Valparaiso University

CS-350 Fall 2017
Database Management Systems

Dates:	Time:	Online:
08/22-12/14/2017	TR 12:00-1:15 pm in URH 119	http://blackboard.valpo.edu or
Instructor:	**Office Hours:**	**Contact:**
Sonja Streuber	MTWRF 10:30-11:30 in MEH 145H	sonja.streuber@valpo.edu

Introduction

Welcome to CS-350, Database Management Systems! This course examines data structures, file organizations, concepts and principles of database management systems (DBMS), as well as data analysis, database design, data modeling, database management and database implementation. More specifically, it introduces hierarchical, network and relational data models; entity relationship modeling, the Structured Query Language (SQL), data normalization, and database design. Using MySQL as main implementation vehicle, this course provides hands-on experience in database design and implementation through assignments and lab exercises. Advanced database concepts such as transaction management, distributed databases, multi-tier client/server architectures and web-based database applications are also introduced. Other DBMSs studied include MS Access, Oracle, SQL Server, and NoSQL/ NewSQL systems such as MongoDB, HBase, and Big Query.

Learning Objectives

Students learn about database design and programming, with a major focus on the relational model and SQL (Structured Query Language). With that in mind, the outcomes of this course are to:

1. Describe fundamental data and database concepts
2. Compare and contrast the relational database model with other database models
3. Explain and use the database development lifecycle
4. Design databases using data modeling and data normalization techniques
5. Solve problems by constructing database queries using the Structured Query Language
6. Develop insights into future data management tool and technique trends
7. Critique the effectiveness of Database Management Systems in computer information systems

Topics Covered

- Database environment and development
- MySQL: The relational database model
- Intro to Structured Query Language (SQL) and the SQL SELECT statement
- Advanced SQL: WHERE with operators, aggregates, sub-selects, views, table Joins
- SQL Programming: Triggers & Stored Procedures
- Transaction Management and User Access
- Client/ Server and Distributed DBMSs, DBMS Integration
- Database Analysis—Data Modeling: Business Rules, Conceptual and Logical Design
- Logical Database Design—Normalization and Physical Design

- Other DBMSs: Oracle and PL/ SQL, Windows SQL Server
- NoSQL Database Systems: Hadoop and HBase, MongoDB, BigQuery, and NewSQL
- After the Database: Data Warehouses and OLAP

Course Format and Attendance Requirement

This course has an attendance requirement, and attendance will be taken during the first 5 minutes of class. In addition, each class session may contain graded in-class work, which CANNOT be made up. **If you miss more than 5 sessions, you will fail the course**.

The focus of the weekly sessions will be approximate the following:

- **Tuesday**: Discussion of the weekend's lab assignment; introduction of topic for the week
- **Thursday**: In-depth discussion of topic for the week with exercises; weekend lab discussion.

Required Textbooks & Materials

- Oppel, Andy (2011). *Databases Demystified*. 2nd edition. ISBN 978-0-07-174799-8.
- YouTube Playlists: Intro to DBs by J. Widom (Stanford) and DB Intro by M. Fudge (Syracuse).
- **Optional** (but a very good idea): A laptop computer (Windows, Mac, or Linux). You must have administrator permissions.

Workload

This 3-credit course requires significant research and teamwork. You will be completing the following:

- **XP Quizzes (12*10 points=120)**: Once a week as shown on the schedule, I post one quiz, question or problem about the readings and videos on Blackboard. This XP scoring opportunity will be open during the class session only and **cannot be made up**.
- **Labs (12*50 points each=600)**: Each week contains one lab assignment about a theoretical, practical, or programming problem and will be solved in teams of 2 or 3. Solutions must be posted on Blackboard by Saturday 11:59 pm CST. **NO EMAIL SUBMISSIONS WILL BE ACCEPTED.**
- **Final Exam (100 points)**: The format of the final exam will depend on the quality of student work in this course. The exam is scheduled by the registrar as shown on the course schedule.

You can earn up to 820 points in this course. No extra credit assignments will be given.

