University of Asia Pacific (UAP)

Department of Computer Science and Engineering (CSE)

BSc in CSE Program

Course Outline – Course Name

Part A – Introduction

1. **Course No. / Course Code:** CSE 212
2. **Course Title:** Database Systems Lab
3. **Course Type:** Lab
4. **Level/Term and Section:** 4th Semester (2nd Year 2nd Semester)
5. **Academic Session:** Spring 2025
6. **Course Instructor:** Nadeem Ahmed (Assistant Professor), Dr. Subhra Prosun Paul (Assistant Professor), Alif Ruslan (Lecturer)
7. **Pre-requisite (If any):** N/A
8. **Credit Value:** 1.5
9. **Contact Hours:** 3 hours weekly
10. **Total Marks:** 100
11. **Course Objectives and Course Summary:** The course focuses on the principles of development of a database in a real-life scenario. Therefore, this lab emphasizes the database design and model, which the students will learn gradually in the lab.

    The objectives of this course are to:

    1. Introduce the fundamental concepts, applications, data models, schemas, and instances of a database.
    2. Teach students on how to use different constraints, DDL and DML operations.
    3. Enhance students' ability to solve the basics of SQL and construct queries using SQL.
    4. Introduce the principles of normalization process in the database model.
    5. Equip students with necessary skills to design and model databases for real life scenarios.

12. Course Learning Outcomes: at the end of the Course, the Student will be able to –

CLO No.	**CLO Statements:** **Upon successful completion of the course, students should be able to:**
CLO1	Use a modern/popular IDE (Database Software/Tool) to manage database systems.
CLO2	Construct standard queries using Structured Query Language (SQL) to store, retrieve and manipulate data.
CLO3	Identify the database requirement for a real world problem that can be translated into an engineering problem.
CLO4	Identify the relationship sets and construct the corresponding E-R model.
CLO5	Assess societal, health, safety, legal and cultural issues related to the project.
CLO6	Function effectively in a multidisciplinary team.
CLO7	Build and implement the proposed database system.
CLO8	Present the implemented solution through technical documentation and oral presentation.

13. Mapping / Alignment of CLOs with Program Learning Outcomes (PLO)

CLO No.	**Corresponding PLOs (Appendi x-1)**	**Bloom's taxonomy domain/ level (Appendix 2)**	**Delivery methods and activities**	**Assessment Tools**	**Ks**	**Ps**	**As**
CLO1	e	2/Manipulation	Tool Demonstration	Lab Task, Lab Exam	K6		
CLO2	a	1/Apply	Practical Demonstration	Lab Task, Lab Exam	K3		
CLO3	b	1/Analyze	Lecture, Case Studies	Report, Viva	K3	P1	
CLO4	c	1/Create	Lecture, Case Studies	Continuous Project Evaluation	K5	P3, P7	A1, A5

CLO5	f	1/ Analyze	Lecture, Case Studies	Report	K7		
CLO6	i	3/Valuing	Group work	Continuous Project Evaluation			
CLO7	c	1/Apply	Case Study	Project Demonstration	K6	P7	A1
CLO8	j	1/ Analyze	Case Study	Project Demonstration , Report, Viva	K5		

Part B – Content of the Course

14. **Course Content:** Basic concept of SQL Server and relational database, and SQL Server connection establishment. Create Database and backup of database. Understanding the basic concept of creating tables on SQL server and how to create tables from schema diagrams. Understanding the data types and basic syntax of inserting data into the database. Understanding the basic syntax of database query and applying it on the created database.
15. **Alignment of topics of the courses with CLOs:**

SL No.	Topics / Content	Course Outcome
1	Database Management Systems basic, database software tool, database administration	CLO1
2	Data Definition Language (DDL), Data Manipulation Language (DML)	CLO2
3	Entity Relationship Model (ERD), Normalization, Advanced SQL	CLO3, CLO7, CLO8

16. **Class Schedule/Lesson Plan/Weekly plan:**

Topics	Specific Outcome(s)	Time Frame	Suggested Activities	Teaching Strategy(s)	Alignment with CLO
Introduction to Database System	Understand fundamentals of DBMS, ER Diagram, and how real-world problems map	Week 1	Discuss DBMS concepts; demonstrate ER diagram; analyze a complex	Lecture, Demonstratio n, Q&A	CLO1

	to database systems.		engineering problem.		
Introduction to Database Software and Database Language	Learn installation of Oracle/MySQL/SQL Server; understand database language classifications.	Week 2	Install DB software; demonstrate Oracle Live SQL; review user manual.	Hands-on, Demonstration	CLO1
Implementation of DDL Commands	Understand and use DDL commands to create and manage database structures.	Week 3	Write and execute CREATE, ALTER, DROP commands in SQL.	Hands-on Practice	CLO2
Implementation of DML Commands	Learn to manipulate data using SELECT, INSERT, UPDATE, DELETE commands.	Week 4	Practice DML queries on sample database.	Practical Exercise, Demonstration	CLO2
Functions and Operators	Understand SQL functions (Number, Aggregate, Date) and operators (Arithmetic, Logical).	Week 5	Implement examples using SQL functions and operators.	Hands-on Practice, Problem Solving	CLO2
Clauses and Joins	Implement SQL clauses and various joins (INNER, OUTER, NATURAL).	Week 6	Practice JOIN operations and clauses like ORDER BY, GROUP BY.	Hands-on Practice, Group Work	CLO2

