Course Description

COURSE NUMBER and NAME	DATA 210 Database Design & Analytics
UNITS	3
LENGTH OF CLASS	8 Weeks
COURSE DESCRIPTION	This course provides an overview of database and database management system concepts, internal design models, normalization, network data models, development tools, and applications.
REQUIRED TEXT	Dr. Mukesh Chandra Negi, Dr. Mukesh Negi (2019). *Fundamentals of Data and Database Management System* BPB Publications ISBN: 9789388176620 Textbook Link
INSTRUCTIONAL METHOD	Online / On-Campus

Summary of Graded Work and Assessments

Graded work and assessments offer students the opportunity to show the degree of mastery for each CLO. The following table shows how assessments and CLOs align (link).

Assignments	Totals	Weight	CLOs
Engagement and Professionalism (Rubric)	160	16%	1, 2, 3, 4, 5, 6, 7
Week 1 Discussion	25	2.5	1, 2, 3
Week1 Assignment 1	95	9.5%	2, 5, 6, 7
Week 2 Assignment 2	95	9.5%	2, 5, 6, 7
Week 3 Assignment 3	95	9.5%	2, 5, 6, 7
Week 4 Discussion	25	2.5%	1, 4, 5
Week 4 Assignment 4	95	9.5%	2, 5, 6, 7
Week 5 Assignment 5	95	9.5%	2, 5, 6, 7
Week 6 Assignment 6	95	9.5%	2, 5, 6, 7
Week 7 Assignment 7	95	9.5%	2, 5, 6, 7
Week 8 Discussion	25	2.5	6

Assignments	Totals	Weight	CLOs
Week 8 Final Assignment	100	10%	6
Total Points/Percentage	**1000 Points**	**100%**	

Course Policies

For Westcliff's course policies, please see the Course Policies document.

Discussion Requirements

For all discussions, the primary response is due by Wednesday at 11:59 p.m. Pacific Time. The primary response must be at least 200 words in length and fully address the topic, demonstrating critical thinking and understanding. Each student must then also post a minimum of two responses to other students in the discussion by Saturday night at 11:59 p.m. Pacific Time. Each peer response must be at least 50 words in length and substantively engage with the other student's original post, continuing the discussion in a professional manner. If at any time information or material is brought in from an outside source or website, it must be properly cited following APA 7th edition guidelines, and a full reference must be provided.

Assignment Requirements

Each assignment deliverable is specifically defined in the assignment instructions, such as page length, citations and references, audio or video, presentations, tables, etc. For all written assignments, the required page length does not include the cover or references pages. Refer to the specific requirements as stated in each assignment, and reach out to your instructor for additional information as needed. All graded submissions are due by Sunday at 11:59 p.m. Pacific Time.

Participation Requirements

Students are required to attend each live class session either in person or virtually as stipulated in the course policies. Participation in the live class session is determined by actively engaging, answering or asking questions, providing comments, interacting in group activities, etc., as required by the instructor. Students who are unable to attend the live in-class or virtual sessions must follow the Virtual Class Session (VCS) submission requirements as stated in the Course Policies document.

Writing Center

The Westcliff University Writing Center is dedicated to providing quality support to students and faculty. From assignment review, to in-class workshops, to dissertation support, to publication

help, the Writing Center is committed to empowering individuals to use the written language to articulate and disseminate knowledge.

Course Learning Outcomes (CLOs)

Learning outcomes are statements that describe significant and essential scholarship that students have achieved and can reliably demonstrate at the end of the course. Learning outcomes identify what the learner will know and be able to do by the end of a course – the essential and enduring knowledge, abilities (skills), and attitudes (values, dispositions) that constitute the integrated learning needed for successful completion of this course. The learning outcomes for this course summarize what students can expect to learn, and how this course is tied directly to the educational outcomes of the degree.