Letter Grade Conversion:

>93%: A	90-93%: A-	87-90%: B+	83-87%: B	80-83%: B-	77-80%: C+
73-77%: C	70-73%: C-	<70%: F			

Assignment Submission, Late Work, and Academic Honesty

- **Assignment Submission:** All Assignments must be submitted on Blackboard. **No emailed Assignments will be accepted.**
- **Late Work:** Work is considered late if not posted to Blackboard by 11:59 pm CST of the day on which it is due. **Late work will lose 50% of the grade. If more than 1 week late, submitted work will earn only 1 point.**
- **Academic Honesty:** **All work you submit for this course must be your own**. You may NOT use anyone else's words (from blogs, webpages, purchased solutions, etc.) without giving a clear source citation. If you are unsure, consult http://www.plagiarism.org/ or the Writing Center. In addition, you must write and sign with your name the following statement on all course work:

  I have neither given nor received, nor have I tolerated others' use of unauthorized aid.

  For more information about Valparaiso University's Academic Honor Code, case review cycles, and potential penalties, please refer to http://www.valpo.edu/student/honorcouncil/index.php

Diversity and Inclusion

Valparaiso University aspires to create and maintain a welcoming environment built on participation, mutual respect, freedom, faith, competency, positive regard, and inclusion. This course will not tolerate language or behavior that demeans members of our learning community based on age, ethnicity, race, color, religion, sexual orientation, gender identity, biological sex, disabilities (visible and invisible), socio-economic status, or national origin. The success of this class relies on all students' contribution to an anti-discriminatory environment where everyone feels safe, welcome, and encouraged to engage, to explore, and ultimately, "to embark on a rewarding personal and professional journey" (Pres. Heckler).

Title IX

Valparaiso University strives to provide an environment free of discrimination, harassment, and sexual misconduct (sexual harassment, sexual violence, dating violence, domestic violence, and stalking). If you have been the victim of sexual misconduct, we encourage you to report the incident. If you report the incident to a University faculty member or instructor, she or he must notify the University's Title IX Coordinator about the basic facts of the incident. Disclosures to University faculty or instructors of sexual misconduct incidents are not confidential under Title IX. Confidential support services available on campus include: Sexual Assault Awareness & Facilitative Education Office "SAAFE" (219-464-6789), Counseling Center (219-464-5002), University Pastors (219-464-5093), and Student Health Center (219-464-5060). For more information, visit http://www.valpo.edu/titleix/ .

Access and Accommodation Services

The Access & Accommodations Resource Center (AARC) is the campus office that works with students to provide access and accommodations in cases of diagnosed mental or emotional health issues, attentional or learning disabilities, vision or hearing limitations, chronic diseases, or allergies. You can contact the office at aarc@valpo.edu or 219.464.5206. Students who need, or think they may need, accommodations due to a diagnosis, or who think they have a diagnosis, are invited to contact AARC to arrange a confidential discussion with the AARC office. Further, students who are registered with AARC are required to contact their professor(s) if they wish to exercise the accommodations outlined in their letter from the AARC.

Academic Support

To get help, use the Academic Success Center (ASC) online directory (valpo.edu/academicsuccess) or contact the ASC (academic.success@valpo.edu) to help point you in the right direction for academic support resources for this course. Valpo's learning centers offer a variety of programs and services that provide group and individual learning assistance for many subject areas. These learning centers include:

- Tutoring Lab: Serves the academic needs of undergraduate and graduate students – tutors offer suggestions on organization of papers, assist in research and citations, and help in understanding difficult assignments. Additional one on one tutoring is also available.
- Writing Center: Writing Consultants provide proofreading and editing assistance for papers and assignments.

Library Services

The librarian best able to help you navigate information resources for independent research or additional reading is listed on the library research guide for our department. Click the link to Library Guides within the Blackboard table of contents for this course.

Class Cancellations

Notifications of class cancellations will be made through Blackboard with as much advance notice as possible. It will be both posted on Blackboard and sent to your Valpo e-mail address. If you don't check your Valpo e-mail account regularly or have it set-up to be forwarded to your preferred e-mail account, you may not get the message. Please check Blackboard and your Valpo e-mail (or the e-mail address it forwards to) before coming to class.

