

# Bangladesh University of Business and Technology (BUBT) Faculty of Engineering& Applied Sciences (FEAS) Department of Computer Science and Engineering (CSE)

## THEORY COURSE OUTLINE

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	Program	B.Sc. Engg. in CSE							
2	Course Code	CSE 417							
3	Course Title	Distributed Database Management Systems							
4	Course Type	Advanced course							
	Academic Session	Spring 2021							
6	Credit Hour	3.0							
7	Intake	38							
8	Section	1							
9	Pre-requisites	CSE 207 Database System	ns						
10	Campus	Permanent Campus							
11	Course	Name: Mohammad Zaee	ed	<b>Designation</b> : Lecturer					
1	Teacher	<b>Specialization</b> : Software	Engin	eering, Image Processing,	Natural Lang				
		Room No. 314/B1		Email: mohammad_zaeed@bubt	odu bd	Cell No. 01991592404			
12	Class Schedule			monammau_zaceu@bubt	.eau.ba	01991392404			
12	Class Schedule								
		Class Day		Class Hours		s Room			
		Tuesday		01:20 PM – 02:50 PM		910 (B-2)			
		Wednesday	1	1:30 AM – 01:00 PM	910	(B-2)			
13	Counselling	CI D							
1	Schedule	Class Day		Class Hours		Class Room			
		Sunday		1:20 PM – 2.40 PM		(B-1)			
		Tuesday		3:00 PM – 4.20 PM	314	(B-1)			
14	Course	The aim of the course is to	enhan	ce the previous knowledge	of database sy	stems by deepening			
(	Objectives			cal and practical aspects o	-				
				ibuted database technolog					
				`	•				
		•		idents will able to introduce	•	*			
				outed database systems a		•			
		distributed query processing	ng phas	ses. This course emphasized	d on finding o	ut the optimal query			
		execution strategies.							
15	Course	Introduction to distribut	ed da	tabase management, Pro	mises of di	stributed database,			
1	Synopsis	Distributed database design	n chal	lenges, Distributed DBMS	architecture:	s, Top-down design			
		Distributed database design challenges, Distributed DBMS architectures, Top-down design process, Distribution design issue, Fragmentation, Allocation, View Management, Data							
		•	_	ontrol, Objectives of que		· '			
		•	•	•	• •				
		• •	_	g and data localization, D	-	• •			
		•		gement: taxonomy, types a		•			
16	Text Book	<u>*</u>		base Systems, Third Editio	n				
		- M. Tamer Oezsu, Patrick Valduriez							

	I = 0														
17	Reference	1.	1. Distributed Systems: Principles and Paradigms, 2nd Edition												
	Book		- Andrew S. Tanenbaum 2. Distributed Database Management Systems												
		2.	Distributed Database Management Systems     Saeed K. Rahimi												
18	Course Outcomes		- Saccu K. Kallilli												
	(COs)		pon comp												
		C	O1: Und					design a	architect	ures, q	uery ex	ecution	process	of dist	ributed
		C	oat O2: Desi	abase m				data fra	amentai	tion re	alicatio	n alloca	ition met	thode a	nd data
				urity etc		aataba	ise using	uata 11t	iginema	11011, 10	Jiicatio.	ii, aiiocc	ition me	inous a	na aata
			O3: Anal												
		C	O4: Appl	l <b>y</b> optim	al quer	y exec	cution pla	an in dis	tributed	databa	se envii	onment			
	Mapping	of													
	COs to PO		CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			CO1												
			CO2			√									
			CO3		<b>√</b>										
						√									
			CO4			<b>'</b>									
		<u> </u>													
	CO No	. PO N	No. Dor	Bloom's Domain / Level			Delivery Methods / Activities			Assessment Tools					
	CO1	PC	Unc	Cognitive / Understanding			Lecture, Class works					erm and l	Final		
	CO2	PC	App	gnitive / olying	lying Assignments					Mid-term					
	CO3	PC		gnitive / alyzing			Lecture, Class works, Assignments			Final					
	CO4	PC	O <sub>4</sub> Cog	gnitive/			Lecture, Class work,				Final				
			App	olying			Assignments								
19	Teaching	Movim	um topics	will be	2 001101	ad fra	m the te	wthools	For the	rost of	the ten	ios rofe	ranga h	20120 111	:11 ha
19	Strategy		ed. Some								-				
		Multim	nedia proj	ector ar	nd a PO	C will	be used	for the	conven	ience o	of the s	tudents	to under	stand	codes
			ally. Stud		ist part	icipate	e in class	sroom d	iscussio	ns for	case sti	idies, p	roblems	solving	g and
		project	developn	nents.											
20	Assessm	Cla	ss Partic	ination							:	10%			
_0	ent and		iss i artic	ipation							•	1070			
	Marks		•	ъ.								100/			
Distribu Assignment/Presentation						:	10%								
	Class Test : 10%														
		Mic	dterm Ex	aminati	ion						:	30%			
		Fin	al Exami	nation							:	40%			
		1 111	ai Laanii								•	1070			

