	Universitas Negeri Surabaya Faculty of Engineering, Undergraduate Study Program in Informatics Engineering	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Database	5520204011	Compulsory Study Program Subjects	T=4	P=0	ECTS=6.36	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	I Made Suartana, S.Kom., M.Kom.	.....	Aditya Prapanca, S.T., M.Kom.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**	
	PLO-2	Able to design and simulate multi-platform technology applications that are relevant to the needs of industry and society using theoretical concepts in the field of computer science/informatics knowledge (KNO-02)
	PLO-3	Develop logical, critical, systematic and creative thinking in carrying out specific work in their field of expertise and in accordance with work competency standards in the field concerned
	PLO-6	Able to analyze, design, build, and evaluate user interfaces and interactive applications based on user needs and transdisciplinary scientific developments (COM-01)
	Program Objectives (PO)	
	PO - 1	Able to develop logical, critical and systematic thinking
	PO - 2	Able to carry out work in accordance with the field of expertise and work competency standards in the field concerned
	PO - 3	Able to analyze user application interfaces and interactive applications based on user needs and transdisciplinary scientific developments
	PO - 4	Able to design user application interfaces and interactive applications based on user needs and transdisciplinary scientific developments
	PO - 5	Able to build and evaluate user application interfaces and interactive applications based on user needs and transdisciplinary scientific developments
	PO - 6	Able to master theoretical concepts in the field of computer science/informatics knowledge
	PO - 7	Able to design multi-platform applications that are relevant to industry and community needs
	PO - 8	Able to simulate multiplatform technology applications that are relevant to industrial and societal needs
	PLO-PO Matrix	

P.O	PLO-2	PLO-3	PLO-6
PO-1		✔	
PO-2		✔	
PO-3			✔
PO-4			✔
PO-5			✔
PO-6	✔		
PO-7	✔		
PO-8	✔		

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					✔					✔	✔					
PO-5																
PO-6							✔	✔				✔	✔	✔		
PO-7									✔						✔	
PO-8																✔

Short Course Description	This course explains the concepts and definitions of databases, starting from the components that make up a database, architecture and database 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 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 was studied using a relational algebra notation approach which was strengthened by an introduction to the concept and implementation of the use of query language (SQL) through DDL and DML. Apart from developing databases using relational concepts, this course covers the development of database technology with the concept of noSQL data bases
References	**Main :**
	1. Raghu Ramakrishnan, Johannes Gehrke Database Management Systems, 3rd edition McGraw-Hill Education. 2018 2. Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016 3. Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022
	Supporters:
Supporting lecturer	Dr. Wiyli Yustanti, S.Si., M.Kom. I Made Suartana, S.Kom., M.Kom. Paramitha Nerisafitra, S.ST., M.Kom.

Week-	**Final abilities of each learning stage (Sub-PO)**	**Evaluation**		**Help Learning, Learning methods, Student Assignments, [Estimated time]**		**Learning materials [References]**	**Assessment Weight (%)**
		Indicator	**Criteria & Form**	**Offline (*offline*)**	**Online (*online*)**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**

1	Students are able to explain database concepts	1. Students can conclude the definition of a database 2. Students can tell the history of databases 3. Students can name the components that make up a database 4. Students can show database architecture 5. Students can name various DBMS models	**Criteria:** - **Form of Assessment** : Participatory Activities, Tests	Contextual Teaching Learning (CTL) 3 X 50		**Material:** Database Concepts **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Database technology **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Database & DBMS **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	0%

2	Students are able to design data models	1. Students can state the meaning of the ER symbol 2. Students are able to define information in the real world into ER symbols 3. Students can use ERD symbols to draw a conceptual model of a case study	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities	Contextual Teaching Learning (CTL) 3 X 50		**Material:** Introduction to data model **Literature:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** ER Model **Library:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Entities, Attributes, and Primary Keys **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Relationship ERD **Readers:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Building ERD **Readers:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	5%

3	Students are able to design data models with relational concepts	1. Students can state the rules for relationships between entities 2. Students can use mapping rules to draw a relational model of data from a case study	**Criteria:** Assessment rubric is attached **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Problem Based Learning (PBL) 4 X 50		**Material:** Relational Data Models **References:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Converting ER models to Relational Data Models **References:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Reference Integrity **Readers:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	5%
4	Students are able to normalize databases and use certain application programs to design logical databases	1. Students can draw CDM using software. 2. Students can change CDM to PDM using software. 3. Students can connect the design to the RDBMS software	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Contextual Teaching Learning (CTL) Problem Based Learning (PBL) 3 X 50		**Material:** Normalization **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** database logic design **Readers:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	5%

5	Students are able to carry out Physical Database Design	1. Students can change PDM into tables and physical relations 2. Students can apply referential integrity, primary-foreign key	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities	Problem Based Learning (PBL) 3 X 50		**Material:** - Physical Design **Reader:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** - primary key - foreign key **References:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** - design implementation (physical database design) **References:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	5%

6	Students are able to process data in databases using SQL	1. Students can CRUD data in a database 2. Students can make changes to the structure and data in the database 3. Students can apply queries to display data in the database	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities	Problem Based Learning (PBL) 3 X 50		**Material:** SQL **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** DDL **Bibliography:** *Raghu Ramakrishnan, Johannes Gehrke Database Management Systems, 3rd edition McGraw-Hill Education. 2018* **Material:** DML **Bibliography:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016* **Material:** Bibliography Query **:** *Ramez Elmasri, Shamkant Navathe. Fundamentals of Database Systems. 7th edition. Pearson. 2016*	15%
7	Students are able to apply queries to display data from databases	1. Students can design queries with clauses and joins 2. Students can display data from the database according to user needs	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities	Contextual Teaching Learning (CTL) Problem Based Learning (PBL) 3 X 50		**Material:** Query **Bibliography:** *Raghu Ramakrishnan, Johannes Gehrke Database Management Systems, 3rd edition McGraw-Hill Education. 2018*	0%
8	Midterm Exam (UTS)	1. Students can answer questions related to basic database concepts 2. Students can solve database design problems using ERD techniques 3. Students can solve database design problems using Normalization techniques	**Criteria:** -	Virtual Learning 2 X 50			0%

9	Students are able to differentiate the concept of a noSQL database from a relational database	1. Students differentiate NoSQL database concepts 2. Students can differentiate the characteristics of NoSQL database types	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities	Contextual Teaching Learning (CTL) 3 X 50			20%
10	Students are able to simulate data models using the NoSQL approach - document base database	1. Students can install a database environment with the keyvalue concept 2. Students can build data models using a key value approach	**Criteria:** -	Contextual Teaching Learning (CTL) Problem Based Learning (PBL) 3 X 50		**Material:** Document based database **References:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022*	0%
11	Students are able to simulate data models using the NoSQL -key value database approach	1. Students can install a database environment with the keyvalue concept 2. Students can build data models using a key value approach	**Criteria:** Assessment rubric is attached **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Problem Based Learning (PBL) 3 X 50		**Material:** key-value database **References:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022*	5%
12	Students are able to apply database concepts on multiple servers in a distributed manner	1. Students can explain the concept of distributed storage (database) 2. Students can determine distributed database technology or framework 3. Students can simulate distributed database technology	**Criteria:** Assessment rubric is attached	Contextual Teaching Learning (CTL) Problem Based Learning (PBL) 3 X 50		**Material:** Distributed Databases **References:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022*	5%

13	Students are able to differentiate the NewSQL database concept from the NoSQL concept and the relational database model	1. Students can differentiate the NewSQL database concept from other database models 2. Students can create databases with the NewSQL concept	**Criteria:** Assessment rubric is attached	Contextual Teaching Learning (CTL) 3 X 50		**Material:** - NewSQL Database Concepts **Reader:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022* **Material:** - NewSQL Database Implementation **Reader:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022*	5%
14	Students are able to apply database management	1. Students can install DBMS according to industry and community needs 2. Students can configure database management including database creation, user management and security management 3. Students can back up databases and restore databases	**Criteria:** Assessment rubric is attached **Form of Assessment** : Project Results Assessment / Product Assessment	Contextual Teaching Learning (CTL) Problem Based Learning (PBL) 3 X 50		**Material:** - Data Planning and Data Design **Library:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022* **Material:** - Database Maintenance **Library:** *Shouhong Wang, Hai Wang. Business Database*	20%

						Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022 **Material:** - Database Backup and Recovery **Library:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022* **Material:** - Data Security, access policy and data ownership **Reader:** *Shouhong Wang, Hai Wang. Business Database Technology, 2nd edition (Theories and Design Process of Relational Databases, SQL, Introduction to OLAP, Overview of NoSQL Databases). Universal Publishers. 2022*	

15	Students are able to simulate databases using multiplatform technology	1. Students can determine technology according to the case study/project given 2. Students can design data models using the noSQL database concept approach 3. Students can implement data models with DBMS with NoSQL concepts	**Criteria:** Assessment rubric is attached **Form of Assessment** : Project Results Assessment / Product Assessment	Problem Based Learning (PBL) 3 X 50			10%
16	Final Semester Examination (UAS)	Students Can Demonstrate Final Project Results in Making an RDBMS	**Criteria:** Assessment rubric is attached	Project Based Learning 2 X 50			20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	51.67%
2.	Project Results Assessment / Product Assessment	36.67%
3.	Test	1.67%
		90.01%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.