Republic of Yemen

Ministry of Higher Education & Scientific Research

Council of Academic Accreditation & Quality Assurance of Higher Education(CAQA)

21 September University for Medical and Applied Sciences

Faculty of Engineering and Computer

Department of Information Technology

Program of Information Technology

Course Specification of

Database management system

Course Code. (07.01. 734)

2024

T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:	Reviewed by:	Head of the Department:	Quality Unit:	Dean
Dr. ---------	Dr. -----			

I. General Information:

1.	Course Title:	Database management system				
2.	Course Code:	07.01. 734				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	3 Level / 2 Semester				
5.	Pre –Requisite (if any):	Database system				
6.	Co –Requisite (if any):	Non				
7.	Program (s) in which the Course is Offered:	Bachelor of Information Technology				
8.	Language of Teaching the Course:	English/Arabic				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:					
11	Date and Number of Approval by Council:					

II. Course Description:

Database Management System aims to deepen students' understanding of advanced database management concepts, with a focus on applications within healthcare information technology. It covers database design optimization, indexing, query processing, transaction management, data security, and performance tuning to support large-scale health data requirements. The course emphasizes practical skills in managing and securing data for healthcare environments, equipping students to design solutions that enhance data integrity, support clinical operations, and meet regulatory standards.

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs		
	A. Knowledge and Understanding:	**I, P or M/A**		
a1			A1	
a2	Identify the specific data management needs of healthcare settings to design database solutions		A2	Identify user and Healthcare needs to provide IT based solutions to real-world problem.
a3	Demonstrate an understanding of advanced database tools and techniques for effective healthcare data management.		A3	Demonstrate a profound knowledge in utilizing and adapting IT tools, techniques, practices, and methods for solving computing problems in Health environment.
a4			A4	
	B. Cognitive/ Intellectual Skills:			
b1	Critically analyze healthcare-related database requirements and propose optimized solutions for data integrity and performance		B1	Critically analyse complex computing problems and propose appropriate information technology based solutions and integrate them effectively

				into the uses and organization Health.
b2	Assess the impact of database management decisions on healthcare objectives and regulatory compliance		B2	Analyze the impacts of computing on Health objectives and customer needs, and consider them during the analytical processing, selection, integration, configuration and administration of information systems
b3	Explore challenges in healthcare data storage, security, and retrieval to select the optimal database management approaches.		B3	Explore variety of challenges and problems related to Health Information Technology to select the optimal solution.
b4	Evaluate database management solutions in terms of healthcare-specific requirements and security standards.		B4	Evaluate IT based solution to meet a given set of Health requirements in the context of Health Information Technology discipline
	C. Practical and Professional Skills:			
c1			C1	
c2	Design, implement, and test secure and scalable database systems tailored to healthcare application needs.			design, implement, and test a computing-based solution to meet a given set of computing requirement in the context of Health Information Technology
c3	Apply systematic approaches to develop, secure, and manage databases that fulfill healthcare data goals and confidentiality requirements.			Use systematic approaches to select, develop, apply integrates, and administrate secure computing technologies to accomplish user and Health goals

c4	Utilize industry-standard database management tools and practices for managing healthcare data effectively		**C4**	Use current techniques, skills, and tools necessary for computing practices
	D. General and Transferable Skills:			
d1			**D1**	
d2			**D2**	
			D3	
d4	Engage in continuous learning of emerging database management tools and technologies relevant to healthcare.		**D4**	Engage in continuing professional development and lifelong learning as an IT professional
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

	(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1		▪	▪
a2	Identify the specific data management needs of healthcare settings to design database solutions	▪ Lectures ▪ Discussion ▪ Presentation ▪ Self-learning	▪ Written exam (mid and final terms and quizzes) ▪ Assignments
a3	Demonstrate an understanding of advanced database tools and techniques for effective healthcare data management.	▪ Lectures ▪ Discussion ▪ Presentation ▪ Self-learning	▪ Written exam (mid and final terms and quizzes)
a4		▪	▪
	(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning	**Teaching Strategies**	**Assessment Strategies**

