

King Fahd University of Petroleum & Minerals
College of Computing Sciences and Engineering
Information and Computer Science Department



ICS 254 – Discrete Structures II – Spring 2022 (Term 212)

Website: www.almuhammadi.com/sultan/ics254 and Blackboard

Class Time, Venue and Instructor Information:

Sec.	Time	Venue	Instructor	Office Hours
02	MW 12:30-13:45	22-127	Dr. Sultan Almuhammadi Office: 22-316 Phone: 03-860-1625 E-mail: sultan@almuhammadi.com	See: website/ Blackboard

Course Description

Number Theory: Modular Arithmetic, Integer Representation, Fermat’s Little Theorem, Chinese Remainder Theorem, Applications from Number Theory: Affine Transformation, RSA; Relations: Closures and Equivalence Relations, Partial Orderings and Lattices, Hasse Diagrams; Automata Theory: Finite State Machines, Regular Expressions, DFA, NFA and their equivalence; Graphs terminology and applications, Connectivity, Isomorphism, Euler and Hamilton Paths and Circuits, Planarity and Coloring; Trees terminology and applications.

Prerequisite: ICS 253

Course Objectives

1. To introduce the students to theoretical foundations of computer science in the area of discrete structures.
2. To develop problem-solving skills of the students using a range of theoretical results.

Course Learning Outcomes

After completion of this course, the student shall be able to:

1. understand relations and their graphical representation.
2. explain basic concepts in number theory and apply them in problem-solving.
3. understand foundational knowledge of automata theory.
4. comprehend graphs and trees and their mathematical properties.

Textbook:

K. H. Rosen, [*Discrete Mathematics and Its Applications*](#), 7th Ed., McGraw-Hill. (Available online)

Course Contents (tentative):

The following schedule is tentative and subjected to changes. Any change will be announced in the class and course website/ Blackboard.

1. Number Theory: modular arithmetic, integer representation, Fermat’s Little Theorem, Chinese Remainder Theorem, RSA and applications of Number Theory. (4 weeks)
2. Relations: properties and application of relations, representation, closure, equivalence relations, and partial ordering. (5 weeks)
3. Automata Theory: Finite State Machines, Regular Expressions, DFA, NFA and their equivalence. (3 weeks)
4. Graphs and Trees (3 weeks)

Assessment Plan

Assessment Tool	Weight
Course Work*	30 %
Project	10 %
Midterm Exam (12/3/2022)	25 %
Final Exam (comprehensive)	35 %

* See Course Policies for details

Course Policies

- **Coursework includes** participation, online/in-class discussions and activities, attendance, homework assignments, and quizzes. Active learning is implemented in this class. Students are expected to be positively engaged in the learning process.
- **Course Website & Participation:** Students are required to periodically check the course website and download course material as needed.
 - Several resources will be posted through the website as well.
 - [Blackboard](#) will be used for communication and interaction, posting and submitting assignments, posting grades, posting sample exams, etc.
 - It is expected that you get benefit of the discussion board by raising questions or answering questions put by others.
- **Attendance:** Regular attendance is a university requirement.
 - Attendance will be checked at each lecture.
 - Missing 20% of the classes will result in an automatic DN grade (without warning).
 - Late arrivals will disrupt the class session, and may be counted as a miss if repeated.
 - If you find yourself unable to attend a class, email the instructor ahead of time for better planning and management of the class. If you fail to do so, send your email as soon as you get a chance and provide your excuses if any.
 - Every unexcused absence may lead to a loss of 0.5% of total grade.
- **Late assignments:** are subjected to late-penalty. See late submission policy on the course website/ Blackboard under the Assignments page.
- **Re-grading policy:** If you have a complaint about any of your grades, discuss it with the instructor no later than 3 days of distributing the grades (except for the final). Only legitimate concerns on grading should be discussed.
- **Office Hours:**
 - Students are encouraged to use the office hours to clarify any part of the material that is not clear. Use the Blackboard (Bb) for quick points and homework questions.
 - For urgent issues, use emails instead of Bb-mails, please indicate ICS254 in the "Subject" field of your email (e.g. ICS254: Quiz1 score is missing).
- **Academic honesty:**
 - Students are expected to abide by all the university regulations on academic honesty.
 - Cheating will be reported to the Department Chairman.
 - Although collaboration and sharing knowledge is highly encouraged, copying others' work without proper citation, either in part or full, is considered plagiarism. Whenever in doubt, review the university guidelines or consult the instructor.
- **Courtesy:**
 - Students are expected to be courteous toward their classmates and the instructor throughout the duration of this course (in-class and online).
 - Side-talks and text-messages during the class are prohibited.