

Knight Foundation School of Computing and Information Sciences

Course Title: Information Storage and Retrieval Concepts

Date: 12/20/2022

Course Number: COP 4703

Number of Credits: 3

Subject Area: Database	Subject Area Coordinator: Antonio Bajuelos email: abajuelo@fiu.edu
Catalog Description: Introduction to information management and retrieval concepts. The design and implementation of a relational database using a commercial DBMS. Online information retrieval and manipulation. Not acceptable for credit for Computer Science majors.	
Textbook: Bundle: "Concepts of Database Management" (7th Ed) and "A Guide to SQL" (8th Ed) by Pratt Thompson Course Technology (ISBN: 0324825838)	
References: "Fundamentals of Database Systems" (7 ^h Ed) Elmasri and Navathe Addison Wesley e-Book ISBN-13: 978-0133971224 Paperback ISBN-13: 978-0133970777	
Prerequisites Courses: COP 3804 or COP 3337	
Corequisites Courses: None	

Type: Required (CY, IT)

Prerequisites Topics:

- Java data types
- Design of Java classes
- Design of basic web pages

Course Outcomes:

1. Discuss database architecture and its components [Understanding]
2. Design retrieval queries [Creating]
3. Evaluate normalization principles in database designs [Evaluating]
4. Design a relational database [Creating]
5. Describe embedded SQL queries [Understanding]
6. Illustrate fundamental database security concepts [Applying]

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Association between Student Outcomes and Course Outcomes

BS in Computing: Student Outcomes	Course Outcomes
1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	1
2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	3, 4
3) Communicate effectively in a variety of professional contexts.	
4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	
5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	
Program Specific Student Outcomes	
6) Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	
6) Apply security principles and practices to maintain operations in the presence of risks and threats. [CY]	2, 5, 6
6) Use systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to accomplish user goals. [IT]	2, 5, 6

Assessment Plan for the Course and how Data in the Course are used to assess Student Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:
<https://abet.cis.fiu.edu/>

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Outline

Topic	No. of Lecture Hours	Course Outcome
<ul style="list-style-type: none"> • Database systems <ul style="list-style-type: none"> ○ Data redundancy ○ Components of database systems ○ DBMS functions ○ Database architecture and data independence • Information retrieval <ul style="list-style-type: none"> ○ Search engines, web crawling, page ranking 	4	1
<ul style="list-style-type: none"> • Relational data model concepts <ul style="list-style-type: none"> ○ Relational model introduction ○ Query by example ○ Relational algebra 	6	2
<ul style="list-style-type: none"> • Structured query language <ul style="list-style-type: none"> ○ Simple retrieval queries ○ Multi-table queries ○ Nested queries ○ Insert, delete, update queries ○ Embedding secure SQL queries in a procedural language 	6	2,5
<ul style="list-style-type: none"> • Relational database design <ul style="list-style-type: none"> ○ Views, indexes ○ Integrity rules: entity, referential ○ Functional dependency ○ Normal forms (1NF, 2NF, BCNF) ○ Multivalued dependency (4NF) ○ Mapping conceptual schema to a relational schema 	6	3,4
<ul style="list-style-type: none"> • DBMS functions <ul style="list-style-type: none"> ○ Transactions, Concurrency, deadlock ○ Two-phase locking, time stamping ○ Recovery 	4	
<ul style="list-style-type: none"> • Database administration <ul style="list-style-type: none"> ○ Policies: access control, disaster planning, archiving, security ○ Administrative: DBMS evaluation, selection, maintenance, training ○ Technical: design, testing, tuning 	4	6
<ul style="list-style-type: none"> • Database management approaches <ul style="list-style-type: none"> ○ Distributed DBMS, OODB ○ Data warehouse, data mining, OLAP 	4	
<ul style="list-style-type: none"> • Database security <ul style="list-style-type: none"> ○ Database encryption and privacy ○ Information storage and physical database security ○ SQL injection ○ Authentication and access control ○ Physical data security 	6	6

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Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Database query design (relational algebra) Outcomes: 2	2
2	Database query design (SQL) Outcomes: 2	2
3	Database query design (advanced SQL) Outcomes: 2	2
4	Mapping of a conceptual schema to a relational schema Outcomes: 3, 4	2
5	Embedding SQL queries in an application program Outcomes: 5	2

Oral and Written Communication

No significant coverage

Social and Ethical Implications of Computing Topics

No significant coverage

Theoretical Contents

Topic	Class time
Set theory	0.5
Relational algebra	0.5

Problem Analysis Experiences

1.

Solution Design Experiences

1.
2.