Marshall University Syllabus

Course Title/Number	Database Engineering/ CS 350
Semester/Year	Spring/2013
Days/Time	TR /2.00 - 3.15 PM
Location	GH 206A
Instructor	Venkat N Gudivada
Office	GH 207A
Phone	304 - 696 - 5452
Email	gudivada@marshall.edu
Office/Hours	MWF 11.00 - 12.00, Tu 10.00 - 12.00, Th 1.00 - 2.00 PM
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment.

1 Course Description: From Catalog

Rigorous and comprehensive introduction to relational database theory and applications: data modeling, normalization, transaction processing, relational algebra, SQL, data server internals, query optimization, database programming and Internet applications. (PR: CS 210)

This course provides rigorous and comprehensive introduction to relational database theory and applications. This course is designated as a writing-intensive (WI) course. Therefore, substantial writing is required in this course.

Informal, **low-** and **medium-stakes**, as well as **high-stakes** assignments are designed to effect learning through writing. Students are exposed to concepts, principles, and procedures of databases repeatedly through these writing assignments.

One or two informal, ungraded writing takes place in every class meeting. Low-stakes writing takes place at least once a week, and so does the medium-stakes writing. High-stakes writing is spread through the entire semester and involves revision based on instructor and peer feedback.

2 Course Student Learning Outcomes

The table below shows the following relationships: How each student learning outcomes will be practiced and assessed in the course.

Course Student Learning Outcomes	How students will practice each outcome in this Course	How student achievement of each outcome will be assessed in this Course
Students will enhance their **writing skills and strategies** by writing several documents in the context of developing database applications – contributes to BSCS degree program goal f (see Section 13)	Informal in-class writing	Several formal writing assignments
Students will **use various forms of writing** (low, medium, and high stake) both in class and outside class as a means **to learn** database concepts and methods – contributes to degree program goal f (see Section 13)	Informal in-class writing	Several formal writing assignments
Students will be able to **demonstrate** both conceptual understanding of multi-faceted view of relational database systems and theoretical foundations of the relational data model – contributes to degree program goals a, f, h, and i (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments, exams
Students will be able to **perform** conceptual data modeling; and develop entity-relationship data models; map conceptual data models to the relational data model – contributes to degree program goals a and i (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments, exams

Students will be able to **write** database queries using relational algebra and relational calculus – contributes to degree program goals a and i (see Section 13)	In class exercises, guided discussions, and informal writing	Exams
Students will be able to **write** a broad range of SQL statements for database creation, manipulation, and retrieval; and write Java programs to programmatically access and manipulate databases, and develop database stored procedures – contributes to degree program goals a and i (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments, exams
Students will be able to **perform** logical database design based on functional dependencies and normal forms, and physical database design based on transaction types and access patterns – contributes to degree program goal a (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments, exams
Students will be able to **demonstrate** practical skills in using PostgreSQL — an open source object-relational database system – contributes to degree program goal i (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments, exams
Students will be able to **develop** a database application from inception to completion in a team environment – contributes to degree program goals b, c, d, f, and i (see Section 13)	In class exercises, guided discussions, and informal writing	Formal writing assignments
Students will be able to **create and parse** XML files, validate XML documents using DTD and schema, specify XPath expressions, write XQueries, and transform XML documents using XSLT – contributes to degree program goal i (see Section 13)	In class exercises, guided discussions, and informal writing	Exams

3 Required Texts, Additional Reading, and Other Materials

Ramez Elmasri and Shamkant Navathe. **Fundamentals of Database Systems**. Addison Wesley, sixth edition, 2010. ISBN-13: 978-0136086208

Reference Books (no need to buy)

① Lynn Beighley. **Head First SQL**. O'Reilly Media, 2007. ISBN: 0596526849.

② Joe Celko. **Joe Celko's SQL Puzzles and Answers**. Morgan Kaufmann, second edition, 2006. ISBN: 0123735963.

③ Andrew Cumming and Gordon Russell. **SQL Hacks**. O'Reilly Media, 2007. ISBN: 0-596-52799-3.

④ C.J. Date. **SQL and Relational Theory: How to Write Accurate SQL Code**. O'Reilly Media, 2009. ISBN-10: 0596523068.

