SUBJECT DESCRIPTION FORM

Subject Title: Advanced Database Systems

Subject Code: COMP5151

Credit Value: 3

Pre-requisite(Subject title and code no, if any):

Database Systems and Management (COMP5111) or
Database Systems (COMP503) or equivalent
[waived for Software Technology students]

Recommended background knowledge:

Knowledge of relational database and familiar with SQL. Fundamental concept of
object-oriented paradigm and familiar with C++.

Mutual Exclusions:

Modern Database System and Technology (COMP516)

Learning Approach:

42 hours of Class activities including - lecture, tutorial, lab, workshop seminar where
applicable

Assessment:

Continuous Assessment	45%
Test, and Examination	55%

Objectives:

1. To equip students with principles and knowledge of distributed database systems;
2. To discuss in details the key concepts and practical issues in the implementation and application of distributed database systems;
3. To equip students with principles and knowledge of object oriented database system design

---

Learning Outcomes:

After completing the subject, students should be able to:
1. better understand the principles and knowledge in distributed database systems;
2. explore and identify the various issues related to the development of distributed database system; and
3. recognize the design aspects of OO databse system and related development

The Department reserves the right to update the syllabus contents. Please note that the learning approach for the same subject could vary slightly due to different delivery modes.

<u>Keyword Syllabus:</u>

Review of database technology
Overview of object-oriented databases and distributed databases. Comparison between relational, object-oriented distributed database systems.

Distributed database systems
Distributed database vs. distributed data processing, problem areas of distributed database system, architecture of distributed database system, multimedia database

Database design and query processing
Data fragmentation, allocation, query optimization, execution strategies, object clustering and performance benchmarking.

Transaction processing and concurrency control
Serializability, locking-based concurrency control, design transactions, timestamp-based concurrency control, optimistic concurrency control, deadlock detection and prevention

Database integrity and security
Data protection and authorization control, multi-level database systems

Overview of object-oriented data modelling
Object definition, types and classes, object methods, assertions and constraints, and ODMG.

Concepts and implementation issues in object-oriented database systems
Storage structure for complex/composite objects, object identity, encapsulation, types/classes, inheritance, late binding, persistence, indexing mechanism

Optional topics
Examples may include: application of distributed database technology to the World Wide Web, web databases, ODBC, JDBC, data warehousing on the web, mobile databases, multimedia databases, spatial and temporal databases

---

<u>Indicative reading list and references:</u>

<u>Books</u>

Blaha, M. and Premerlani, W., 1998, *Object-Oriented Modeling and Design for Database Applications, Prentice-Hall.*
Embley, D. 1997, *Object Database Development: Concepts and Principles*, Addison-Wesley.
Kim, W., 1995, *Modern Database Systems: The Object Model, Interoperability, and Beyond,* ACM Press.
Maurer, Scherbakov, Halim and Razak, 1998, *From Databases to Hypermedia,* Springer,
Ozsu, M.T. and Valuriez, P., 1999, *Principles of Distributed Database System 2ed Edition*, Prentice-Hall.
Eaglestone, B. and Ridley, M., 2001, *Web Database Systems,* McGraw Hill.
Bernstein, Hadzolacos and Goodman, 1987, *Concurrency Control and Recovery in Database Systems.* Addison-Wesley.
Abiteboul, Buneman, and Suciu, 2000, *Data on the Web,* Margan Kaufmann.
Ceri, S. and Pelagatti, G., 1985, *Distributed Databases - Principles & Systems,* McGraw Hill.

<u>Journals</u>

Journal of ACM
ACM Transactions on Database Systems
IEEE Transactions on Knowledge and Data Engineering
VLDB Journal