	Outcomes		
b1	Critically analyze healthcare-related database requirements and propose optimized solutions for data integrity and performance	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments
b2	Assess the impact of database management decisions on healthcare objectives and regulatory compliance	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments
b3	Explore challenges in healthcare data storage, security, and retrieval to select the optimal database management approaches.	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments
b 4	Evaluate database management solutions in terms of healthcare-specific requirements and security standards.	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments
	(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
c1		▪	▪
c2	Design, implement, and test secure and scalable database systems tailored to healthcare application needs.	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments
c3	Apply systematic approaches to develop, secure, and manage databases that fulfill healthcare data goals and	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments

	confidentiality requirements.		
c4	Utilize industry-standard database management tools and practices for managing healthcare data effectively	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1		▪	▪
d2		▪	▪
d3		▪	▪
d 4	Engage in continuous learning of emerging database management tools and technologies relevant to healthcare.	▪ Lectures ▪ Tutorials ▪ Discussion ▪ Self-Learning	▪ Written exam (mid and final terms and quizzes) ▪ Final practical exam ▪ Assignments ▪ Research Reports

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction to Advanced DBMS Concepts	Review of basic DBMS concepts, healthcare-specific DB requirements	1	2	a2
2	Database Architecture and Design	Client-server architecture, distributed databases, DB design for healthcare	2	4	c2
3	SQL for Advanced Data Management	Advanced SQL queries, joins, triggers, stored procedures	2	4	c4
4	Healthcare Database Models	Hierarchical, network, relational, and object-oriented models	1	2	a3

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
5	Database Normalization	Normal forms, redundancy, dependency, healthcare data normalization	1	2	b1
6	Data Integrity and Security	Data integrity constraints, authentication, access control in healthcare	1	2	b2
7	Midterm Exam	Mid-Term Theoretical Exam	1	2	a2,a3,b1,b2,c2,c3,c4
8	Transactions and Concurrency Contro	ACID properties, concurrency issues, and control in healthcare environments	1	2	b4
9	Database Recovery	Backup techniques, recovery management, fault tolerance for critical healthcare systems	1	2	b3
10	Database Performance Tuning	Indexing, query optimization, caching, healthcare-specific performance requirements	1	2	b4
11	Big Data and NoSQL in Healthcare	Overview of big data, NoSQL databases, application to healthcare data management	2	4	c3
12	Database Project Presentation	Project presentation, feedback, real-world application discussion	1	2	d4
13	Final Exam	Comprehensive final assessment	1	2	a2,a3,b1,b2,b3,b4,c2,c3,c4,d4
Number of Weeks /and Units Per Semester			16	32	

B. Practical Aspect (Lab(/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Advanced SQL Queries Practice	2	4	c4
2	Healthcare Database Design Workshop	1	2	a2
3	Data Normalization and Integrity	1	2	b1
4	Security and Access Control Lab	2	4	b2
5	Mid-Term Practical Exam	1	2	a2,b1,b2,c4
6	Transactions and Concurrency Lab	1	2	b4
7	Database Recovery Exercise	1	2	b3
8	Performance Tuning Lab	2	4	b4
9	NoSQL Database Implementation	2	4	c3
10	Project Demonstration	1	2	d4
11	Practical Exam	1	2	a2,b1,b2,b3, b4,c3,c4,d4
Number of Weeks /and Units Per Semester		15	30	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1				
2				
3				
4				
5				
6				
7				
8				
9				

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
10				
11				
12				
13				
14				
Number of Weeks /and Units Per Semester				

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Exercises and Home Works, Problem Solving (I)	3	3	a2,a3,b1,b2
2	Exercises and Home Works, Problem Solving (II)	9	3	b3,b4,c2,c3,c4,d4
3	Technical Report and Presentation.	11	4	a2,a3,b1,b2,b3,b4,c2,c3,c4,d4
Total			10	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments	3,8,11	10	10 %	a2,a3,b1,b2,b3,b4,c2,c3,c4

