SYLLABUS FOR ADVANCED DATABASE SYSTEMS (226)	
Fall 2017	**California State University, Fresno**
Course Information: Graduate elective covering key topics in Database Systems.	**Insructor Name:** Dr. David Ruby
Units: 3	**Office Number:** Sci II 273
Time: TuTh @ 5:00 – 6:15pm	E-Mail: druby@csufresno.edu
Location McKee Fisk 208	**Telephone** 278-4312
Website TBD	Office Hours

Prerequisites

CSci 144

Required Textbooks and Materials

Textbook:
Database Systems: The Complete Book, Second Edition
   By Hector Garcia-Molina; Jeffrey D. Ullman; Jennifer Widom

Software (Freely Available):
MySQL Community Server (Version 5.6)

Course Goals and Primary Learning Outcomes

Course Goals:

Provide students with an understanding of key concepts from the world of Databases.

Primary Learning Outcomes:

- Data Models
    — Students will understand how data models are used to create frameworks for efficiently working with classes of data.
    — Students will understand the relational data model and how it is used as within modern relational databases.
    — Students will understand the semistructured data model and how it compares to Relational Data Model
    — Students will understand the XML and JSON data format and how then can implement the semistructured data model.
    — Student will understand how Semistructured Data Schemas like XML's DTD and JSON's JSON Schema.
    — Students will understand how to query Semistructured data with tools like XML's Xpath.

- Relational Algebra
    — Students will understand how to read and write expressions in Relational Algebra.
    — Students will understand the difference between set and bag versions of relational algebra.
    — Student will understand how to read and write relational algebra expressions involving aggregation.
    — Students will understand the Datalog model for using logic to query relational data.

- SQL
    — Students will understand how to create relations within a DBMS using SQL.
    — Students will understand how to add and modify data within a DBMS using SQL.
    — Students will understand how to write simple and complex queries with SQL using subqueries & aggregation.
    — Students will understand how create and use Views to facilitate queries within a DBMS using SQL.
    — Students will understand how to create and use Triggers and Stored Procedures.

- Database Design & Theory
    — Students will understand how to develop a database design using E/R Diagrams and UML Diagrams.
    — Students will understand functional dependencies and multi-valued dependencies and how define and reason with them.

— Students will understand Boyce-Codd Normal Form, 3rd and 4th Normal form, and understand how to establish them for their database.

- Big Data & Data Mining & The Internet
    — Students will understand where Big Data problems require alternatives to traditional Relational DBMS.
    — Students will understand how NoSQL approaches like Map-Reduce/Hadoop or MongoDB offer alternative to traditional DBMS that better meet special requirements of Big Data problems.
    — Students will understand how Data Mining is used within a DBMS context.
    — Students will understand Data Mining and its relationship to Machine Learning and Artificial Intelligence.
    — Students will understand differences between supervised learning and un-supervised learning methods, and when they are applicable.
    — Students will understand issues with internet search.
    — Students will understand PageRank algorithm and how it facilitates search.

Assignment and Examination Schedule

Date	Assignment/Examination/Presentation	Points
Various	In-Class Work/Attendance	100
	DB1: https://lagunita.stanford.edu/courses/DB/RDB/SelfPaced/about DB2: https://lagunita.stanford.edu/courses/DB/XML/SelfPaced/about DB3: https://lagunita.stanford.edu/courses/DB/JSON/SelfPaced/about DB4: https://lagunita.stanford.edu/courses/DB/RA/SelfPaced/about DB5: https://lagunita.stanford.edu/courses/DB/SQL/SelfPaced/about DB6: https://lagunita.stanford.edu/courses/DB/XPath/SelfPaced/about DB7: https://lagunita.stanford.edu/courses/DB/XSLT/SelfPaced/about	50
	Presentation 1: Class Intro/DB Topic	50
	Midterm	200
	DB8: https://lagunita.stanford.edu/courses/DB/RD/SelfPaced/about DB9: https://lagunita.stanford.edu/courses/DB/UML/SelfPaced/about DB10: https://lagunita.stanford.edu/courses/DB/Indexes/SelfPaced/about DB11: https://lagunita.stanford.edu/courses/DB/Constraints/SelfPaced/about DB12: https://lagunita.stanford.edu/courses/DB/Views/SelfPaced/about DB13: https://lagunita.stanford.edu/courses/DB/OLAP/SelfPaced/about DB14: https://lagunita.stanford.edu/courses/DB/Recursion/SelfPaced/about	50
	Presentation 2: Advanced Database Topic	50
	Assignment: Project Database/Presentation	200
	Final	300

