

### PhD Entry Exam Syllabus

**Number of Questions:** 40 Multiple-Choice Questions

**Total time duration:** Two Hours

**Exam Time:** Thursday, 20/11/1447H – 7/5/2026, at 11 AM.

**Location:**

**Male section:** FCIT building 080B in Lab L1-9

**Female section:** Building 61 Lab G130

**Exam Coordinators:**

**Male section:** Dr. Faris Kateb [Fakateb@kau.edu.sa; 0508007895]

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Subject	Textbook and Topics
Probability and Statistics (15%)	<p><b>Douglas C. Montgomery, George C. Runger</b>  <b>Applied Statistics and Probability for Engineers, 6<sup>th</sup> Edition</b>                      Chapter 1 (Probability): Conditional Probability, Bayes' Theorem                      Chapter 2 (Discrete Random Variables and Probability Distribution): Discrete Random Variables, PDF, CDF, Binomial Distribution, Poisson Distribution                      Chapter 3 (Continuous Random Variables and Probability Distribution): Normal Distribution, Exponential Distribution                      Chapter 7 (Point Estimation of Parameters and Sampling Distributions): Central Limit Theorem                      Chapter 8 (Statistical Intervals for a Single Sample): Confidence Interval, Prediction Interval                      Chapter 9 (Tests of Hypotheses for a Single Sample): Hypothesis Testing</p>
Mathematics (15%)	<p><b>Introduction to Linear Algebra, Fifth Edition, by Gilbert Strang</b>                      Chapter 1 (Introduction to Vectors)                      Chapter 2 (Solving linear equations)                      Chapter 3 (Vector Spaces and Subspaces)                      Chapter 4 (Orthogonality)                      Chapter 5 (Determinants)                      Chapter 6 (Eigenvalues and Eigenvectors)</p>
Programming (20%)	<p><b>Deitel and Deitel</b>  <b>Java How to Program, 11<sup>th</sup> Edition (Late Objects)</b>                      Chapter 3 (Control Statements: Part 1)                      Chapter 4 (Control Statements: Part 2)                      Chapter 7 (Introduction to Classes and Objects)                      Chapter 8 (Classes and Objects: A Deeper Look)                      Chapter 9 (Object-Oriented Programming: Inheritance)                      Chapter 10 (Object-Oriented Programming: Polymorphism and Interfaces)                      Chapter 11 (Exception Handling: A Deeper Look)                      Chapter 15 (Files, Input/Output Streams)                      Chapter 18 (Recursion)  <b>John Hubbard, "Schaum's Outline of Data Structures with Java", 2<sup>nd</sup> Edition</b></p>

	<p>Chapter 2 (Arrays)</p> <p>Chapter 3 (Linked Data Structures)</p> <p>Chapter 5 (Stacks)</p> <p>Chapter 6 (Queues)</p> <p>Chapter 7 (Lists)</p> <p>Chapter 10 (Trees)</p> <p>Chapter 11 (Binary Trees)</p> <p>Chapter 12 (Search Trees)</p> <p>Chapter 13 (Heaps and Priority Queues)</p> <p>Note: No specific language construct will be examined.</p>
Operating Systems (10%)	<p><b>Gagne, Galvin, Silberschatz</b>  <b>Operating System Concepts, 8<sup>th</sup> Edition</b></p> <p>Chapter 3 (Processes)</p> <p>Chapter 4 (Threads)</p> <p>Chapter 5 (CPU scheduling)</p> <p>Chapter 6 (Process Synchronization)</p> <p>Chapter 7 (Deadlocks)</p> <p>Chapter 8 (Main Memory)</p> <p>Chapter 9 (Virtual Memory)</p> <p>Chapter 10 (File System Interface)</p>
Networking (10%)	<p><b>James F. Kurose, and Keith W. Ross.</b>  <b>Computer Networking: A Top-Down Approach, 6th ed. (2013).</b></p> <p>Chapter 1 (Computer Networks and the Internet)</p> <p>Chapter 2 (Application Layer): HTTP, FTP, Socket Programming</p> <p>Chapter 3 (Transport Layer): TCP, UDP protocols</p> <p>Chapter 4 (The Network Layer): IPV4, IPV6, Routing Algorithms: DSDV, LS</p> <p>Chapter 5 (The Link Layer): Error detection techniques, MAC protocols, Ethernet</p> <p>Chapter 6 (Wireless and Mobile Networks): IEEE 802.11</p> <p>Chapter 8 (Security in Computer Networks): authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls</p>
Database (10%)	<p><b>Ramez Elmasri, Shamkant B. Navathe</b>  <b>Fundamentals of Database Systems, 7<sup>th</sup> Edition</b></p> <p>Chapter 3 (Data Modeling Using the Entity Relationship (ER) Model)</p> <p>Chapter 4 (The Enhanced Entity Relationship (EER) Model)</p> <p>Chapter 5 (The Relational Data Model and Relational Database Constraints)</p> <p>Chapter 6 (Basic SQL)</p> <p>Chapter 7 (More SQL: Complex Queries, Triggers, Views, and Schema Modification)</p> <p>Chapter 8 (The Relational Algebra and Relational Calculus)</p> <p>Chapter 9 (Relational Database Design by ER- and EER-to-Relational Mapping)</p> <p>Chapter 14 (Basics of Functional Dependencies and Normalization for Relational Databases)</p> <p>Chapter 15 (Relational Database Design Algorithms and Further Dependencies)</p> <p>Chapter 16 (Disc Storage, Basic File Structures, Hashing, and Modern Storage Architectures)</p>

	<p>Chapter 17 (Indexing Structures for Files and Physical Database Design)</p> <p>Chapter 18 (Strategies for Query Processing)</p> <p>Chapter 19 (Query Optimization)</p> <p>Chapter 20 (Introduction to Transaction Processing Concepts and Theory)</p> <p>Chapter 21 (Concurrency Control Techniques)</p>
<p>Software Engineering (10%)</p>	<p><b>Roger Pressman, Bruce Maxim</b>  <b>Software Engineering: A Practitioner's Approach, Eighth Edition</b></p> <p>Chapter 8 (Understanding Requirements)</p> <p>Chapters 9, 10, 11 (Requirements Modeling)</p> <p>Chapter 12 (Design Concepts)</p> <p>Chapter 13 (Architectural Design)</p> <p>Chapter 14 (Component-Level Design)</p> <p>Chapter 19 (Quality Concepts)</p> <p>Chapter 20 (Review Techniques)</p> <p>Chapter 21 (Software Quality Assurance)</p> <p>Chapter 22 (Software Testing Strategies)</p> <p><b>Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides</b>  <b>Design Patterns: Elements of Reusable Object-Oriented Software</b></p> <p>Chapter 3 (Creational Patterns)</p> <p>Chapter 4 (Structural Patterns)</p> <p>Chapter 5 (Behavioral Patterns)</p>
<p>Multimedia (10%)</p>	<p><b>Fundamentals of Multimedia, 2nd edition, By Ze-Nian Li, Mark S. Drew, Jiangchuan Liu</b></p> <p>Chapter 1 (Introduction to Multimedia)</p> <p>Chapter 2 (Graphics and Image Data Representation)</p> <p>Chapter 4 (Color in Image and Video)</p> <p>Chapter 5 (Fundamental Concepts in Video)</p> <p>Chapter 7 (Lossless Compression Algorithms)</p> <p>Chapter 8 (Lossy Compression Algorithms)</p>