

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
Big Data Analytics
Course Code. (07.01. 730)

2024



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

Prepared by:
Dr. Malek Algabri

Reviewed by:
Dr. ----

Head of the Department:

Quality Unit:

Dean

I. General Information:

1.	Course Title:	Big Data Analytics				
2.	Course Code:	07.01. 730				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		2	2	--	---	--
4.	Level/ Semester at which this Course is offered:	Level 4/ Semester 1				
5.	Pre –Requisite (if any):					
6.	Co –Requisite (if any):	non				
7.	Program (s) in which the Course is Offered:	Bachelor of Medical Information Technology				
8.	Language of Teaching the Course:	English				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:	Dr. Malek Algabri				
11	Date and Number of Approval by Council:					

II. Course Description:

This course introduces the characteristics of medical data and associated data mining challenges on dealing with such data. cover various algorithms and systems for big data analytics. This course focus on studying those big data techniques in the context of concrete healthcare analytic applications such as predictive modeling, computational phenotyping, and patient similarity.

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	Identify and describe the various healthcare informatics and analytics concepts.		A1	Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to Health Information Technology discipline. .
a2	Identify and describe research methodologies, cultural relevance and research, and international classification disease.		A4	Demonstrate a sound understanding the computing concept related to analysis, design, implementation, and evaluation of Health information system.
			A3	
B. Intellectual Skills:				
b1	Explain healthcare data and methods of collecting.		B3	Explore variety of challenges and problems related to Health Information Technology to select the optimal solution
b2	Identify, describe and apply foundational mathematical and statistical concepts and operations, including the application of tools such as R, SQL and Python languages, that underlie data sourcing, management, analysis and interpretation		B4	Evaluate IT based solution to meet a given set of Health requirements in the context of Health Information Technology discipline
			B3	
C. Professional and Practical Skills:				
c1	Program and evaluate healthcare informatics and analytics code.		C2	design, implement, and test a computing-based solution to meet a given set of computing requirement in the context of Health Information Technology
c2	Apply and Evaluate healthcare analytics		C3	Use systematic approaches to

				select, develop, apply integrates, and administrate secure computing technologies to accomplish user and Health goals.
			C3	
D. Transferable Skills:				
d1	demonstrate healthcare analytics effective communication and negotiation skills		D2	Commit to professional ethics, responsibilities, and norms of professional IT practices
d2			D3	
			D3	
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	Identify and describe the various healthcare informatics and analytics concepts.	<ul style="list-style-type: none"> ▪ Lectures, Interactive class ▪ discussions, Tutorials. 	<ul style="list-style-type: none"> ▪ Written exams, assignment ▪ work, quizzes, submission of reports
a2	Identify and describe research methodologies, cultural relevance and research, and international classification disease.		
a3		▪	▪
(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
b1	Explain healthcare data and methods of collecting.	<ul style="list-style-type: none"> ▪ Lectures, Tutorial, Interactive class 	<ul style="list-style-type: none"> ▪ Written exams, Project, Case

b2	Identify, describe and apply foundational mathematical and statistical concepts and operations, including the application of tools such as R, SQL and Python languages, that underlie data sourcing, management, analysis and interpretation	<ul style="list-style-type: none"> ▪ discussions, and group work, ▪ presentation 	<ul style="list-style-type: none"> ▪ studies and assignment work.
	...	▪	▪
(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	Program and evaluate healthcare informatics and analytics code.	<ul style="list-style-type: none"> ▪ Short lectures, case study, Laboratory ▪ experiments, Project, and group work, ▪ Field training, Drawing sessions 	<ul style="list-style-type: none"> ▪ Written exams, quizzes, Practical ▪ exam assignment and report ▪ submission
c2	Apply and Evaluate healthcare analytics		
	...	▪	▪
		▪	▪
(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:			
	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	demonstrate healthcare analytics effective communication and negotiation skills	<ul style="list-style-type: none"> ▪ Group work, Self-study, Interactive ▪ class discussions, Tutorials, Seminar/ ▪ project/presentation, Laboratory ▪ experiments, Project, and Art Gallery 	<ul style="list-style-type: none"> ▪ Project presentation, Laboratory ▪ exam, Report/Project
d2			
	...	▪	▪

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Understanding of From Data to Big Data and the difference between data and big data	- Intro to big data and analytics	1	2	a1,a2
2	Big Data: A Revolution that Changes the Game	- Workshop: with Python and introduction to analyse big data in Hadoop environment	1	2	a1,a2
3	Big Data Analytics	- Multiple linear regression using MS excel and Installing Anaconda function	1	2	a1,a2,b1
4	Applications of big data analytics	- Familiarities with Anaconda environment for analytics applications	1	2	a1,a2,b2,d1
5	Processes of big data analytics	- Practical Exercise - Random Forest, SVM	1	2	a1,a2,b1,b2,d1
6	Machine learning for big data analytics	- Practical Exercise - Decision Tree, Random Forest - Naive Bayes			
7	Mid team	- Mid team exam	1	2	b1,b2,c1
8	Supervised versus	- Practical Exercise – Gradient Boosting	1	2	b1,b2,c1,d1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	Unsupervised Algorithms	- K-Nearest Neighbour			
9	Supervised versus Unsupervised Algorithms for examples	- Practical Exercise – Logistic Regression - Support Vector Machine	1	2	b1,b2,c1 ,d1
10	Applications and Examples of Big data analytics	- Practical Exercise – - Logistic Regression, Support Vector Machine	1	2	b1,b2,c1 ,d1
11	Predictive Analytics and applications	- Practical Exercise - Support Vector Machine	1	2	a1,a2, b1,b2,c1 ,d1
12	Augmented Analytics	- Practical Exercise - Deep learning methods	1	2	a1,a2, b1,b2,c1 ,d1
13	Future applications (Industry and Society) for Analytics	- Practical Exercise - Deep learning methods	1	2	a1,c1,c2 , b1,b2,c1 ,d1
14	Revision	- Revision activities and exam preparation	1	2	a1,c1,c2 , b1,b2,c1 ,d1
15	Slected topic in Big data analytics	- Slected topic in Big data analytics	1	2	a1,c1,c2 , b1,b2,c1 ,d1
16	Final Theoretical Exam	- Final Exam	1	2	a1,a2, a1,c1,c2 , b1,b2,c1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
					,d1
Number of Weeks /and Units Per Semester			16	32	

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Ideation Assignment	1-10	5	a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
2	Assignment 2: Ideation Presentation	2-12	5	a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
3	Assignment 3: Class Attendance and Participation	Every unit	5	a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
4	In-Class Assignments, Activities & Homework	2-12	5	a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
Total				

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	1-12	20		a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
2	Mid-Term Theoretical Exam	7-8	20		a1,a2,b1,b2,d1,d2
3	Final Theoretical Exam	16	60		a1,a2, a1,c1,c2, b1,b2,c1,d1,d2
Total			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):
<p>1- Akash Kumar Bhoi (editor), Ranjit Panigrahi (editor), Victor Hugo C. de Albuquerque (editor), Rutvij H. Jhaveri , Healthcare Big Data Analytics: Computational Optimization and Cohesive Approaches (Intelligent Biomedical Data Analysis, 10), Walter de Gruyter, Year: 2024, ISBN: 3110750732,9783110750737</p> <p>2- Sedkaoui, Soraya, Data analytics and big data, ISTE Ltd / John Wiley & Sons, Inc, Year: 2018, ISBN: 978-1-78630-326-4,1786303264</p>
2- Essential References:
<p>1- Dr. Jugnesh Kumar, Dr. Anubhav Kumar, Dr. Rinku Kumar, Big Data and Analytics: The key concepts and practical applications of big data analytics, BPB Publications, Year: 2024</p> <p>2- Ümit Demirbaga, Gagangeet Singh Aujla, Anish Jindal, Oğuzhan Kalyon, Big Data Analytics, Springer, Year: 2024 ,ISBN: 9783031556388,9783031556395</p> <p>3- Ulrich Matter, Big Data Analytics: A Guide to Data Science Practitioners Making the Transition to Big Data, CRC Press/Chapman & Hall, Year: 2023 ,ISBN: 1032457554,9781032457550</p>
3- Electronic Materials and Web Sites etc.:
<p>Websites:</p> <p>1- https://sunlab.org/teaching/cse6250/spring2024/</p> <p>2- https://www.ee.columbia.edu/~cylin/course/bigdata/</p>

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.

Faculty of Medical Technology

Department of Medical Information Technology

Program of Medical Information Technology

Course Specification of

Big Data Analytics

Course Code. (07.01. 730)

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./2025.

II. Course Identification and General Information:

	Course Title:	Big Data Analytics				
	Course Code:	07.01. 730				
	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	Clinical
			Lecture	Tutorial/ Seminar	Lab	
		2	2	--	---	-
	Level/ Semester at which this Course is offered:	Level 4/ Semester 1				
	Pre –Requisite (if any):					
	Co –Requisite (if any):	non				
	Program (s) in which the Course is	Bachelor of Medical Information				

	Offered:	Technology
	Language of Teaching the Course:	English
	Location of Teaching the Course:	Faculty of Medical Technology
	Prepared by:	Dr. Malek Algabri
11	Date and Number of Approval by Council:	

III. Course Description:

This course introduces the characteristics of medical data and associated data mining challenges on dealing with such data. cover various algorithms and systems for big data analytics. This course focus on studying those big data techniques in the context of concrete healthcare analytic applications such as predictive modeling, computational phenotyping, and patient similarity.

IV. Course Intended Learning Outcomes (CILOs) :

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

	A. Knowledge and Understanding:
a1	Identify and describe the various healthcare informatics and analytics concepts.
a2	Identify and describe research methodologies, cultural relevance and research, and international classification disease.
	B. Intellectual Skills:
b1	Explain healthcare data and methods of collecting.
b2	Identify, describe and apply foundational mathematical and statistical concepts and operations, including the application of tools such as R, SQL and Python languages, that underlie data sourcing, management, analysis and interpretation
	C. Professional and Practical Skills:
c1	Program and evaluate healthcare informatics and analytics code.
c2	Apply and Evaluate healthcare analytics

D. Transferable Skills:	
d1	demonstrate healthcare analytics effective communication and negotiation skills
d2	
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
1	Understanding of From Data to Big Data and the difference between data and big data	– Intro to big data and analytics	1	2
2	Big Data: A Revolution that Changes the Game	– Workshop: with Python and introduction to analyse big data in Hadoop environment	1	2
3	Big Data Analytics	– Multiple linear regression using MS excel and Installing Anaconda function	1	2
4	Applications of big data analytics	– Familiarities with Anaconda environment for analytics applications	1	2
5	Processes of big data analytics	– Practical Exercise -Random Forest, SVM	1	2
6	Machine learning for big data analytics	- Practical Exercise - Decision Tree, Random Forest Naive Bayes		

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
7	Mid team	– Mid team exam	1	2
8	Supervised versus Unsupervised Algorithms	- Practical Exercise – Gradient Boosting – K-Nearest Neighbour	1	2
9	Supervised versus Unsupervised Algorithms for examples	- Practical Exercise – Logistic Regression – Support Vector Machine	1	2
10	Applications and Examples of Big data analytics	- Practical Exercise – – Logistic Regression, Support Vector Machine	1	2
11	Predictive Analytics and applications	– Practical Exercise - Support Vector Machine	1	2
12	Augmented Analytics	Practical Exercise - Deep learning methods	1	2
13	Future applications (Industry and Society) for Analytics	Practical Exercise - Deep learning methods	1	2
14	Revision	Revision activities and exam preparation	1	2
15	Sleeted topic in Big data analytics	Sleeted topic in Big data analytics	1	2
16	Final Theoretical Exam	Final Exam	1	2
Number of Weeks /and Units Per Semester			16	32

VI. Teaching and Learning Strategies of the Course:

- Interactive lectures,
- Problem solving,
- Tutorials,
- Seminar/ Project/Presentation,
- Teamwork,
- Laboratory based session,
- Interactive Class Discussions,
- Directed Self- Study,
- Exercises and Home Works,
- Field Visits.

VII. Assessment Methods of the Course:

- Coursework Activities
- Written tests
- Written assessments such as multiple-choice questions and Quizzes
- Report/Project/ Practical Lab Sessions
- Home works and assignments.
- Presentations

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Ideation Assignment	1-10	5
2	Assignment 2: Ideation Presentation	2-12	5
3	Assignment 3: Class Attendance and Participation	Every unit	5
4	In-Class Assignments, Activities & Homework	2-12	5
Total			

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments	1-12	20	
2	Mid-Term Theoretical Exam	7-8	20	
3	Final Theoretical Exam	16	60	
Total			100	

X. Learning Resources:

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

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

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Sedkaoui, Soraya, Data analytics and big data, ISTE Ltd / John Wiley & Sons, Inc, Year: 2018, ISBN: 978-1-78630-326-4,1786303264

2- Essential References:

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- 1- Ümit Demirbaga, Gagangeet Singh Aujla, Anish Jindal, Oğuzhan Kalyon, Big Data Analytics, Springer, Year: 2024 ,ISBN: 9783031556388,9783031556395
- Ulrich Matter, Big Data Analytics: A Guide to Data Science Practitioners Making the Transition to Big Data, CRC Press/Chapman & Hall, Year: 2023 ,ISBN: 1032457554,9781032457550

3- Electronic Materials and Web Sites etc.:

Websites:

<https://sunlab.org/teaching/cse6250/spring2024/>

<https://www.ee.columbia.edu/~cylin/course/bigdata/>

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