School of Computing and Information Sciences

Course Title: Advanced Database Management **Date:** 3/5/20

Course Number: COP 4722

Number of Credits: 3

Subject Area: Database	**Subject Area Coordinator:** Nagarajan Prabakar **email:** prabakar@cis.fiu.edu
Catalog Description: Design & management of enterprise systems; query optimization, transaction processing; concurrency techniques; web queries; XML interchanges; data warehousing, datamining; OLAP; NOSQL and bigdata.	
Textbook: Fundamentals of Database Systems, 7th Edition Elmasri and Navathe Addison Wesley (ISBN: 0-13-397077-9)	
References:	
Prerequisites Courses: COP-4703 or COP-4710	
Corequisites Courses: None	

Type: Elective

Prerequisites Topics:

- Database architecture
- Relational algebra
- Design of SQL queries

Course Outcomes:

1. Exposure to enterprise database system
2. Master query optimization
3. Master transaction processing and concurrency techniques
4. Be familiar with web queries
5. Be familiar with XML and XQueries
6. Be familiar with data mining, data warehouse and OLAP
7. Be familiar with information retrieval
8. Be familiar with NOSQL and big data

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Outline

Topic	Number of Lecture Hours	Outcome
• Enterprise database systems o Enterprise server features o Enterprise server organization	2	1
• Query optimization o Translation of SQL query to relational algebra o Efficient implementation of relational algebra operations o General query transformation rules o Query cost estimation, tuning queries o Semantic query optimization	6	2
• Concurrency o Transaction processing, ACID properties o Serializability, equivalence of schedules o Locks, two-phase locking o Deadlock, time stamp ordering	6	3
• Internet databases and web queries o Web databases o PHP database programming	4	4
• XML and XQueries o XML hierarchical tree data model o XML documents, DTD, XSD o Importing/exporting XML documents o XML querying: Xpath, XQuery	4	5
• Data warehousing and data mining o Data modeling for data warehouses o Building data warehouses o Data mining – support and confidence o Association rules algorithms o Classification and clustering	6	6
• Information retrieval and big data o Information retrieval concepts o Web search and analysis o NOSQL systems and CAP theorem o Hadoop and HDFS o MapReduce algorithm	8	7, 8

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Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Query optimization Outcome: 2	2
2	Serializability of schedules Outcome: 3	2
3	PHP Queries Outcome: 4	2
4	XQueries Outcome: 5	1
5	Data mining – Frequent Itemsets Outcome: 6	1
6	Big data – MapReduce Outcome: 8	2

Oral and Written Communication: No significant coverage

Number of written reports:

Approximate number of pages for each report:

Number of required oral presentations:

Approximate time for each presentation:

Social and Ethical Implications of Computing Topics

No significant coverage

Topic	Class time	Student performance measures

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Theoretical Contents

Topic	Class time
Relational algebra	0.5

Problem Analysis Experiences

1. Analysis of data mining results to derive data patterns

Solution Design Experiences

1. Design of an extended query processing algorithm
2. Optimization of semantic query trees
3. Construction of precedence graphs for schedules