Week	Lecture #	Selected Topics	Chapter #	COs	Asse
week	Lecture #	Introduction: Distributed Data Processing, Distributed Database	Chapter #	CO1	ASS
		System, Data Delivery Alternatives, Promises of DDBSs,	Chapter 1	COI	
1	1	Transparent Management of Distributed and Replicated Data,			
	1	Reliability Through Distributed Transactions, Performance,			
		System Expansion			
		Complications Introduced by Distribution, Distributed Database	Chapter 1	CO1	
		Design, Distributed Directory Management, Distributed Query	Chapter 1	COI	
		Processing, Distributed Concurrency Control, Distributed			
	2	Deadlock, Reliability of Distributed, Replication, Relationship			
		among Problems, Additional Issues, Distributed DBMS			
		Architecture			
		A Generic Centralized DBMS Architecture, Architectural Models	Chapter 1	CO1	
	2	for Distributed DBMSs, Autonomy, Distribution, Heterogeneity,	•		
	3	Architectural Alternatives, Client/Server Systems, Peer-to-Peer			
2		Systems, Multi-database System Architecture			
	1	Overview: Relational database & anomalies, Database	Chapter 2	CO2	
	4	normalization review			
	5	Distributed Database Design: Top-Down Design Process,	Chapter 3	CO2	
3		Distribution Design Issues			
	6	Reasons for Fragmentation, Fragmentation Alternatives, Degree	Chapter 3	CO2	I
		of Fragmentation, Correctness Rules of Fragmentation	CI . 2	G0.2	T
4	7	Allocation Alternatives, Information Requirement,	Chapter 3	CO2	E
4		Fragmentation, Horizontal Fragmentation	Chapter 2	CO2	
	8	Vertical Fragmentation, Hybrid Fragmentation, Allocation, Allocation Problem, Information Requirements for	Chapter 3	CO2	
	0	Fragmentation			
5	9	Allocation Model, Solution Methods, Data Directory	Chapter 3	CO2	
		Dota and Access Control View Management Views in	Chapter 5		
	10	Data and Access Control: View Management, Views in Centralized DBMSs, Views in Distributed DBMSs, Maintenance	Chapter 5	CO2	
	10	of Materialized Views, Data Security		CO2	
		Discretionary Access Control, Multilevel Access Control,	Chapter 5	CO2	
6	11	Distributed Access Control	Chapter 5	CO2	
Ü		Semantic Integrity Control, Centralized Semantic Integrity	Chapter 5	CO2	
	12	Control, Distributed Semantic Integrity Control		002	
		Overview of Query Processing: Query Processing Problem,	Chapter 6	CO4	
		Objectives of Query Processing, Complexity of Relational	•		
7	13	Algebra Operations, Characterization of Query Processors,			
		Languages, Types of Optimization, Optimization Timing,			
		Statistics			
		Decision Sites, Exploitation of the Network, Exploitation of	Chapter 6	CO4	
	14	Replicated Fragments, Use of Semi joins, Layers of Query			
		Processing: Query Decomposition, Data Localization, Global			
0		Query Optimization, Distributed Query Execution			
8		Midterm Examination	1		•
9		Localization of Distributed Data, Reduction for Primary	Chapter 7	CO4	
	15	Horizontal Fragmentation, Reduction for Vertical Fragmentation,			
		Reduction for Derived Fragmentation, Reduction for Hybrid			
		Fragmentation Overy Decomposition and Data Legalization, Overy	Chapter 7	CO4	
	16	Query Decomposition and Data Localization, Query Decomposition, Normalization, Elimination of Redundancy,	Chapter 7	CO4	
	10	Rewriting			
10		Optimization of Distributed Queries: Search Space, Search	Chapter 8	CO4	
10	17	Strategy, Distributed Cost Model	Chapter o		