⑤ Stephane Faroult and Peter Robson. **The Art of SQL**. O'Reilly Media, 2006. ISBN: 0596008945.

⑥ Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom. **Database Systems: The Complete Book**. Prentice Hall, second edition, 2008. ISBN-10: 0131873253.

⑦ Joel Murach. **Murach's Oracle SQL and PL/SQL**. Mike Murach & Associates, 2008. ISBN: 1890774502.

⑧ Raghu Ramakrishnan and Johannes Gehrke. **Database Management Systems**. McGraw-Hill, 2002. ISBN: 978-0072465631.

⑨ Abraham Silberschatz and Henry Korth and S. Sudarshan. **Database System Concepts**. McGraw-Hill, 2010. ISBN: 978-0073523323.

Web Resources

❍ Download PostgreSQL from EnterpriseDB here.

❍ pgAdmin — an open source tool for PostgreSQL administration and database development. Download it here.

❍ SQL Power Architect — an open source tool for Data Modeling and Profiling. Download it here.

❍ PostgreSQL Wiki here.

4 Course Requirements/Due Dates

Activity/Deliverable	Due Date
Medium-stakes Writing Assignment 1	February, 10
Midterm Exam 1	February, 12
Medium-stakes Writing Assignment 2	February, 24
Medium-stakes Writing Assignment 3	March, 17
Midterm Exam 2	March, 26
Medium-stakes Writing Assignment 4	April, 28
High-stakes Writing Assignment	April, 30
Final Exam	May, 9

5 Grading Policy

Activity	Weight
Low-stakes writing assignments	10%
Medium-stakes writing assignments	20%
High-stakes writing assignment	20%
Two midterm exams @15% each	30%
Final exam	20%

Course grade is awarded based on the following scheme:

Score	Letter Grade
>= 90	A
>= 80 & < 90	B
>= 70 & < 80	C
>= 60 & < 70	D
< 60	F

6 Attendance Policy

Attendance will be taken at the start of class. Only University Excused Absences will be accepted.

7 Course Schedule

- Week 1
  - Database system concepts
  - Database systems architecture
  - PostgreSQL login procedure and client tools
- Week 2
  - Relational data model and integrity constraints
- Week 3
  - Relational algebra
- Week 4
  - Domain and tuple relational calculus
- Week 5
  - Midterm exam 1 (includes topics from weeks 1 through 4)
  - Conceptual data modeling
- Week 6
  - Mapping conceptual data models into relational model
  - Using SQL for database creation, data loading, schema modification
- Week 7
  - Writing SQL queries
- Week 8
  - Writing SQL queries
  - Database programming
- Week 9
  - Database design theory
- Week 10

- ✧ Database design theory

❍ Week 11

- ✧ Midterm exam 2 (includes topics from week 6 through 10)
- ✧ Physical database design

❍ Week 12

- ✧ Database transactions

❍ Week 13

- ✧ Triggers and stored procedures
- ✧ Authorization and access control

❍ Week 14

- ✧ XML, DTD, XML Schema
- ✧ XPath, XQuery, and XSLT

❍ Week 15

- ✧ Final exam (Includes all topics from weeks 1 through 14. Will be held on 9 May 2013, 12.45 PM - 2.45 PM)

8 Writing Assignments

Substantial technical writing is required in this course. In fact, we will be writing on a regular basis. We approach writing as an effective means to learn database concepts and methods, rather than as a practice to improve our writing abilities. However, it is expected that our ability to write well will also improve as a byproduct because of the frequency and the amount of writing involved.

Technical writing is precise, concise, and comprehensive. Typically sentences are short and written in active voice. Long sentences are hard to read and also prone to multiple interpretations. Brevity and accuracy are the hallmarks of technical communication. Variation in sentences is good only when it makes sense. Convoluted means to introduce sentence variation just for the sake of it is considered a bad practice. We will do two types of writing: **informal** and **formal**.

8.1 Informal writing

In every class we will do one or more *explain to the village idiot* type informal, ungraded writing. Village idiot is a person known for ignorance and lack of sophistication. We will write about technical concepts in plain English in a way that even a village idiot can understand. We take turns in sharing our writing with the class. Each informal writing activity is designed to take no more than three to four minutes of class time.

8.2 Formal writing

We will do **three types of formal writing**. All written assignments need to be turned in as PDF documents.

8.2.1 Low-stakes Writing Assignments

Low-stakes writing is administered in the form of about ten short, graded quizzes. They typically feature free response questions and may contain multiple choice questions.

Free response questions are often open-ended and require you to explain a concept, demonstrate a computation, compare and contrast two concepts or procedures, draw analogies, and integrate what you are currently learning with what you have already learned.

8.2.2 Medium-stakes Writing Assignments

Medium-stakes writing is administered in the form of graded database *lab reports*. These assignments are completed outside the class period.

Lab assignments involve performing a practical, hands-on task to assess your understanding of database concepts and procedures. You will answer questions and reflect on the lab activity. Each lab requires about 2 to 4 hours to complete it. There will be one lab assignment corresponding to each of the following topics:

① Conceptual data modeling using SQL Power Architect

② Writing relational algebra queries

③ Writing SQL queries

④ Logical and physical database design

8.2.3 High-stakes Writing Assignment

This course requires one formal, high-stakes writing assignment. You will complete this assignment by working with students in the class in a small team environment (typically 2 students).

This assignment involves developing a database application from its inception to delivery and deployment. This process requires developing several documents including requirements elicitation and analysis, conceptual database design, selecting a database management system, logical database design, physical database design, creating and populating the database, transaction and application implementation. These documents are revised based on self-evaluation, peer and instructor feedback, and then resubmitted. Details will be provided in separate handouts.

9 Assessment Day

Wednesday, April 3 is Assessment Day. The hours of 8:00 – 4:00 are set aside for university assessment activities. All seniors graduating in May, summer, or December of 2013 should be present from 10:00 – 11:30 to complete a senior assessment. A free lunch on the MSC Plaza will follow immediately afterward. Students other than graduating seniors should check with their departments for Assessment Day schedules.

10 Classroom Etiquette

- Students are expected to show up for class on time and remain in the class for the entire duration of the class.
- Students are not allowed to use personal laptops during the lecture part of the class.
- All types of phones and personal digital assistants must be turned off or put in silent mode during lectures.
- While taking tests, all types of electronic gadgets including cell phones, iPhones, iPod touch, blackberries, laptops must be turned off. No internet browsing is allowed during test taking.

11 muOnline

It is important to visit muOnline regularly for up-to-date information about the course. It hosts all the course materials including assignments, handouts, lecture notes, and reading materials.

12 Policy for Students with Disabilities

Marshall University is committed to equal opportunity in education for all students, including those with physical, learning and psychological disabilities. University policy states that it is the responsibility of students with disabilities to contact the Office of Disabled Student Services (DSS) in Prichard Hall 117, phone 304-696-2271, to provide documentation of their disability. Following this, the DSS Coordinator will send a letter to each of the student's instructors outlining the academic accommodation he/she will need to ensure equality in classroom experiences, outside assignment, testing and grading. The instructor and student will meet to discuss how the accommodation(s) requested will be provided. For more information, please visit http://www.marshall.edu/disabled or contact Disabled Student Services Office at Prichard Hall 117, phone 304-696-2271.

13 BSCS Degree Program Goals

a. an ability to apply knowledge of computing and mathematics appropriate to the discipline, including the ability to analyze and evaluate performance tradeoffs of algorithms, data structures, and hardware solutions;

b. an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;

c. an ability to design, implement, and evaluate a computer-based system, process, component, or program, including software systems of varying complexity, to meet desired needs;

d. an ability to function effectively on teams to accomplish a common goal;

e. an understanding of professional, ethical, legal, security, and social issues and responsibilities;

f. an ability to communicate effectively, both written and oral, with a range of audiences;

g. an ability to analyze the local and global impact of computing on individuals, organizations, and society;

h. a recognition of the need for and an ability to engage in continuing professional development;

i. an ability to use current techniques, skills, and tools necessary for computing practice, including the ability of expressing algorithms in at least two of the most important computer languages currently in use in academia and industry.