Course Learning Outcomes (CLOs)	PLOs
1. Define a database and its uses, and implement a database using the relational model with emphasis on data integrity and security.	1, 3
2. Describe the difference between traditional files and databases, what a database management system (DBMS) is and the services it provides to users, and the differences between logical and physical design.	1, 4
3. Identify and describe the main features of hierarchical, network, and relational database models.	1, 4
4. Model a realistic business application using a technology-independent data model.	5
5. Define and use the normalization process to further refine relational table definitions, data definition language, data manipulation language, and instructions to apply relational algebra.	1, 3, 5
6. Demonstrate an understanding of the database administration function and of distributed database systems.	3
7. Evaluate and select an appropriate DBMS for a given application.	1, 2, 4

Detailed Course Outline

The following outline provides important assignment details for this course, unit by unit. Students are responsible for all of the assignments given. Please refer to the Detailed Description of Each Grading Criteria in the syllabus for specific information about each assignment.

Week 1

Assignments to complete this week:

- Reading:
  - Chapter 1: Fundamentals of Data and Database Management System
  - Chapter 2: Database Architecture and Models (2.1 to 2.4)

Week 1 Live Class Activity

After reviewing the reading for this week, as well as the instructor lecture, break into small teams depending on class size and discuss:

1. the different databases that you may have interacted with
2. the type of data stored
3. how you access these databases and the interfaces used

Share your findings with the live class.

Week 1 Discussion (Rubric)

Databases have many groundbreaking potential uses. Watch the TED talk The mission to create a searchable database of Earth's surface by Will Marshall.

While viewing the presentation, take notes on how the planet's database can be used. Think about additional uses for the database that were not discussed and reflect on the following questions:

1. What new, groundbreaking uses for the database can you imagine?
2. What types of queries could retrieve the appropriate data?
3. What types of decisions could be made with the data that has been retrieved?

Week 1 Assignment 1 (Rubric)

Download the diner data pdf provided. Answer each of the following questions based on the diner data. No computer work is required.

Examine the diner data and complete the following case exercises/problems:

1. What is the total amount each customer spent at the restaurant?

2. How many days has each customer visited the restaurant?
3. What was the first item from the menu purchased by each customer?
4. What is the most purchased item on the menu and how many times was it purchased by all customers?
5. Which item was the most popular for each customer?
6. Which item was purchased first by the customer after they became a member?
7. Which item was purchased just before the customer became a member?
8. What is the total items and amount spent for each member before they became a member?
9. If each $1 spent equates to 10 points and sushi has a 2x points multiplier - how many points would each customer have?
10. In the first week after a customer joins the program (including their join date) they earn 2x points on all items, not just sushi - how many points do customer A and B have at the end of January?

Apply key concepts to the diner case:

1. The owner of the diner wants to know if improvements needed on waiting time for food to be served to customers. What other attribute(s) could be included in one of the tables to assist on this?
2. The owner also wants the database to include data on all its customers, not just those who are members. What additional entities would the administrator need to include in the database to store this data? What are the attributes?

Submit your answers to the above the Examine and Apply questions in a single Word document.

Week 2

Assignments to complete this week:

- Reading:
  - Chapter 2: Database Architecture and Models (2.5)
  - Chapter 3: Relational Database and Normalization

Week 2 Live Class Activity

Break into small groups depending on class size and discuss the differences between a relational database and a flat file. Regarding data that individuals have used, which systems do team members feel more comfortable using and why? Share your discussion findings in the live class.

Week 2 Assignment 2 (Rubric)

Part A: Identifying Keys

Using the three tables from the diner case in week 1, identify the following keys between these tables that make them a relational database model, ie. of the fields or attributes in the tables, which one is or are:

1. Candidate key(s) and for which table(s)
2. Primary key(s) and for which table(s)
3. Foreign key(s) and for which table(s)

The following questions are related creating basic data tables that the owner and his team can use to quickly derive insights without needing to join the underlying tables using SQL.

Part B: Join All The Things

Recreate by normalizing table 1 using data from table 2 and 3 where all data are tabulated and not duplicated onto one table. Create this table in MS Word.