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				Centralized (							Chapter 8	CO4	Fin	
		18			Query Optimization, Hybrid Query Optimization, Join ng in Distributed Queries								Exa	m
						_					GI °	~ -		
	11	19 Distributed (			Query Optin	on		Chapter 8	CO4	94 40				
				Dynamic Ap Hybrid Appr	-	itic Ap	proach,	Semi join-ba	ased	Approach,	Chapter 8	CO4		
	12			Introduction		tion M	anagem	ent: Serializa	ahilit	T/	Chapter	CO1		
	12	21		Taxonomy of							10	COI		
		21		Transactions					Ondit	.10115 01	10			
				Formalization	<u></u>				ies o	f	Chapter	CO1		
		22		Transactions	ir or the ri	unbuct.	ion con	cept, 1 ropert	105 0		10	COI		
	13	23		Types of Tra	nsactions.	Flat Ti	ransactio	ons. Nested 7	Trans	actions.	Chapter	CO1		
				Workflows A				,		,	10			
		24	•	Review class	for Semes	ter Fir	nal Exan	nination			Chapter 10	CO1		
	14	25		Real world p	roblem sol	ving								
		26		Final Exam I	Review Cla	ıss								
	15							Final Exam	1					
22	Overa	ll CO	As	sessment methor	ods of COs	are gi	iven belo	ow:						
	Assess			Assessmo	ent Area			CO					sessmei	
	Criter	ia										Ar	ea Mar	k
						CO <sub>1</sub>		CO2	(	C <b>O</b> 3	CO4			
				Class Partici	pation									
				Assignment/Presentat										
			_	ion										
				Class Test										
				Midterm Exa	am		15	15					30	
				Final Exam		10				15	15	40		
				Total Mark		25		15		15	15		70	
23	Rubri	cs	C	Os	Excellent		Good		Sati	isfactory	Poor	Unsat	tisfact	Mar
				Bloom's	(80%-100	<b>%</b> )	(70%-7	79%)		<b>%-69%</b> )	(40%-59%)	ory		ks
		Level)									(0-39%)		(70)	
			C	01	Answer is		Answei	is brief	Ans	swer is	Answer is	None	of the	
				Jnderstanding)	complete a	and	with su			f with	incomplete	releva		
					sufficient			rovided to		ıfficient	and		s were	
					provided t			issues were		ail provided	excessive		led or	
					support iss			ced. And the basic		upport es were	discussion of unrelated	didn't		
					question.			are included		oduced.	issues.	aliswe		
					also deals		but son		11101		And serious			
					with the entire		missing	Ţ <b>.</b>			gaps in the			
				02	question.					•	basic details.	NT	. C .1	
				O2 Inderstanding)	Answer is complete a	and				swer is of with	Answer is incomplete	releva	of the	
			(	macrstanding)	sufficient of					ıfficient	and		s were	
					provided t	<u> </u>			ail provided	excessive		led or		
					support iss		introdu	ced. And	to support		discussion	didn't		
					related to t			the basic		es were	of unrelated	answe	er.	
					question. A also deals		but som	are included ne are	intro	oduced.	issues. And serious			
					with the en		missing				gaps in the			
					question.						basic details.			

24	Grading	CO4 (Analyzing) a a b si n		answe approby appropriate appropriate approby appropriate appropriate approby appropriate appropriate approby appropriate appr	priately plying the sted od in the on.  uestion is ered priately plying the sted od in the	The question is answered briefly by applying the suggested method in the question.  The question is answered briefly by applying the suggested method in the question		answer correct apply sugger method questing some missing the correct apply sugger method questing some questing some method questing some method questing some method questing some questing so	The question is answered correctly by applying the suggested method in the question but some steps are missing.  The question is answered correctly by applying the suggested method in the question but some steps are missing.		estion ered etel in stion ered etel etel etel etel etel etel etel et	The stated chain of analysis does not lead to the stated question.  No attempt to implement the suggested method.		
24	Policy				ering and				C+ 50-<55	C 45-<50	D 40-<4	guideline pro  F  45 <40	vided	
25	Additional Course Policies	Assign	nments Test	T w w	There will be at least two assignments. Average marks of the assignments will be counted. No late homework will be accepted.  Any kind of copy/manipulation in assignment will carry zero mark.  Two or more copied assignments will carry zero mark in all assignments. Zero tolerance will be shown in this regard. Solutions to assignment problems will be provided through web and on hand.  There will be at least three class tests (CT). Best two of three or best three of four CTs will									
		Exams	S	C	be counted. Both of regular and surprise CTs can be conducted.  CT, Mid-term and final exam will be closed book, closed notes. Mobile phone is strictly prohibited in exam hall. Students are insisted to carry their own watch and synchronize time during exam hours.									
		Test Policy			If a student is absent from class test anyway and made no report to the class teacher personally beforehand, his/her score for that test will be zero. No make-up for the class test will be allowed as 2 of 3 or 3 of 4 CTs are being considered. No make-up for Mid-exam will be entertained without physical presence and recommendation of the guardian along with written permission of the department. Make-up of Mid-exam may be much harder than the regular one.								ass test l-exam a along	
26	Additional Information													
27	27 Bloom's Taxonomy for Teaching-Learning													

