

Department of Basic Sciences—Philadelphia University

Course Syllabus

Course Title	Discrete Structures
Course Code	250104
Semester	First/2018–2019
Lecturer	Amin Witno
Office Room	403 Nursing Faculty Building
Office Hours	Sun/Tue/Thu: 10–11; Mon/Wed: 11–12
E-mail	awitno@philadelphia.edu.jo

Short Description

This course is an introduction to Discrete Mathematics for students from the IT majors, covering main topics in number theory, propositional logic, proof techniques, sets and relations, counting techniques, and graph theory, together with selected applications in computer algorithms.

Topics by the Week

1. Number systems in different bases: binary, decimal, hexadecimal.
2. Logic operators and their truth tables: AND, OR, XOR, IFF, IF-THEN, logical equivalence, normal forms: CNF and DNF.
3. Set operators, Venn diagram, set identities, subset, power set, cardinality.
4. Modular arithmetic: MOD, GCD, LCM, the extended Euclidean algorithm.
5. Inverse mod, power mod computation, application in the RSA algorithm.
6. Counting techniques: the inclusion-exclusion principles, the binomial coefficients, counting problems involving combinations.
7. Sequences: arithmetic, geometric, recursive, finding explicit formula for second-order linear homogeneous recurrence relation.
8. Methods of proof: mathematical induction.
9. Binary relations: graphical and matrical representations, composition of two relations, application in transitive closure.
10. Partial order and total order relations, Hasse diagrams.
11. Graphs: representations by adjacency matrices and incidence matrices, Euler's theorem, complete and bipartite graphs.
12. Trees and algorithms: minimal spanning tree, breadth-first search and depth-first search, traversal algorithms for labeled binary trees.
13. Euler circuits and the Chinese postman problem, Hamilton cycles and the traveling salesman problem.
14. Coloring algorithm, planar graphs, maps and dual graphs.

Recommended Textbook

Discrete Structures in Five Chapters (2010, CreateSpace)

The pdf version of the chapters are available for download at

<http://witno.com/discrete>.

Supporting Material

The revision notes *Discrete Structures* also contain a collection of practice review problems which are very relevant to the course, and they can be accessed at

<http://www.philadelphia.edu.jo/math/witno/notes.htm>

Online Resources

The following shortcut will take you to my web homepage at the University, where you find the course syllabus, exam dates, copies of old exams, links to the above materials, and any important announcement related to the current semester.

<http://phi.witno.com>

Grade Distribution

Homework	
Quizzes	20%
Class participation	
First Exam	20%
Second Exam	20%
Final Exam	40%

Exam Dates

Exam dates, once determined, will be posted online at the homepage as well as at the University student-portal page.

Homework Sets

Homework problem sets with selected answers can be downloaded also from the above homepage.