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| **Department:** *Computer Science* | |
| **Module Title:** *Database Systems* | **Module Code: CoSc-M2061** |
| **Module ECTS: 12** |
| **Course Tile:** Advanced Database systems | Course Code: CoSc2072 |
| **Instructor Name**: Boki Chelkeba | Course ECTS: 6 |

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| **Instructor’s Contact Information:**  Office  Phone:  Email: nafirom3@gmail.com  Office Hours: | **Course Information:**  Academic Year: 2012 E.C  Year :II  Semester: II  Meeting day:  Meeting time:  Meeting location: |

1. **Course Description**:

This course deals with, query optimization, transaction management, recovery, and concurrency control, database authorization and security. Additional topics including, object oriented and object relational database system, distributed databases, databases, and integration may also be covered. A major component of the course is a database implementation project using current database languages and systems.

1. **Course Goals or Learning Outcomes:**

By the end of this course, students will be able to:

* Describe the main concepts of the OO model such as object identity, type constructors, encapsulation inheritance, polymorphism, and versioning
* Evaluate a set of query processing strategies and select the optimal strategy. Know the basics of transaction management and concurrency control
* Understand database security
* Use different recovery methods when there is a database failure
* Design a distributed database system in homogenous and heterogeneous environments

1. **Prerequisites:** Fundamentals of Database Systems(CoSc2071)

1. **Reference**

**Text book:**

* RamezElmasri and Shamkant B. Navathe (2000) Fundamentals of Database Systems, 3rd edition.

**Reference books:**

* Massachusetts AddisonWesleyC. J. Date (2000) An Introduction to Database Systems. Massachusetts: Addison Wesley
* Ramakrishna, Raghu & Johannes Gehrke (2000) Database Management Systems, 2nd edition. McGraw Hill
* Shepherd John C. (1990) Database Management: Theory and Practice. Boston:
* IRWIN
* Database Management Systems, 2/e. Raghu Ramakrishna & Johannes Gehrke, McGraxv-Hiil, 1998.
* Database System Concepts 3/e. Abraham SibcrschatzHeriy F Korth& S. Sudarshan, McGraw-Hill,1997.
* A First Course in Database Systems, Jeffrey Ullman *&*Jennifer Widom, Prentice-Hall,1997.
* Database System Implementation, Hector Garcia-Molina, Jeffrey Ullman *&*Jennifer Widom, Prentice-Hall, 2000.
* Readings in Database Systems, Michael Stonebraker& Joe Hellerstein, eds, Morgan-Kaufmann, 1998

1. **Schedule:**

The following is an outline of the order in which syllabus contents will be covered. The exact dates and due dates for assignments and exams can be found on the class calendar and are subject to change with notice.

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| ***Date*** | ***Topic*** | ***Subtopic*** | ***Reading*** |
| Week 1-2 | **Concepts for Object-Oriented Databases**   * Overview of Object-Oriented Concepts * Object Identity, Object Structure, and Type Constructors * Encapsulation of Operations, Methods, and Persistence * Type Hierarchies and Inheritance | | Ref-1 part 3 Chapter 11 |
| Week 3-4 | **Query processing and Optimization**   * Translating SQL Queries into Relational Algebra * Basic Algorithms for Executing Query Operations * Using Heuristic in Query Optimization * Using Selectivity and Cost Estimates in Query Optimization * Semantic Query Optimization | | Ref-1 part 4 Chapter 15 |
| Week 5-6 | **Transaction Processing Concepts**   * Introduction * Transaction and System Concepts * Properties of Transaction * Schedules and Recoverability * Serializability of Schedules * Transaction Support in SQL | | Ref-1 part 5  Chapter 17 |
| Week 7-8 | **Concurrency Control Techniques**   * Locking Techniques for Concurrency Control * Concurrency Control Based ON Timestamp Ordering * Multiversion Concurrency Control Techniques * Validation (Optimistic) Concurrency Control Technique * Granularity of Data Items and Multiple Granularity Locking * Using Locks for Concurrency Control in Indexes | | Ref-1 part 5 Chapter 18 |
| Week 9-10 | **Database Recovery Techniques**   * Recovery Concepts * Recovery Concepts Based on Deferred Update * Recovery Concepts Based on Immediate Update * Shadow Paging * The ARIES Recovery Algorithm * Recovery in Multi database Systems | | Ref-1 part 5 Chapter 19 |
| Week 11 | **Database Security and Authorization**   * Introduction to DB Security Issues * Discretionary Access Control Based on Granting /Revoking of Privileges * Mandatory Access Control for Multilevel Security * Statistical DB Security | | Ref-1 part 7 Chapter 23 |
| Week 12 | **Distributed Database System**   * Distributed Database Concepts * Data Fragmentation, Replication, and Allocation Techniques for Distributed database Design * Types of Distributed Database Systems * Query Processing in Distributed Databases | | Ref-1 part 7 Chapter 24 |

**11. Assessment Arrangements:**

List the assessment methods along with weight distribution.

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| Test #1 | 15% |
| Test # 2 | 10% |
| Final examination | 40% |
| Quizzes | 5% |
| Lab Examination | 15% |
| Project | 15% |
| Total | 100% |