Part C: Rank All The Things

The owner also requires further information about the ranking of customer products, but he purposely does not need the ranking for non-member purchases so he expects null ranking values for the records when customers are not yet part of the loyalty program (member). Add the necessary field and tuples by recreating table 1 from Part B based on this new rank criteria.

Submit your answers to the all three parts in a single Word document file.

Week 3

Assignments to complete this week:

- Reading:
  - Chapter 4: Open Source Terminology and Introduction to SQL (Structure Query Language)
  - Chapter 5: Database Queries
  - Chapter 10: Database Installation
  - Chapter 11: Oracle and MySQL Tools

Week 3 Live Class Activity

In a relational database, SQL allows the database administrator to use commands to perform actions to manipulate the structure and content of the database. In small groups depending on class size, discuss/research which SQL statement category or categories and data types would be appropriate for the diner case example. Share your findings with the live class.

Week 3 Assignment 3 (Rubric)

In this assignment, you will write SQL statements to perform actions for a university database. First, you will need to install a DBMS to write and access the database. The most common DBMS for SQL is MySQL. Go to chapter 10 and follow the installation instructions. Please note that the author focus on windows platform. If you are using a different platform, please google the appropriate installation process for your platform. Or you can also consult your professor for advice or direction.

After installation, go to chapter 5 and follow the instructions to setup and add content to the university database. Note: You must create the database before you can create any tables. You can do this by using the features within the MySQL dashboard or by writing SQL statement ie. `CREATE DATABASE databasename;` Add your last name to the university database name. No spaces please! Consult your professor for clarifications and directions if needed. At the end of the exercise, you would have setup four tables in the database. Take screenshots of:

1. the database with the database name
2. of each table with content on it

Add all your screenshots on MS Word. Submit in a single Word document file.

Week 4

Assignments to complete this week:

- Reading:
  - Chapter 6: SQL Operators

Week 4 Live Class Activity

A database serves no purpose on its own. A user interface is required and there must be a degree of involvement by those who will be using the database in order to ensure it will serve the required purpose. Break into small groups depending on class size and research best practices in database interface design. Summarize your findings and share with the live class.

Week 4 Discussion (Rubric)

Listen to Episode 8: Database Design by Louis Davidson and Carlos L. Chacon.

Answer the following questions according to the podcast:

1. What are the key takeaways and important skills for database developers?
2. What are the risks for a database management system if it is designed without user involvement?
3. What role should user involvement play in system development?

Week 4 Assignment 4 (Rubric)

Examine the university database and complete the following case exercises/problems:

Continuing with the university database from the previous week, you will perform operations on the database as an administrator. These operations are commonly perform based on requests by the end users. On chapter 6 this week, the author introduce operations like arithmetic, character, comparison to name a few by using SQL statements to create queries on the university database. Just follow and work through these SQL queries examples that shows screenshots of the output (black color screenshots). Take screenshot of the output each time you perform a query. They will be automatically saved either on the desktop or the download folder. You will gather them for submission after completing the chapter exercise.

You will notice right away, there's mention of salary data on the faculty table. As of previous week, we don't have such field and data. So the first thing you will need to do is add a salary field (attribute) to the faculty table and insert salary data for each faculty as shown on the table diagram. However, instead of salary per year, change it to salary per month. And the salary should be 7000, 8000, 9000, 7500.

When complete, you would have learned how to perform SQL operations with arithmetic, character, comparison, logical and set operators on the university database.

Apply key concepts to the university case:

1. Can you union enrollment_no with student_id? Why or why not?
2. Should marks number also appear on student and subject tables? Why or why not?

Insert and organize all your screenshots in a Word document. Submit your answers to the Examine and Apply questions in a single Word document file.

Week 5

Assignments to complete this week:

- Reading:
  - Chapter 7: Introduction to Database Joins

Week 5 Live Class Activity

You may have heard the statement "good data in, good data out." What does this mean? Break into small groups depending on class size; then, research and discuss best practices in ensuring data accuracy. Summarize your findings in a brief 2-3 slide presentation that each team will then deliver in the live class.