Schedule

Week	Dates	Topic	Reading and Other Preparation	Graded Work Due
1	08/22 08/24	Course Intro, database environment and development Installing MySQL	Oppel 1 Videos: Widom 1, Fudge 1 Other materials in Blackboard	No lab
2	08/29 08/31	The relational database model	Oppel 2 Videos: Widom 2, Fudge 2, 3	**MW:** XPQuiz_01 **S:** LAB_01: Intro to a DBMS and the relational model
3	09/05 09/07	Intro to Structured Query Language (SQL) The SQL SELECT statement	Oppel 4 Widom 3, 11 Khan Hour of Code Other materials in Blackboard	**MW:** XPQuiz_02 **S:** LAB_02: Intro to SQL (DQL and DML)
4	09/12 09/14	Advanced SQL: WHERE with operators, aggregates, sub-selects, views	Oppel 4 Widom 14, 15, 42 Fudge 6, 7 Other materials in Blackboard	**MW:** XPQuiz_03 **S:** LAB_03: SQL SELECT, aggregates, views, sub-selects
5	09/19 09/21	Advanced SQL: Table Joins	Oppel 4 Widom 12, 16 Fudge 4, 5 Other materials in Blackboard	**MW:** XPQuiz_04 **S:** LAB_04: Table Joins
6	09/26 09/28	SQL Programming: Triggers & Stored Procedures,	Oppel 8 Widom 33, 36-38 Fudge 8, 9 Other materials in Blackboard	**MW:** XPQuiz_05 **S:** LAB_05: SQL Programming: Triggers & Stored Procs
7	10/03 10/05	Transaction Management and User Access	Oppel 10, 11 Widom 49-41 Other materials in Blackboard	**MW:** XPQuiz_06 **S:** LAB_06: Transaction Management, DBMS Security #1
8	10/10	Client/ Server and Distributed DBMSs Systems Integration with MS	Oppel 9, 10 Other materials in Blackboard	**MW:** XPQuiz_07 **S:** LAB_07: Distributed DBMSs,

		Access		DBMS Security #2
9	10/17 10/19	Database Analysis—Data Modeling: Business Rules, Conceptual and Logical Design	Oppel 5 Widom 30, 31 Other materials in Blackboard	**MW:** XPQuiz_08 **S:** LAB_08: Conceptual Modeling and Logical Modeling
10	10/24 10/26	Logical Database Design—Normalization and Physical Design	Oppel 6, 7 Widom 22 Other materials in Blackboard	**MW:** XPQuiz_09 **S:** LAB_09: Data Normalization and Physical Design
11	10/31 11/02	Other DBMSs: Oracle and PL/ SQL Functions in PL/ SQL	PL/ SQL Tutorial Other materials in Blackboard	**MW:** XPQuiz_10 **S:** LAB_10: Oracle Databases and SQL queries in PL/ SQL
12	11/07 11/09	Other DBMSs: Windows SQL Server	Oppel 8 Lynda.com Course "Querying Microsoft SQL Server 2012" Other materials in Blackboard	**MW:** XPQuiz_11 **S:** LAB_11: Windows SQL Server
13	11/14 11/16	NoSQL Database Systems: Hadoop and HBase	Oppel 8 Lynda.com Course "NoSQL for SQL Professionals Widom 51, 52 Other materials in Blackboard	No lab
THANKSGIVING BREAK 				
14	11/28 11/30	NoSQL Databases: MongoDB, BigQuery, and NewSQL	Oppel 12 Widom 53, 54 Other materials in Blackboard	**MW:** XPQuiz_12 **S:** LAB_12 : NoSQL and NewSQL Systems
15	12/05 12/07	After the Database: Data Warehouses and OLAP Course Summary, Course Final Discussion	Review course materials	Nothing due in this course.
F	12/14	Course Final Exam	**USE**: Books&slides& assignments **DO NOT USE**: Friends, internet, etc.	**R (12/14 10:30-12:30 pm)**: **Course Final Exam**

APPENDIX

Student Learning Objectives—Computer Science Majors

1. Students will demonstrate expertise in the development and design of software.
2. Students will have a working knowledge of the theoretical foundations of the discipline.
3. Students will demonstrate the ability to communicate computer science-related topics in written and oral form.
4. Students will demonstrate that they are informed citizens in the social and ethical implications of the use of computer technology.
5. Students will utilize their computer science education in either their careers or in the pursuit of graduate work.