	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Data Science Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Database	4920203031	Compulsory Study Program Subjects	T=2	P=1	ECTS=4.77	3	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-10	Able to use technology in the field of data science
	PLO-16	Mastering data science theories and concepts
	Program Objectives (PO)	
	PO - 1	Able to work together to design database systems that are useful in real life
	PO - 2	Able to use database related software
	PO - 3	Able to write SQL queries based on existing algorithms
	PO - 4	Able to demonstrate theories and concepts of databases and database systems
	PLO-PO Matrix	

P.O	PLO-10	PLO-16
PO-1		
PO-2		
PO-3		
PO-4		

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																
PO-3																
PO-4																

Short Course Description	This course discusses the concepts and definitions of databases, which include the concepts of database preparation and database architecture and design using a relational model approach (entity relationship diagram). Apart from that, the concept of mapping between the conceptual model and the physical database model is also discussed. Next, the concept of database normalization is introduced as part of the database design quality testing method. After that, the concept of database processing using a relational algebra notation approach is studied which is strengthened by the introduction of the concept and implementation of the use of query language (SQL) through data definition language (DDL) and data manipulation language (DML).	
References	**Main :**	
	1. Elmasri R. & Navathe S. (2017). Fundamentals of Database System (Seventh edition). Pearson	
	Supporters:	
Supporting lecturer	Dr. Wiyli Yustanti, S.Si., M.Kom. Hasanuddin Al-Habib, M.Si. Fadhilah Qalbi Annisa, S.T., M.Sc.	

Week-	Final abilities of each learning	Evaluation	Help Learning, Learning methods, Student Assignments, [Estimated time]	Learning materials [References]	Assessment Weight (%)

	stage (Sub-PO)	Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Explain database concepts	1. Concluding the database definition 2. Mention the components that make up a database 3. Explain the concept and architecture of database systems 4. Mention various database management system (DBMS) models	**Criteria:** Non-Test **Form of Assessment** : Participatory Activities	Contextual Teaching Learning 3x50'		**Material:** Introduction to Databases **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	2%
2	Designing a conceptual model of a relational database	1. Explains the concept of entity-relationship modeling 2. Defining information in the real world into entity relationship diagram (ERD) symbols 3. Designing a conceptual model of a case in ERD	**Criteria:** 1. Non-Test 2. Independent Assignment: Designing a database system ERD **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning 3x50'	Perform DIA installation	**Material:** Conceptual Data Modeling and Database Design **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	5%
3	Mapping the conceptual database model into a physical model	1. Using DIA software to draw a CDM of a case study 2. Mention the mapping rules from CDM to PDM 3. Use mapping rules to draw a physical database model of a case	**Criteria:** 1. Non-Test 2. Independent Assignment: Designing CDM and PDM database systems **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning 3x50'	Install PowerDesigner	**Material:** Conceptual Data Modeling and Database Design **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	5%
4	Solving data design problems using the ERD method	1. Translating system analysis results into ERD concepts 2. Translating the results of the ERD concept into a database in the form of tables 3. Determining relationships between tables	**Criteria:** 1. Non-Test 2. Group Assignment: Determine the database system project topic **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Contextual Teaching Learning; Stage 1 PjBL: Prepare assignments for database system projects to be carried out; Stage 2 PjBL: Convey the boundaries and scope of the database project being undertaken; Stage 3 PjBL: Agree on the duration of project work and time for project progress reports; 3x50'		**Material:** Data Modeling Using the Entity–Relationship (ER) Model **Library:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	4%

5	Using application programs to design databases	1. Draw a CDM using Power Designer 2. Convert CDM to PDM using Power Designer 3. Connecting CDM and PDM plans to RDBMS	**Criteria:** 1. Non-Test 2. Independent Assignment: Design a CDM and PDM database system using Power Designer **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Contextual Teaching Learning; Stage 4 PjBL: Monitor project progress through group presentations; 3x50‘		**Material:** Creating CDM, PDM, and DBMS Connections **Library:** *https://help.sap.com/...*	10%
6	Designing a database with normalization techniques	1. Shows the functional dependency (FD) of a table 2. Distinguish between forms of normalization 3. Normalize the FD table	**Criteria:** Non-Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning (CTL) 3x50‘	Stage 4 PjBL: Monitor student project topics asynchronously via Vinesa	**Material:** Database Design Theory and Normalization **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	4%
7	Solving data design problems using normalization techniques	1. Shows the FD of a table 2. Distinguishing normality conditions from a table 3. Perform table normalization 4. Drawing a normalized table relation schema	**Criteria:** 1. Non-Test 2. Group Presentation **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning; Stage 4 PjBL: Monitor project progress through group presentations; 3x50‘		**Material:** Database Design Theory and Normalization **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	15%
8	Midterm exam	1. Answer questions related to basic database concepts 2. Solving database design problems using ERD techniques 3. Solving database design problems with normalization techniques	**Criteria:** Writing test **Form of Assessment** : Practice/Performance, Test	Written exam 2x50‘		**Material:** Chapters 1-4 **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	0%
9	Writing query algorithms using Relational Algebra (AR)	1. Mentions basic operators in AR 2. Using AR symbols to solve problems	**Criteria:** Non-Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning 3x50‘	Stage 4 PjBL: Monitor student project topics asynchronously via Vinesa	**Material:** The Relational Algebra and Relational Calculus **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	5%
10	Solving query problems using Relational Algebra (AR) notation	1. Write problem solving algorithms with AR 2. Translates AR symbols into simple SQL syntax	**Criteria:** Non-Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning 3x50‘	Stage 4 PjBL: Monitor student project topics asynchronously via Vinesa; Installing MySQL;	**Material:** The Relational Algebra and Relational Calculus **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	4%

11	Write queries with SQL	1. Write command data definition language (DDL) 2. Write data language manipulation (DML) commands 3. Using query builders in RDBMS applications 4. Write SQL syntax to solve problems	**Criteria:** 1. Non-Test 2. Independent Assignment: Write SQL syntax 3. Group Presentation **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Contextual Teaching Learning; Practice; Stage 4 PjBL: Monitor project progress through group presentations; 3x50‘		**Material:** Basic SQL **Reference:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	7%
12	Write queries with complex SQL	1. Distinguish between different types of SQL syntax for DML 2. Shows various functions, operators, and SQL parameters 3. Write SQL syntax to solve more complex problems	**Criteria:** 1. Non-Test 2. Independent Assignment: Write more complex SQL syntax **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Contextual Teaching Learning; Practice;	Stage 4 PjBL: Monitor project progress asynchronously via Vinesa	**Material:** More SQL: Complex Queries, Triggers, Views, and Schema Modification **References:** *Elmasri R. & Navathe S. (2017). Fundamentals of Database Systems (Seventh edition). Pearson*	4%
13	Designing database systems to solve problems related to Data Science	1. Create tables in RDBMS software 2. Writing queries in RDBMS software	**Criteria:** Group Presentation **Form of Assessment** : Project Results Assessment / Product Assessment	Stage 4 PjBL: Monitor project progress through 3x50‘ group presentations			10%
14	Designing database systems to solve problems related to Data Science	1. Create forms in RDBMS software 2. Create reports in RDBMS software	**Criteria:** Group Presentation **Form of Assessment** : Project Results Assessment / Product Assessment	Stage 4 PjBL: Monitor project progress through group presentations			10%
15	Designing database systems to solve problems related to Data Science	1. Create forms in RDBMS software 2. Create reports in RDBMS software	**Criteria:** Group Presentation **Form of Assessment** : Project Results Assessment / Product Assessment	Stage 5 PjBL: Review of group work results;	Stage 6 PjBL: Reflection and evaluation based on input in the review;		15%
16	Final exams	Demonstrate the results of the RDBMS project	**Criteria:** 1. Group Presentation 2. Question and answer **Form of Assessment** : Project Results Assessment / Product Assessment	Stage 7 PjBL: Presentation of project results and group work reports in a face-to-face forum 3x50‘			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	29.32%
2.	Project Results Assessment / Product Assessment	62.32%
3.	Practice / Performance	8.32%
		99.96%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.

4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.