Database

Module name	Database	
Module level	Undergraduate	
Code	IF221108	
Courses (if applicable)	Database	
Semester	2	
Lecturer	Afina Lina Nurlaili, S.Kom, M.Kom. (PIC) Dr. Rr. Ani Dijah Rahajoe, S.T, M.Cs. Dr. Eng. Ir. Anggraini Puspita Sari, MT. Made Hanindia Prami S, S.Kom, M.Cs. Retno Mumpuni, S.Kom, M.Sc.	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program; compulsory; 2nd semester	
Type of teaching, contact hours	Lectures, < 60 students,	
Teaching Methods	simulation, case study, collaborative learning	
Workload	1. Lectures: 3 sks x 50 = 150 minutes (2 hours 30 minutes) per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private study: 3 x 60 = 180 minutes (3 hours) per week	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Computational Mathematics	
Courses description	In this course, students learn about how to model data and information in the form of charts and diagrams concept of physical and apply it to the database in a DBMS using DDL. Students also learn about the concept of relational algebra and data manipulation language (DML) and its application to manage data and information in a database. Students also learn to create database applications to manipulate data in the database. Concepts and practice are done in the classroom and laboratory individual and group. Case studies are used in lectures is a real.	
Learning outcomes and their corresponding PLOs	After completing this module, a student is expected to:	
	CO1 Understand the stages of the database system development life cycle, the main phases of database design which include conceptual design, logical design, and physical design.	PLO3, PLO8
	CO2 Understand the basic concepts associated with the Entity-Relationship (ER) Model (entities, relationships, and attributes) and Enhanced-ER (EER) Model (class/subclass relationships, specialization and generalization, and categories), and be able to perform basic conceptual designs relational data using ER and EER Models.	PLO3, PLO8

	CO3 Able to design logical databases for relational data models using the conversion algorithm of conceptual database design results (ER/EER schemes) into a set of relations, and be able to refine logical database designs for relational data models using functional dependency and data normalization.	PLO3, PLO8
	CO4 Able to specify data retrieval requests using relational algebra, able to create database schemas and tables using SQL commands, and able to define queries, constraints, and updating data in SQL.	PLO3, PLO8
	CO5 Able to map logical database designs into physical database designs using a specific database management system (DBMS) as a target, and understand physical database design methodologies and be able to apply them to improve database performance through tuning, indexing data, improving database design, and query refinement.	PLO3, PLO8
Content	● BASIC CONCEPTS OF INFORMATION MANAGEMENT: differences in the data, information and knowledge; benefit from data and information to support human needs; demonstration of the use of data and information for the organization; identification of issues persistent data usage in organizations; evaluation of the use of small to medium scale applications to meet the real needs of users. ● DATABASE SYSTEMS: characteristics that distinguish the database approach with traditional approaches to programming with data files; evolution of database and systems approach; the basic purpose, function model, application components and social impact from database systems ; identification of the main function from DBMS and describing its role in the system database; concept of data independence and importance in the database systems; the use of declarative query language to obtain information from databases; ● DATA MODELLING: categories based on the type of concept data model is provided to describe the structure of the database (concept data model, physical data model, and representational data model), modelling concepts and the use of modelling notation (ERD, UML); relational data model, the basic principles of the relational data model, modelling concepts and notation of the relational data model; The main concept of OO model such as identity, type constructor, inheritance, polymorphism, and versioning; differences in relational data model with semistructured data model (DTD, XML Schema). ● RELASIONAL DATABASE: relational schema from conceptual model created using the model er; relational database design; the concept of integrity constraints and referential integrity constraints; the use of relational algebra operations from mathematical set theory (union, intersection, difference, and Cartesian product) and relational algebra operations to database (select, restrict, project, join, and division); query in the tuple relational algebra and relational calculus; Functional dependence between two or more attributes that are a subset relations, Decomposition of a schema; lossless-join and dependency preservation properties of a decomposition, Candidate keys, superkeys, and closure of a set of	

	attributes, Normal forms (1NF, 2NF, 3NF, BCNF), Multi-valued dependency (4NF), Join dependency (PJNF, 5NF), Representation theory. ● QUERY LANGUANGE: database language, SQL (DDL and DML for define data structure, query, update, boundaries, and integrity); QBE and 4th -gen environments, Explicite Set & NULL, Rename, Aggregate Function & Grouping, Arithmetic Operator & Ordering, VIEW in SQL. 6. DATABASE APPLICATION.
Media employed	LCD, whiteboard, websites, books (as references), online meeting, etc.
Assessments and Evaluation	One written Midterm assessment (60 minutes) and one final oral exam (30 minutes), two short computer-based quizzes, takehome written assignments
Study and examination requirements and forms of examination	The final grade in the module is composed of: • Two short computer-based quizzes: 15% x 2 = 30% • Take-home written assignments: 15% • Written Midterm assessment: 25% • Final oral exam: 30% Students must have a final grade of 55.6% or higher to pass.
Reading List	● C. Coronel, S. Morris, Database Systems: Design, Implementation, & Management, 14th edition. Cengage, 2023. ● M. L. Gillenson. Fundamentals of Database Management Systems. 2023. ● W. Tarigan, T. P. Sihaloho, Lismardiana, Iswanto, H. Silalahi, Perancangan Basis Data. Eureka Media Aksara, 2021. ● T. Alkin, A. Ibrar, Database design and modeling with postgreSQL and MySQL: build efficient and scalable databases for modern applications using open source databases. Packt Publishing, 2024. ISBN: 9781803233475. [Online]. Available: https://portal.igpublish.com/iglibrary/obj/PACKT0007468?searchid=1754986021140cjr6jhcpcjxWxHn1PfWV4