Bloom's Taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three lists cover the learning objectives in Cognitive, Affective and Psychomotor domains. The Cognitive domain list has been the primary focus of most education and is frequently used to structure curriculum learning objectives, assessments and activities. The three domains and respective levels are illustrated below.

Cognitive [C] (Knowledge-based)	Affective [A] (Emotion-based)	Psychomotor [P] (Action-based)				
1. Remembering	1. Receiving	1. Imitating				
2. Understanding	2. Responding	2. Manipulating				
3. Applying	3. Valuing	3. Précising				
4. Analyzing	4. Organizing	4. Articulating				
5. Evaluating	5. Characterizing	5. Naturalizing				
6. Creating						

### Descriptions of Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001):

The **cognitive domain** involves the development of our mental skills and the acquisition of knowledge.

Level	Category	Meaning	Keywords
C1	Remembering	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
C2	Understanding	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
C3	Applying	Carrying out or using a procedure through executing, or implementing. Applying relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
C4	Analyzing	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure
C5	Evaluating	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation.	Appraise, argue, assess, choose, conclude, critique, decide, evaluate, judge, justify, predict, prioritize, prove, rank, rate, select, Monitor
C6	Creating	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce

#### 29 Graduate Attributes (Program Outcomes) for B.Sc. in Engineering Program based on Washington Accord

Program Outcomes (POs) are narrower statements that describe what students are expected to know and be able to do by the Time of graduation. These relate to the knowledge skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in EEE program are expected to achieve the following graduate attributes or program outcomes at the time of graduation.

**PO1–Engineering knowledge (Cognitive):** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

**PO2–Problem analysis (Cognitive):** Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

**PO3**–**Design/development of solutions (Cognitive, Affective):** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

**PO4–Investigation (Cognitive, Psychomotor):** Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

**PO5**–**Modern tool usage (Psychomotor, Cognitive):** 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 the limitations.

**PO6**—The engineer and society (Affective): Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

**PO7–Environment and sustainability** (**Affective, Cognitive**): Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

**PO8–Ethics** (Affective): Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.

**PO9–Individual work and teamwork (Psychomotor, Affective):** Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

**PO10–Communication** (**Psychomotor**, **Affective**): Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

**PO11–Project management and finance (Cognitive, Psychomotor):** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

**PO12–Life-long learning (Affective, Psychomotor):** Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

#### 30 Social & Moral Capital

Our promises are based on the three cardinal principles:

(a) What we do believe (b) What we do practice, and (c) What we will promote

However, students are advised to undertake the following commitments for moral development.

- 1. To be punctual and attentive in class
- **2.** To maintain inclusive learning environment
- **3.** To ensure mutual respect
- **4.** To be cooperative in group learning.
- 5. To be innovative and Creative
- **6.** To follow dress code and wearing ID card
- 7. To be always proactive

- **8.** Try to follow and review day to day class
- **9.** To avoid conspiracy
- **10.** To prioritize honesty & faith
- **11.** To be motivated for asking question and encourage feedback
- **12.** To develop attitude for speaking in English
- **13.** Do not ignore to carry out any assignments or commitments
- **14.** To be clean and decent in all levels.

- **15.** To be sincere for class preparation
- **16.** Do not forget to switch-off the cell phone in class
- **17.** Do not forget to carry course pack and learning stuffs in class
- **18.** To maintain loyalty and trust to the university
- **19.** Must avoid unfair means and plagiarism in exam, reports and assignments
- **20.** Must maintain eco-friendly environment in the campus.

Approved by:

Prepared by:

Checked by: