**COURSE DESCRIPTION FORM**

**INSTITUTION** National University of Computer and Emerging Sciences (NUCES-FAST)

BS(CS)

**PROGRAM (S) TO BE**

**EVALUATED**

1. **Course Description**

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

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| --- | --- | --- | --- | --- |
| **Course Code** | CS-203 | | | |
| **Course Title** | Database Systems | | | |
| **Credit Hours** | 3+1 | | | |
| **Prerequisites by Course(s) and Topics** | CS-201 (Data Structures) | | | |
| **Assessment Instruments with Weights** (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | Mid-I: 15  Mid-II: 15  Assignments/Quizzes: 10  Project: 10  Final: 50 | | | |
| **Course Coordinator** | Dr. Zulfiqar Ali Memon | | | |
| **URL (if any)** |  | | | |
| **Current Catalog Description** | Basic database concepts. Fundamentals of Information System, Relational data model. Relational theory and languages. Conceptual modeling & Database design. Programming using SQL. Introduction to transaction processing and concurrency. Introduction to query processing and optimization, database security and emerging trends. | | | |
| **Textbook** (or **Laboratory Manual** for Laboratory Courses) | Ramez Elmasri & Shamkant B. Navathe, *Database Systems, Models, Languages, Design and Application Programming,* 7th Edition, 2016. | | | |
| **Reference Material** | 1. Thomas Connolly, Carolyn Begg, *Database Systems: A practical approach to design, implementation and Management*, 6th Edition, 2015. 2. C.J. Date, *An Introduction to Database Systems*, 8th Edition, 2004 | | | |
| **Course Goals** | |  | | --- | | **A. Course Learning Outcomes (CLOs)** | | 1. Understand the concepts of Information Systems, Database and its Architecture 2. Learn Conceptual Modeling with ER and EER using real life examples of various enterprises. 3. Manage Logical Design or implementation of ER and EER for the designing of Schema 4. Identify Functional dependencies and perform normalization of Conceptual and Logical design 5. Write queries using formal query languages such as relational algebra. 6. Formulate, using SQL, solutions to a broad range of query and data update problems. 7. Learn about Transactions, Comprehend the ACID properties of Transactions and recoverability schedules. 8. Introduction to Query Processing and Optimization with heuristic approach | | |  |  | | --- | --- | | **B. Program Learning Outcomes** | | | For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cell blank if the enablement is little or non-existent. | | | |  |  | | --- | --- | | 1. Academic Education: | To prepare graduates as computing professionals | |  | | |  |  | | --- | --- | | 2. Knowledge for Solving Computing Problems: | Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the  abstraction and conceptualization of computing models from defined problems and requirements. | |  | | |  |  | | --- | --- | | 3. Problem Analysis: | Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines. | |  | | |  |  | | --- | --- | | 4. Design/ Development of Solutions: | Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. | |  | | |  |  | | --- | --- | | 5. Modern Tool Usage: | Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations. | |  | | |  |  | | --- | --- | | 6. Individual and Team Work: | Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings. | |  | | |  |  | | --- | --- | | 7. Communication: | Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions. | |  |  | |  | | |  |  | | --- | --- | | 8. Computing Professionalism and Society: | Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice. | |  | | |  |  | | --- | --- | | 9. Ethics: | Understand and commit to professional ethics, responsibilities, and norms of professional computing practice. | |  | | |  |  | | --- | --- | | 10. Life-long Learning: | Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional. | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **C. Relation between CLOs and PLOs**  (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes) | | | | | | | | | | | | |  | | **PLOs** | | | | | | | | | | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | | **CLOs** | 1 |  |  |  |  |  |  |  |  |  |  | | 2 |  |  |  |  |  |  |  |  |  |  | | 3 |  |  |  |  |  |  |  |  |  |  | | 4 |  |  |  |  |  |  |  |  |  |  | |  | 5 |  |  |  |  |  |  |  |  |  |  | |  | 6 |  |  |  |  |  |  |  |  |  |  | |  | 7 |  |  |  |  |  |  |  |  |  |  | |  | 8 |  |  |  |  |  |  |  |  |  |  | | | | | |
| **Topics Covered in the Course, with Number of Lectures on Each Topic** (assume 15-week instruction and one-hour lectures) | |  |  |  |  | | --- | --- | --- | --- | | **1. Topics to be covered:** | | | | | List of Topics | No. of Weeks | Contact Hours | CLO | | Introduction to Database System, Introduction to Databases & Information Systems, Database Systems Concepts and Architecture | **2** | **6** | **2,3** | | Relational Database Concepts and Programming, The Basic Relational Data Model & Constraints, Basic SQL, general concepts and constructs | **2** | **6** | **2,3** | | Database Design, Conceptual Data Modeling Using Entities and Relationships | **1** | **3** | **1,2,3** | | *Mid 1* | ***1*** | ***1*** |  | | Mapping a conceptual Design into a Logical Design, ER modeling | **1.5** | **4.5** | **1,2,5** | | Extending the ER model, EER Modeling | **1.5** | **4.5** | **1,2,5** | | Formal Relational Languages: The Relational Algebra | **1.5** | **4.5** | **1,2,5** | | Database Design Theory, Design Anomalies, Concept of Functional dependencies | **1.5** | **4.5** | **2, 4, 6** | | *Mid 2* | ***1*** | ***1*** |  | | Normalization and its various forms | **1** | **3** | **2, 4, 6** | | Foundations of Database Transaction Processing, ACID Properties | **1** | **3** | **2,5,7** | | Recovery Concepts & Concurrency Control | **1** | **3** | **2,6,8** | | Emerging Database Concepts & Review | **1** | **3** | **1,6,8** | | Total | **15** | **45** |  | | | | |
| **Laboratory Projects/Experiments Done in the Course** |  | | | |
| **Programming Assignments Done in the Course** |  | | | |
| **Class Time Spent on** (in credit hours) | **Theory** | **Problem Analysis** | **Solution Design** | **Social and Ethical Issues** |
| 30 | 9 | 5 | 1 |
| **Oral and Written Communications** | Every student is required to submit at least \_\_1\_\_ written reports of typically \_2\_\_ pages and to make \_1\_\_ oral presentations of typically \_\_10\_\_ minute’s duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy. | | | |