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
2	Quizzes 1 & 2	6,12	5	5 %	a2,a3,b1,b2,b3,b4,c2,c3,c4
3	Mid-Term Theoretical Exam	9	10	10 %	a2,a3,b1,b2,c2,c3,c4
4	Mid-Term Practical Exam	7	5	5 %	a3,a2,a4,b3,c1,c4
5	Final Practical Exam including Project Presentation & Evaluation	15	10	10 %	a2,b1,b2,b3, b4,c3,c4,d4
6	Final Theoretical Exam	16	60	60 %	a2,a3,b1,b2,b3,b4,c2,c3,c4,d4
Total			100	100%	

IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, Title, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two):

1. Elmasri, R., & Navathe, S. (2020). Fundamentals of Database Systems. 7th Edition. United States: Pearson Education.
2. Coronel, C., Morris, S., & Rob, P. (2021). Database Systems: Design, Implementation, & Management. 13th Edition. United Kingdom: Cengage Learning.

2- Essential References:

1. Ramakrishnan, R., & Gehrke, J. (2022). Database Management Systems. 4th Edition. United States: McGraw-Hill.
2. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). Database System Concepts. 7th Edition. United States: McGraw-Hill.
3. Connolly, T., & Begg, C. (2019). Database Systems: A Practical Approach to Design, Implementation, and Management. 6th Edition. United Kingdom: Pearson Education.

3- Electronic Materials and Web Sites etc.:

Websites:

1. HealthIT.gov. *Database Management for Health IT*. Available at: https://www.healthit.gov

2. HIMSS (Healthcare Information and Management Systems Society). *Health Data Management*. Available at: https://www.himss.org

3. *Database Journal*. "Database Articles and Tutorials." Available at: https://www.databasejournal.com

Journals:

1. Smith, J., & Brown, A. (2023). "Advancements in Healthcare Database Systems." *Journal of Health Informatics*, 29(4), 123-135.

2. Li, W., & Zhang, L. (2022). "Database Security in Medical Information Systems." *International Journal of Medical Informatics*, 165, 101423.

Other Web Sources:

1. Khan Academy. *Advanced SQL Queries*. Available at: https://www.khanacademy.org

2. EdX. *Healthcare IT and Database Management*. Available at: https://www.edx.org

X. Course Policies: (Based on the Uniform Students' By law (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:**

	Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Republic of Yemen
Ministry of Higher Education & Scientific Research
University: 21 September University for Medical & Applied Sciences

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة: جامعة 21سبتمبر للعلوم الطبية والتطبيقية

Faculty of Medical Technology

Department of Medical Information Technology

Program of Medical Information Technology

Course Plan (Syllabus) of

Database management system

Course Code. 07.01. 734

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:		Office Hours						
Location& Telephone No.:								
E-mail:		SAT	SUN	MON	TUE	WED	THU	

2024

II. Course Identification and General Information:

1.	Course Title:	Database management system				
2.	Course Code:	07.01. 734				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	3 Level / 2 Semester				
5.	Pre –Requisite (if any):	Database system				
6.	Co –Requisite (if any):	Non				
7.	Program (s) in which the Course is Offered:	Bachelor of Information Technology				
8.	Language of Teaching the Course:	English/Arabic				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:					
11	Date and Number of Approval by Council:					

III. Course Description:

Database Management System aims to deepen students' understanding of advanced database management concepts, with a focus on applications within healthcare information technology. It covers database design optimization, indexing, query processing, transaction management, data security, and performance tuning to support large-scale health data requirements. The course emphasizes practical skills in managing and securing data for healthcare environments, equipping students to design solutions that enhance data integrity, support clinical operations, and meet regulatory standards.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

	A. Knowledge and Understanding:
a1	
a2	Identify the specific data management needs of healthcare settings to design database solutions
a3	Demonstrate an understanding of advanced database tools and techniques for effective healthcare data management.
a4	
	B. Cognitive/ Intellectual Skills:
b1	Critically analyze healthcare-related database requirements and propose optimized solutions for data integrity and performance
b2	Assess the impact of database management decisions on healthcare objectives and regulatory compliance
b3	Explore challenges in healthcare data storage, security, and retrieval to select the optimal database management approaches.
b4	Evaluate database management solutions in terms of healthcare-specific requirements and security standards.
	C. Practical and Professional Skills:
c1	
c2	Design, implement, and test secure and scalable database systems tailored to healthcare application needs.
c3	Apply systematic approaches to develop, secure, and manage databases that fulfill healthcare data goals and confidentiality requirements.
c4	Utilize industry-standard database management tools and practices for managing healthcare data effectively
	D. General and Transferable Skills:

d1	
d2	
d4	Engage in continuous learning of emerging database management tools and technologies relevant to healthcare.
I= Introduced, P=Practiced or M/A= Mastered/Advanced	

