms of graph theory.

Cognitive skills (thinking and analysis):

Students are expected to develop abilities in:

- Understanding mathematical definitions and demonstrating it by writing them in their own words.
- Translating application word problems into mathematical arguments and algorithms.
- Reading and writing mathematical proofs.
- Finding examples and counter-examples to a given propositional theorems.

Communication skills (personal and academic):

Students will learn specific skills in:

- Expressing mathematical ideas in a logically correct manner.
- Good logical writing.
- Identifying ambiguities in mathematical statements and how to overcome them.
- Making good and acceptable presentation of their works.

Practical skills (transferable):

Students will also experience and gain awareness in:

- Planning and undertaking project assignments.
- The high value of meeting deadlines.
- Working independently and managing time wisely.
- Using word processor to write their reports legibly.

IV. Assessment Distribution:

Students will be assessed based on a 100 total marks, which are distributed as follows.

• Exam 1	Week 7	20%
• Project	Week 10	10%
• Exam 2	Week 12	20%
• Final Exam	Week 16	50%

V. Supporting Materials

Lecture Notes:

These notes are required and available for free download.

- Amin Witno, Discrete Structures, http://www.philadelphia.edu.jo/math/witno/notes/discrete.pdf

References:

For students who wish to purchase a textbook, any one of the following titles is recommended.

- Kenneth H. Rosen, Discrete Mathematics and Its Applications, 6th Edition 2007, McGraw Hill.
- Goodaire and Parmenter, Discrete Mathematics with Graph Theory, 3rd Edition 2006, Prentice Hall.
- Kolman, Busby, and Ross, Discrete Mathematical Structures, 5th Edition 2004, Prentice Hall.

Websites:

The following websites contain relevant materials pertaining to the course.

- Basic Sciences Department- http://www.philadelphia.edu.jo/math
- Amin Witno Website- http://www.witno.com

VI. Class Rules and Regulations

Class Attendance:

- Attendance is expected of every student.
- Being absent is not an excuse for not knowing about any important information that may have been given in class.
- Under the University's regulations, a student whose absence record exceeds 15% of total class hours will automatically fail the course.
- Students who in any way disrupt the class will be expelled from the classroom and will not be allowed to return until the problem has been resolved.

Project Assignments:

- Students are allowed to work together on a project assignment; however, the work that is turned in by each student must be his own. For instance, a mere copy of another student's work will not be graded.
- A written project must be properly presented to receive full credit.
- A late project is penalized one point per day after its due date.
- A project sent by email will not be accepted.

Late Exams:

- Late (make-up) exams will be given only to students who have a valid excuse and are able to provide a written document for its verification.
- The level of difficulty of a late exam is about 50% higher than that of the corresponding regular exam.
- All late exams will be conducted during the last week of the semester.
- Each student is allowed only one make-up in a semester, either for the first exam or the second, but not both.
- There is no make-up for a late exam.

Dishonesty:

- Any form of dishonest conduct will be strictly punished.
- A student who is caught cheating, or attempting to do so in an exam will be given a zero for the exam and a report will be written to the Dean for further action.
- A student who helps another student or is seen communicating with another student in an exam will be given the same penalty stated in the previous point.
- Students with different exam forms are not exempt from the above rules.
- Repeat offenders will be expelled permanently and banned from future courses.