**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY**

**COURSE OUTLINE**

**MIT 3104 ADVANCED DATABASE SYSTEMS AND MANAGEMENT**

**LECTURER: DR. MWALILI TOBIAS M**

**Pre-requisites:** None

**Course Purpose**

To provide in depth understanding of object oriented database development, implementation

and management and the techniques and tools for developing and utilizing databases in

business.

**Learning Outcomes**

By the end of the course units the learner should be able to;

1. Explain the principle of object oriented databases
2. Use structured query language (SQL) to access and manipulate data.
3. Optimize databases using Advanced SQL
4. Design and develop relational and object oriented databases
5. Design and Implement distributed Databases

**Course Content**

Introduction Concepts: Relational model and algebra, SQL basics Database Tuning, Parallel database systems and high-performance sorting, Distributed query processing , Concurrency control. SQL in the real world: embedded SQL, data passing, status, cursor, connection, transaction, stored procedure; dynamic SQL, parameter, descriptor; JDBC; SQLJ; ODBC. Object Oriented databases: from relational to object-oriented: less redundancies, simpler queries, conceptual object data model: objects (void, value) & values (prim, ref, tupple, set), classes (type, method signatures, extent) & types (also 4 kinds), subtypes, database schema & instance. Query processing: external sort, duplicate removal, computing projections, computing selections, access path. Computing joins: block nested loops, index-nested loops, sort-merge, hash; star joins: using join index, bitmap indices; choosing indices. Query optimization: equivalence rules; heuristics: pushing selections and projections in, pipelining; cost estimation. Estimating output size; choosing query evaluation plan; incremental update for optimization, example of computing averages. Distributed databases: kinds of data distribution, views of developers; data fragmentation, replication, performance analysis. OLAP, data mining, and data warehouses: OLAP, vs OLTP, vs data mining; multidimensional model, star schema; aggregation, drilling, rolling, slicing, dicing; CUBE, ROLLUP.

**COURSE OUTLINE**

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| **WEEK** | **TOPIC** | **ASSGMTS/**  **CATS** |
| 1 | Review of Database Concepts and The Relational Data Model |  |
| 2 | SQL: Data Manipulation |  |
| 3 | SQL: Data Definition |  |
| 4 | Object-Relational DBMSs |  |
| 5 | CAT 1 |  |
| 6 | Entity—Relationship Modeling |  |
| 7 | Transaction Management |  |
| 8 | Query Processing |  |
| 9 | Distributed DBMSs and Replication |  |
| 10 | CAT 2 |  |
| 12 | Object-Oriented DBMSs–Concepts and Design |  |
| 13 | Data Warehousing Concepts and Design |  |
| 14 | Online Analytical Processing and Data Mining |  |
| 15 | Examination |  |
| 16 | Examination |  |

**Teaching Methodologies**

Lectures, Tutorials, Demonstrations, Presentations, Discussions.

**Instructional Materials/Equipment**

Whiteboard, Computers and Internet, appropriate software.

**Course Assessment**

40% Continuous Course Assessment (Tests 10%, Assignment 10%, Practical 20%)

60% End of Semester Examination.

**Course Textbooks**

1. Michael Manino, Database Design, Application, Development, & Administration, Third Edition, McGraw-Hill, 2007, ISBN: 0072942207
2. Benjamin Rosenzweig, Silvestrova E., Oracle PL/SQL by Example, Prentice Hall PTR Oracle Series, 2003,ISBN-10: 0131172611.
3. Howe D. R., Data Analysis for Database Design, Butterworth Heinemann (3rd Ed), 2001, ISBN: 0750650869
4. Watson, R.J., Data Management: Database & Organizations, Wiley (4th Ed), 2003, ISBN: 0471452254

**Reference Textbooks**

1. Groff & Weinberg, SQL: The Complete Reference, McGraw Hill (Osbourne Media), 2nd Ed., 2002, ISBN: 0072225599
2. McFadden J.A., & Hoffer F.R., Modern Database Management, Benjamin Cummins (7th Ed), 2004, ISBN: 0131453203
3. Korth, Silberschatz, Sudarshan, Database System Concepts, McGraw Hill (5th Ed), 2001, ISBN: 007124476

**Course Journals**

1. Acta Informatica ISSN 0001-5903
2. Advances in Computational Mathematics ISSN 1019-7168
3. Advances in data Analysis and Classification ISSN1 1862-5347
4. Annals Of software Engineering ISSN 1022-7091

**Reference Journals**

1. Journal of computer science and Technology ISSN 1000-9000
2. Journal of Science and Technology ISSN 1860-4749
3. Central European Journal Of Computer Science ISSN 1896-1533
4. Cluster computing ISSN 1386-7857