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction to Advanced DBMS Concepts	Review of basic DBMS concepts, healthcare-specific DB requirements	1	2	a2
2	Database Architecture and Design	Client-server architecture, distributed databases, DB design for healthcare	2	4	c2
3	SQL for Advanced Data Management	Advanced SQL queries, joins, triggers, stored procedures	2	4	c4
4	Healthcare Database Models	Hierarchical, network, relational, and object-oriented models	1	2	a3
5	Database Normalization	Normal forms, redundancy, dependency, healthcare data normalization	1	2	b1
6	Data Integrity and Security	Data integrity constraints, authentication, access control in healthcare	1	2	b2
7	Midterm Exam	Mid-Term Theoretical Exam	1	2	a2,a3,b1,b2,c2,c3,c4
8	Transactions and Concurrency	ACID properties, concurrency issues, and control in healthcare environments	1	2	b4

	Contro				
9	Database Recovery	Backup techniques, recovery management, fault tolerance for critical healthcare systems	1	2	b3
10	Database Performance Tuning	Indexing, query optimization, caching, healthcare-specific performance requirements	1	2	b4
11	Big Data and NoSQL in Healthcare	Overview of big data, NoSQL databases, application to healthcare data management	2	4	c3
12	Database Project Presentation	Project presentation, feedback, real -world application discussion	1	2	d4
13	Final Exam	Comprehensive final assessment	1	2	a2,a3,b1 ,b2,b3,b 4,c2,c3, c4,d4
Number of Weeks /and Units Per Semester			**16**	**32**	

B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Advanced SQL Queries Practice	2	4	c4
2	Healthcare Database Design Workshop	1	2	a2
3	Data Normalization and Integrity	1	2	b1
4	Security and Access Control Lab	2	4	b2
5	Mid-Term Practical Exam	1	2	a2,b1,b2,c4
6	Transactions and Concurrency Lab	1	2	b4
7	Database Recovery Exercise	1	2	b3
8	Performance Tuning Lab	2	4	b4
9	NoSQL Database Implementation	2	4	c3
10	Project Demonstration	1	2	d4
11	Practical Exam	1	2	a2,b1,b2,b3,

				b4,c3,c4,d4
Number of Weeks /and Units Per Semester		15	30	

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
Number of Weeks /and Units Per Semester				

VI. Teaching Strategies of the Course:

Knowledge and Understanding Skills is developed through:

- Lectures
- Discussion
- Presentation
- Self-learning

Intellectual Skills are developed through:

- Lectures
- Tutorials
- Discussion
- Case studies (CBL)
- Self-Learning
- Problem Based Learning (PBL)

Practical and professional Skills are developed through:

- Tutorials
- Training
- Case studies (CBL)
- Problem Solving Learning (PSL)
- Problem Based Learning (PBL)

General/Transferrable Skills are developed through:

- Discussion
- Case studies (CBL)
- Self-Learning
- Presentation

VII. Assessment Methods of the Course:

- Written exam (mid and final terms and quizzes),
- Final practical exam

Assignments

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Exercises and Home Works, Problem Solving (I)	3	3
2	Exercises and Home Works, Problem Solving (II)	9	3
3	Technical Report and Presentation.	11	4
Total			10

IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	3,8,11	10	10 %
2	Quizzes 1 & 2	6,12	5	5 %
3	Mid-Term Theoretical Exam	9	10	10 %
4	Mid-Term Practical Exam	7	5	5 %
5	Final Practical Exam including Project Presentation & Evaluation	15	10	10 %
6	Final Theoretical Exam	16	60	60 %
Total			100	100%

X. Learning Resources:

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7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.