Week 5 Assignment 5 (Rubric)

Examine the university data and complete the following case exercises/problems:

Continuing with the university database from the previous week, you will perform further operations on the database as an administrator to relate and retrieve data using SQL joins. Perform the methods as shown in Chapter 7 by writing and executing SQL queries. Perform those that shows output examples (black diagrams). Take screenshots of the output for each query you wrote and execute. They will be automatically saved on either the desktop or in the download folder. You will gather them for submission after completing the chapter exercise.

Apply key concepts to the university case:

1. If the university wants to know what subject each faculty teaches, what necessary steps are needed to be performed in order to obtain this information.
2. In the marks table, currently there's a faculty_id attribute. What is the purpose of having this attribute on this table? What possible information can be retrieved from this and how? What is the key of this attribute here? If this attribute serves no specific purpose right now, explain what you would do and recommend instead.

Insert and organize all your screenshots in a Word document. Submit your answers to the Examine and Apply questions in a single Word document file.

Week 6

Assignments to complete this week:

- Reading:
    - Chapter 8: Aggregate functions, Subqueries and Users

Week 6 Live Class Activity

It's common to assign more than one user as the role of database administrator. Break into small groups depending on class size, discuss the challenges pose when deciding what appropriate privileges to assign for each user. Give scenarios. Share your findings in the live class.

Week 6 Assignment 6 (Rubric)

Examine the university data and complete the following case exercises/problems:

Continuing with the university database from previous week, perform aggregate functions, subqueries and creation of user as described in Chapter 8. Please note that before you begin following the instructions in the chapter, you will need to add an additional attribute Department_ID and its data in the faculty table, as shown on the table diagram at the beginning of the chapter. Take screenshots of the output for each query you wrote and execute. They will be automatically saved on either the desktop or in the download folder. You will gather them for submission after completing the chapter exercise.

Apply key concepts to the university case:

1. Perform a query by finding out which student has the highest mark and lowest mark, and on which subject.
2. Write SQL statements to create a second user for the university database with limited privileges of only to query and modify existing data.

    - On both queries, take screenshots of your SQL statements along with their respective outputs.

Insert and organize all your screenshots in a Word document. Submit your answers to the Examine and Apply questions in a single Word document file.

Week 7

Assignments to complete this week:

- Reading:
    - Chapter 9: Backup & Recovery

Week 7 Live Class Activity

There are many different DBMS applications available. Break into small groups depending on class size, and research and identify 3 current examples of a DBMS. Describe the differences between each DBMS and when they make sense to use in business. Share your findings with the live class.

Week 7 Assignment 7 (Rubric)

This week's chapter discuss backup and recovery of SQL databases. There are actually different ways to backup. For this assignment, research a method and perform a backup for the existing university database that you have been using for the past weeks. Save the backup file on your computer for submission. On a Word document, explain the method you'd used and the reason for choosing this method to backup.

Submit the backup file along with the Word document.

Week 8

Assignments to complete this week:

- Reading:
  - Chapter 12: Exercise

Week 8 Live Class Activity

Allow students to use class time to work on the final assignment.

Week 8 Discussion (Rubric)

Listen to Tech Career Talk The Value of Database Skills by Tom Henricksen and Ben Brumm.

While listening to the podcast, determine the main points and respond to the following questions:

1. How do database skills pertain to what you are learning?
2. Which career in the database industry interests you the most and why?
3. Why is it so important to know SQL?

Week 8 Final Assignment (Rubric)

Perform the full exercise on Chapter 12. In the process:

1. Take screenshots of all SQL statements wrote and executed
2. Take screenshots of all outputs
3. When complete, perform a backup of the database and save the file on your computer

Submit:

1. A word document containing all screenshots. Please arrange and organize them in the order they were performed. Under a separate heading, explain the method used to do your backup, including how and why you chose this method.
2. The backup file.