Grading

There are a total of 1000 points available for the class. Final letter grades will be assigned based on the points earned and the standard grade scale listed below, with adjustments to this scale made as needed based on the final distribution of points earned by the class:

A: 900-1000
B: 800-899
C: 700-799
D: 600-699
F: < 600

Tentative Course Schedule

Fall 2017

(Tuesday, Thursday Courses)

	Date	Topic	Reading Assignment
1	Tue., Aug 22	Class Introduction	
2	Thu., Aug 24	Database Topics/Git/Python	Chapter 1/GitHub, DB1
3	Tue., Aug 29	XML/JSON	Chapter 11/DB2, DB3
4	Thu., Aug 31	XML/JSON	
5	Tue., Sept 5	Relational Data Model/ Relational Algebra/ SQL 1	Chapter 2,6/DB4, DB5
6	Thu., Sept 7	Advanced RA/Datalog	Chapter 5
7	Tue., Sept 12	SQL 2	Chapter 6
8	Thu., Sept 14	Query Semi-Structured Data	Chapter 12/DB6, DB7
9	Tue., Sept 19	Query Semi-Structured Data	Chapter 12
10	Thu., Sept 21	Presentation 1: Class Intro/DB Topic	
11	Tue., Sept 26	Distributed Databases	Chapter 20
12	Thu., Sept 28	Distributed Databases	Chapter 20
13	Tue., Oct 3		
14	Thu., Oct 5	Review	
15	Tue., Oct 10	Midterm	
16	Thu., Oct 12	Review Midterm	
17	Tue., Oct 17	Databases & The Internet	Chapter 23
18	Thu., Oct 19	Databases & The Internet	Chapter 23
19	Tue., Oct 24	Database Theory	Chapter 3/DB8
20	Thu., Oct 26	Database Theory	
21	Tue., Oct 31	ER/UML/ODL	Chapter 4/DB9
22	Thu., Nov 2	ER/UML/ODL	

23	Tue., Nov 7	Transactions	Chapter 6, 17/DB10	
24	Thu., Nov 9	Constraints & Triggers	Chapter 7, 18/DB 11	
25	Tue., Nov 14	Views & Indexes	Chapter 8, 13/DB 12	
26	Thu., Nov 16		Chapter 15, 16	
27	Tue., Nov 21	Stored Procedures	Chapter 9	
	Thu., Nov 23	HOLIDAY – Thanksgiving Break		
28	Tue., Nov 28	Authoring/OLAP	Chapter 10, 21/DB13, DB14	
29	Thu., Nov 30	Data Mining & Machine Learning/Web	Chapter 22, 23	
29	Tue., Dec 5	Last Day of Instruction		
Finals week			**Days**	**Dates**
Final Exam Preparation & Faculty Consultation Days:			Thursday and Friday	Dec 7 & 8
Final Semester Examinations			Monday – Thursday	Dec 11 – 14
Final Exam in this course				

Subject to Change:

This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.

University Policies

Students with Disabilities:

Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in the Henry Madden Library, Room 1202 (278-2811).

Honor Code:

"Members of the CSU Fresno academic community adhere to principles of academic integrity and mutual respect while engaged in university work and related activities." You should:

a) understand or seek clarification about expectations for academic integrity in this course (including no cheating, plagiarism and inappropriate collaboration)

b) neither give nor receive unauthorized aid on examinations or other course work that is used by the instructor as the basis of grading.

c) take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

Cheating and Plagiarism:

"Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work." Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the university. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

Computers:

"At California State University, Fresno, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services (http://www.fresnostate.edu/adminserv/technology/) or the University Bookstore. In the curriculum and class assignments, students are presumed to have 24-hour access to a computer workstation and the necessary communication links to the University's information resources."

Disruptive Classroom Behavior:

"The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. ... Differences of viewpoint or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop and understanding of the community in which they live . . . Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class."

Copyright Policy:

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