Midterm Examination	Assess practical skills in database design and SQL operations.	Week 7	Conduct hands-on lab exam covering Labs 1-6.	Assessment	CLO1, CLO2
Advanced SQL: DCL, Triggers, Views	Learn advanced SQL concepts such as DCL commands, triggers, and views.	Week 8	Implement triggers, views, and DCL commands.	Hands-on Practice	CLO2
Introduction to Complex Engineering Problem (CEP)	Identify and design a database system for a real-world CEP.	Week 9	Select project topic and draft ER model.	Project-Based Learning	CLO3, CLO4
CEP Project Evaluation - Phase 1	Evaluate initial design and individual contribution.	Week 10	Review project design and give feedback.	Peer Review, Instructor Feedback	CLO3, CLO6
CEP Project Evaluation - Phase 2	Assess progress and suggest improvements.	Week 11	Review project progress and performance.	Mentoring, Feedback	CLO6, CLO7
CEP Project Evaluation - Phase 3	Finalize database system and validate performance.	Week 12	Evaluate completed project system.	Review and Feedback	CLO6, CLO7
Viva-Voce and Final Presentation	Present and demonstrate completed database system.	Week 13	Oral presentation and project demo.	Presentation, Q&A	CLO8

Final Evaluation and Closure	Assess project documentation and ensure learning outcomes achieved.	Week 14	Final review and grading.	Evaluation	CLO8

17. Teaching-Learning Strategies:

Active Learning: Encourage students to actively participate in the course material through rigorous problem-solving, fruitful discussions, and engaging group activities.

18. Assessment Techniques of each topic of the course:

SL No.	Topics / Content	Assessment Techniques
1	Database Management Systems basic, database software tool, database administration	Lab Task, Lab Exam
2	Data Definition Language (DDL), Data Manipulation Language (DML)	Lab Task, Lab Exam
3	Entity Relationship Model (ERD), Normalization, Advanced SQL	Report, Viva, Continuous Project Evaluation, Project Demonstration

Part C – Assessment and Evaluation

Assessment Type	% weight	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6	CLO7	CLO8
Lab Task	10	5	5						
Lab Exam	30	10	20						
Report	10			3		3			4
Viva	15			5					10
Continuous Project Evaluation	20				10		10		
Project Demonstration	15							5	10
Total	**100%**	**15**	**25**	**8**	**10**	**3**	**10**	**5**	**24**

19. Assessment Strategy

Lab Tasks: Students will be provided with some problems during each class and evaluated based on the number of solved problems and correctness.

Lab Exam: A lab exam will be conducted, and students have to write DDL/DML statements based on a provided database problem. A student's performance will be judged through his/her problem-solving skills.

Group Project: A CEP project has to be completed. A group will be formed by 4-5 students. The teacher will continuously monitor the group performance, quality of the individual work, check the report and judge his/her presentation skill.

Lab Tasks and Lab Exam (40 marks)

Bloom's Category Marks (out of 40)	Lab Tasks (10)	Lab Exam (30)
2/Manipulation	5	10
1/Apply	5	20

Project (60 marks)

Bloom's Category	Continuous Project Evaluation	Project Demonstration	Report	Viva
1/Apply		5		
1/Analyze		10	10	15
3/Value	10			
1/Create	10			

20. Evaluation Policy

Grades will be calculated as per the university grading structure and individual student will be evaluated based on the following criteria with respective weights.

1. Lab Tasks and Lab Exam 40%
2. Project 60%

UAP Grading Policy

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75

70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00

Part D – Learning Resources

1. **1. Text Book**
    1. Database System Concept (7th Edition), - Silberschatz, Korth, Sudarshan.
2. **Reference Books & Materials**
    2. Database Management System (4th Ed.) – R. Ramakrishna, J. Gehrke

Appendix-1:

Washington Accord Program Learning Outcomes (PLO) for engineering programs:

(a) Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.

(b) Identify, formulate, research literature and analyze complex engineering problems reaching

substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (K1 to K4)

(c) Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)

(d) Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

(e) Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.

(f) Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (K7)

(g) Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7)

(h) Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)

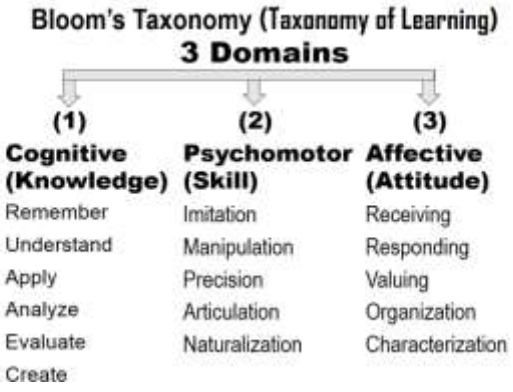
(i) Function effectively as an individual, and as a member or leader in diverse teams and in multi disciplinary settings.

(j) Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

(k) Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

(l) Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Appendix-2:



Knowledge Profile (K)

No.	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline

K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8	Engagement with selected knowledge in the research literature of the discipline

Range of Complex Engineering Problem Solving (P)

Attribute	Complex Engineering Problems have characteristic P1 and some or all of P2 to P7:
Depth of knowledge required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	P4: Involve infrequently encountered issues
Extent of applicable codes	P5: Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and conflicting requirements	P6: Involve diverse groups of stakeholders with widely varying needs
Interdependence	P7: Are high-level problems including many component parts or sub-problems

Range of Complex Engineering Activities (A)

Attribute	**Complex activities** means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	A3: Involve creative use of engineering principles and research-based knowledge in novel ways

Consequences for society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches