Republic of Yemen
Minstry of Higher
Education &Sientific Research
21 september University – for Medical and Applied Science
Faculty of Medical Technology
Department of AI & DS

الجمهورية اليمنية
وزارة التربية والتعليم والتعليم العالي والبحث العلمي
جامعة 21 سبتمبر للعلوم الطبية والتطبيقية
كلية التكنلوجيا الطبية
قسم الذكاء الاصطناعي وعلم البيانات

Artificial Intelligence & Data Science, B.Sc. (Hons.)

Program Specifications

Preparation Committee:

Dr. Abdulrahman Mohemmed Obaid	Chairman	_____
Dr. Gameil Saad Hamzh	Member	_____
Dr. Hamzah Ali Abdulrahman Qasem	Member	_____
Dr. Awadh Ali Abdo Mohammed	Member	_____

2025/2026

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1. Program Identification and General Information:		
1	**Scientific name of the program:**	B.Sc. (Hons.) in Artificial Intelligence & Data Science
2	**Total credit hours required to award the degree**	137 Credit Hours
3	**Number of years needed for completion of the program:**	4 Years
4	**The body responsible for granting the degree:**	21 September University of Medical and Applied Sciences
5	**The body responsible for the program:**	**Department** of Information Technology
6	**Award granted on completion of the program:**	**Bachelor of** Science in Artificial Intelligence & Data Science (Hons.)
7	**Study system:**	Regular attendance (Semester based System)
8	**Study Language of the Program:**	English
9	**Entry requirements:**	Secondary School Certificate (Scientific)
10	**Departments participating in the program:**	Department of Information Technology
11	**Starting year of the program:**	2025/2026
12	**Study methods in the program:**	Full time
13	**Location of Delivery:**	Faculty of Medical Technology 21 UMAS University Campus
14	**The program resources:**	21 September University of Medical and Applied Sciences
15	**Minimum grade requirements:**	Following the Admission Rules made by Ministry of Higher Education and Scientific Research- Republic of Yemen.
16	**Other admission requirements:**	21 UMAS Admission and Regulations Rules.
17	**Date of current development of the program:**	Mar 2025
18	**Prepared by:**	1. Dr. Abdulrahman Mohemmed Obaid 2. Dr. Gameil Saad Hamzh 3. Dr. Hamzah Ali Abdulrahman Qasem 4. Dr. Awadh Ali Abdo Mohammed
19	**Program coordinator:**	Dr. Gameil Saad Hamzh

5. Introduction:

Artificial Intelligence and Data Science is a rapidly growing area of IT, which already finds its application in almost every area of life. In the age of knowledge, information, and data, the medical and industrial sector is becoming very demanding for both the production of the technologies and the manpower to utilize these technologies.

The Faculty of Medical Technology at the 21 September University of Medical and Applied Sciences (21UMAS) addressed this demand and therefore established a program specially designed for that purpose. Artificial Intelligence and Data Science program focuses on the theoretical knowledge that is necessary for the students, and the practical side that is imperative to crystallize the theoretical knowledge. Therefore, the program was engineered by experts in the Artificial Intelligence and Data Science so that our graduate will be equipped with a combination of theories and practices of Data Sciences and Artificial Intelligence.

Promising Jobs:

1- Machine Learning Engineer
2- Data Architect
3- Statistician
4- Data Analyst
5- Data Scientist
6- Smart System Developer
7- Big Data Engineer/Data Engineer

6. University Vision, Mission, Values, Objectives, and Goals:

University Vision:

A Contemporary University with National Responsibility and Faith Identity.

University Mission:

Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.

University Core values:

- Leadership and Influence
- Excellence and Innovation
- Work effectively with a time

University Objectives:

1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service.

2- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work.

3- Attracting and Employing scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens.

4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally.

5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.

7. Faculty Vision, Mission, Values, and Objectives:

Faculty Vision:

A contemporary medical technology faculty with sober academic dimensions, national responsibility and faith identity.

Faculty Mission:

Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.

Faculty Values:

- Fore fronting
- Pioneering
- Sobriety

Faculty Objectives:

1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service.
2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work.
3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens.
4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market.
5- Enhance the university and college position as an ideal partner for the academic and health sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.

8. Department Vision, Mission, and Objectives :

Department Vision:

To be a leading department in Artificial Intelligence and Data Science, shaping the future of Artificial Intelligence through innovative and impactful data-driven solutions that enhance technology fields, contribute to national development, and uphold values of integrity and social responsibility.

Department Mission:

To empower students with the technical skills and ethical grounding needed to lead in the field of data-driven Artificial Intelligence and Data Science solutions, contributing to the advancement of technology in Yemen and beyond.

Department Objectives:

1- **Academic Excellence**: Apply rigorous quality standards in Artificial Intelligence and Data Science education, research, and community service to establish a department known for academic excellence in technology sciences.

2- **Student-Centric Education**: Prioritize students in the educational process by fostering an environment of engagement, personal development, and lifelong learning, preparing them for meaningful careers in the field of data science.

3- **Talent Attraction**: Attract and develop highly skilled professionals and scholars in Artificial Intelligence and Data Science who will contribute to the academic, technological, and economic growth of the all sector and the wider community.

4- **State-of-the-Art Infrastructure**: Leverage modern infrastructure, academic resources, and research centers to enhance the educational and research outcomes in Artificial Intelligence and Data Science, ensuring that graduates are well-equipped to meet the evolving needs of the all sector.

5- **Partnership and Collaboration**: Strengthen the department's position as an ideal partner for both academic and healthcare institutions at local, regional, and international levels, fostering collaborations that lead to innovative AI solutions through data science and artificial intelligence.

9. Artificial Intelligence and Data Science Program Mission and Objectives:

Program Mission:

To equip students with the advanced knowledge and skills necessary to drive the technological transformation of AI and data science, focusing on integrated solutions and creative research to meet the evolving needs of the Yemeni digital sector and contribute to regional development.

Program Educational Objectives:

POE1. Prepare Graduates for Successful Careers: Equip students with the technical, analytical, and problem-solving skills necessary to excel in the rapidly evolving field of Artificial Intelligence and Data Science, ensuring they are prepared to contribute meaningfully to the workforce and technological advancements.

POE2. Foster Innovation and Research: Encourage students to engage in innovative research and apply AI and data science techniques to real-world challenges, thus enabling them to make valuable contributions to the development of AI-driven solutions within various sectors in Yemen and globally.

POE3. Promote Ethical and Social Responsibility: Instill in students a strong sense of ethical responsibility, ensuring they approach AI and data science solutions with integrity and in a way

that benefits society as a whole, contributing to the responsible use of technology for the greater good.

POE4. Encourage Lifelong Learning and Professional Development: Develop students' abilities to continue learning and evolving throughout their careers by providing them with the tools and foundation necessary to stay current with emerging AI and data science trends, fostering a mindset of continuous improvement and professional growth.

POE5. Strengthen Collaborative Partnerships: Equip students with the skills to collaborate effectively with professionals across sectors, both locally and globally, fostering partnerships that promote the advancement of AI solutions and drive meaningful technological innovations within industries and society.

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty.

10. Program Standards & Benchmarks:

Academic Standards:

1. Since, there are no specific advance standards such as (NARS or ABET) for Data science and AI program. Therefore, some points have been taken from NARS for computing, Yemen, First Edition, Council for Accreditation & Quality Assurance, Yemen, May 2018, such as for graduate attributes and teaching strategies because of some similarities.

Governmental Rules and Regulations:

1. Act No. 13/2005 of the Law of state universities, higher institutes and colleges, Yemen.
2. The executive regulations of Act No. 13/2005 of the Law of state universities, higher institutes and colleges, Yemen.
3. 21 September University of Medical and Applied Sciences (21 UMAS) Rules and Regulations.

Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Program Benchmarks *:

1. Bachelor of Science in Data Science and Artificial Intelligence, Department of Data Science and Artificial Intelligence, Al-Ahliyya Amman University, Jordan
   https://fit.ammanu.edu.jo/En/ProgramIntro.aspx?id=13&17
2. BSc (Hons) Data Science and Artificial Intelligence, Department of Engineering and Computing, University of East London, UK
   https://www.uel.ac.uk/undergraduate/courses/bsc-hons-data-science-artificial-intelligence
3. Bachelor of Applied Science in Data Science and, Artificial Intelligence, Department of Data Science, Princess Sumaya University for Technology, Jordan

https://psut.edu.jo/content/first-its-kind-jordan-bachelor-data-science-and-artificial-intelligence-psut

4. BSc (Hons) Data Science and Artificial Intelligence, Department of Computer Science, University of Applied Sciences and Arts of Italian Switzerland (SUPSI), Switzerland
   https://www.supsi.ch/dti_en/bachelor/data-science-ai.html
5. BSc (Hons) Data Science and Artificial Intelligence, Department of Data Science and Knowledge Engineering, Maastricht University, Netherland
   https://www.maastrichtuniversity.nl/education/bachelor/data-science-and-artificial-intelligence
6. BSc (Hons) Data Science and Artificial Intelligence, Department of Sciences, Nanyang University, Singapore
   https://www.ntu.edu.sg/index

* There is no any information found about national program of Data science and Artificial Intelligence.

11. Graduate Attributes:

After successfully completing the program, the graduate should be able to:

1. Apply mathematics foundation, programming fundamentals and Artificial Intelligence and Data Science knowledge and skills to get solutions to complex discipline-related problems.
2. Identify and analyze computing problems using computational approaches, methods, tools and techniques.
3. Analyze, design, implement, evaluate, and manage computing-based solutions to computing problems in the context of Artificial Intelligence and Data Science discipline to meet the users and organizations goals and objectives.
4. Develop and use effective interpersonal skills to work effectively as a part of the team as well as any other role within the team to perform a required task in a variety of professional contexts.
5. Use efficient project management, research capability, leadership, communication, interpersonal relationships and life-long learning skills.
6. Communicate effectively Artificial Intelligence and Data Science concepts within a multidisciplinary and professional context.
7. Demonstrate commitment to ethical, legal, security, political, and social responsibilities and issues as professionals in computing practice.
8. Demonstrate interest to commence postgraduate studies in Artificial Intelligence and Data Science and related fields.

12. Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of the Program, graduates should be able to:

A1. Demonstrate a deep knowledge of the essential facts, concepts, principles and theories related to the fundamental sciences and the field of Artificial Intelligence and Data Science.

A2. Identify the recent trends of technology and its impacts on the individuals, organizations and society in the area of Artificial Intelligence and Data Science.

A3. Describe the principles of various programming skills, and knowledge of computing that leads to exercise critical judgement for solving real world computing problems

A4. Review of the recent models, techniques, tools and technologies to produce solutions relevant to the domain of Artificial Intelligence and Data Science to meet a set of agreed requirements.

A5- Define an awareness of the social, professional, ethical and legal issues involved in the use of computer and intelligent systems that will continue to challenge researchers in the future

B. Cognitive/ Intellectual Skills:

Upon successful completion of the program, graduates should be able to:

B1. Critically analyze complex computing problems using the basic concepts, principles, analytical and mathematical models, algorithms and software tools related to the field of Artificial Intelligence and Data Science.

B2. Evaluate emerging data analysis technologies and their application to different types and amounts of data related to Artificial Intelligence and Data Science.

B3. Select an appropriate model/framework for developing and managing intelligent-based solutions.

B4. Evaluate a computing-based solution in the context of Artificial Intelligence and Data Science and related disciplines.

C. Practical and Professional Skills:

Upon successful completion of the program, graduates should be able to:

C1. Apply computer science theory, Artificial Intelligence and Data Science, and software development fundamentals to design and develop intelligent-based solutions.

C2. Design, implement, and test a computing-based solution to meet a given set of computing requirements in the context of Artificial Intelligence and Data Science.

C3. Deploy effectively computing tools and techniques used for the construction and documentation of intelligent applications of varying complexity.

C4. Utilize and adapt computing tools techniques and intelligent- based systems to meet desired needs.

D. General and Transferable Skills:

Upon successful completion of the program, graduates should be able to:

D1. Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the Artificial Intelligence and Data Science discipline to accomplish a common goal.

D2. Commit to professional ethics, responsibilities, and norms of professional computing practices.

D3. Communicate effectively in writing and verbally in a variety of professional contexts.

D4. Engage in continuing professional development and lifelong learning as a computing professional.

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks)

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and

Annex- 6, Alignment of Program Intended Learning Outcomes (PILOs) to the Faculty Objective

Annex- 8, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)Annex- 9, Mapping of Program Objectives to the Faculty Mission

Annex- 10, Mapping Program Objectives to the Department Mission

Annex- 11, Mapping of Program Objectives (POs) to the Department Objectives

Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International Universities.

13. Teaching and Learning Strategies:

- Lectures/ Interactive lectures,
- Tutorials,
- Discussion/Interactive Class Discussions,
- Illustrations,
- Brainstorming,
- Videos Demonstrations,
- Seminar/ Project/ Presentation
- Case studies,
- Exercises and Homework,
- Laboratory/Practical Experiments-based Session /Simulations
- Computer Laboratory-based Sessions,
- Workshops Practices,
- Directed Self-Study,
- Problem Based Learning,

- Team work (Cooperative Learning),
- Field Visits/Training,
- Online Activities
- Minor/Major Project

Teaching Strategy	Description
Lecture/ Interactive lecture	These are lecture/interactive lectures weekly conducted in the class and supported with variety of teaching formats including, lectures and multimedia presentations, use of whiteboard to solve examples and illustrating different tasks and problems introduced by the presentation, and class discussions, in which concepts, approaches, and case studies are presented, explored, and shown students what they need to know.
Problem solving	This allows students to become more active in their learning as they work out which information, they need to find out how to solve a particular problem.
Tutorials	Tutorial classes are provided to create a stimulating environment for students to work through examples, exercises and case studies. Tutorials include worksheets of carefully-designed questions that make students to think about challenging subjects. They are designed to be used after a brief lecture in which students work in pairs or groups.
Seminar/ Project/Presentation	In each course, different projects which cover a variety tasks in the course will be prepared by the teacher and assigned to different student's groups. Moreover, the teacher needs to set advance work for a selected number of students and then have the selected students present their work to the whole group, for discussion, criticism and suggestions for improvement. Seminar sessions and presentations provide an opportunity to address questions, queries and problems.
Team work (Cooperative Learning)	Group learning involves a large or small group activity that encourages students to focus on a topic and contribute to the overall project. Students then learn practically the team work skills such as dividing the tasks, leading or working with team members, planning, sharing knowledge clearly, time scheduling, searching, reporting, presenting, and resources management, etc.
Laboratory/Practical Experiments-based Sessions/ Simulations	During laboratory sessions, students will be given experiments to work in groups where they can apply and verify the theories and principles gained. This provides them the opportunity to have hands-on experience to design and conduct experiments in addition to analyzing, interpreting resulted data obtained from experiments, and maximize their learning through actual simulation
Interactive Class Discussions	Interactive class discussions are carried out about some aspects, related to the subject. It involves a large or small group activity that encourages students to

Teaching Strategy	Description
	focus on a topic and contribute to the free flow of ideas. The teacher may begin a brainstorming session by posing a question or a problem, or by introducing a topic. Students then express possible answers, relevant words and ideas
Directed Self-Study	Students are encouraged to undertake independent study to both supplement and consolidate what are being learned.
Exercises and Home Works	Students are given special tasks, exercises, puzzles, and activities during the class or at homes. Students are exposed to and use many skills throughout this strategy such as developing their way of thinking and solving exercises and puzzles, cognition, and use of different searching strategies.
Field Visits/ Training	The students are assigned to perform a site visit to acquire field related information.
Illustrations	Illustrations performing an activity so that learners can observe how it is done in order to help prepare learner to transfer theory to practical application. Moreover, this strategy involves the teacher showing learners how to do something
Brainstorming	It is a process for generating multiple ideas/options in which judgment is suspended until a maximum number of ideas has been generated. It is a common teaching approach that is often used by organizing a meeting of a group of students in a round circle, so that students combined focus their thinking on solving a problem in creative ways, and this strategy is usually followed in educational meetings and work sessions to stimulate students, their thinking and discussion.
Computer laboratory-based Sessions	Practical Applications using a variety of simulations software before the real design and implementation. A variety of web-based searches students will be assigned to learn how they can search for solutions using the Web.
Problem based Learning	This allows students to become more active in their learning as they work out to select which information, they need to find out how to solve a particular problem. They can work out a problem collaboratively, practice research as well as testing different components to come up with a valid solution.
Online Activities	For every unit covered in each course, students will be given opportunities to complete interactive learning activities including discussion forums, quizzes and problem-solving activities through the e-platform.
Minor/Major Project	Minor projects are usually associated with the practical parts of some courses. Major project is the graduation project in which students will apply the theoretical knowledge and practical skills to formulate a project under a supervision of a faculty member.
Case Studies	To be taken in selected subject to be aware regarding the courses.

14. Assessment Methods:

- Written Tests (Mid and Final term Exam)
- Quizzes
- Oral Exams,
- Technical/Practical Report
- Project/Practical Lab Sessions/ Simulation
- Assignments
- Practical Lab Performance Assessment,
- Coursework Activities Assessment,
- Home works and Assignments,
- Presentations,
- Problem Solving,
- Oral Exam

Assessment Strategy	Description
Written Tests (Mid and Final term Exam)	Mid. term & Final exams for each course is required for all courses except Graduation Projects. These exams will evaluate the extent in which the student understanding of theoretical and applied subjects.
Quizzes	Assigning case studies to students is very helpful to assess the extent of understanding the topics.
Presentations	Some points are assigned to multiple choice questions and Quizzes in order to asses' student ability to follow the lecturer during the study course. quizzes are related to past as well as topics discussed in the period. This helps students develop self-confidence, readiness, and accuracy in major exams
Technical/Practical Report/Project/Practical Lab Sessions/ Simulation	Assessing students to their ability to write theoretical and lab reports as well as the understanding of organizing the reports. The practical lab sessions are required for some courses. To demonstrate the report writing skills, the use of IT and E-learning and the skills to interpret and report data and draw conclusions
Practical Lab Performance Assessment	To demonstrate the personal skills, practical expertise, communication skills, ability to interpret and report data and draw conclusions, and team work expertise they are expected to be learned and gained through their education.
Coursework Activities Assessment	The entire assessment of coursework activities during the teaching period of each course (which includes group and individual work, tests and presentations, etc.)

Assessment Strategy	Description
Homework and Assignments	Assignments are given to students so that they will have the opportunity to use information provided in textbooks, lecturers, and other resources to test students' degree of understanding in the discussed topic. For all courses except for project.
Problem Solving	This allows students to become more active in their learning as they work out which information, they need to find out how to solve a particular problem.
Oral exams	Used for courses like Graduate Project and Engineering Training to knowing the knowledge of the students.

15. Alignment of Program Intended Learning Outcomes (PILOs) to Teaching Strategies and Assessment Methods:

PILOs	Teaching Strategy	Assessment Methods
Knowledge and Understanding (A1, A2, A3, A4)	Lecture/Interactive Lectures, Tutorials, Illustrations, Videos Demonstrations, Presentation/Seminar, Discussion/Interactive Class discussions, Case studies, Exercises and Home Works, Directed Self-study, Online Activities	Written tests (Mid and Final Terms Exam), Quizzes, Oral Exams, Homework and Assignments, Presentations
Intellectual Skills (B1, B2, B3, B4)	Lectures/ Interactive lectures, Tutorials, Brainstorming, Discussion/Interactive Class Discussions Seminar/ Project/ Presentation, Case Studies, Practical experiments-based Session, Exercises and Home Works, Directed self- study, Problem based Learning, Team work/ Cooperative Learning, Field Visits/Training, Online Activities	Written tests (Mid and Final Terms Exam), Quizzes, Oral Exams, Homework and Assignments, Presentations, Technical Report, Practical Lab Performance Assessment, Coursework Activities Assessment,
Professional & practical skills (Cl, C2, C3)	Interactive Lectures, Tutorials, Interactive Class Discussions Seminar/ Project/ Presentation, Case Studies, Practical Experiments-based Session,	Written tests (Mid and Final Terms Exam), Quizzes, Oral Exams, Homework and Assignments,

PILOs	Teaching Strategy	Assessment Methods
	Exercises and Homework, Computer laboratory-based Sessions Directed Self-Study, Problem based Learning, Teamwork/ Cooperative Learning, Field Visits/Training, Mini/Major Project. Online Activities	Presentations, Technical/Practical Report, Project/Practical Lab Sessions, Practical Lab Performance Assessment, Coursework Activities Assessment
General & Transferable Skills (D1, D2, D3, D4)	Directed Self-Study, Problem based Learning, Teamwork/ Cooperative Learning, Field Visits/Training, Presentation/Seminar, Case Studies, Exercises and Homework	Oral Exams, Presentations Technical/Practical Report

16. Project Assessment:

Each project will be assessed by a committee of three members as follows:

Item	Marks Distribution
Project supervisor	60%
Internal examiner: a member of the department staff.	20%
External examiner: a qualified external examiner (either from other departments of the faculty or from another university)	20%
Total	**100%**

17. Training Course Assessment:

The training course will be assessed through:

Item	Assessment	Mark
Industrial Training	Weekly Report from the student	2 marks per report (Total of 24 marks)
	Training partner reports	20 marks
	Final report from the student	16 marks
	Final Presentation from the students	40 marks
Total		**100%**

18. Intended Learning Outcomes Mapping:

See below Annexes.

Annex- 13, Alignment of Program PILOs with Council of Accreditation and Standards
Annex- 14, Survey of Credit Hours of Similar Programs

19. Program Structure:

No	Requirements		No. of Courses	Credit Hours	Rational Weight %
1	University Requirements	Compulsory	8	17	12%
		Elective	0	0	
2	Faculty Requirements	Compulsory	12	33	24%
		Elective	0	0	
3	Department Requirements	Compulsory	13	39	29%
		Elective	0	0	
4	Program Requirements	Compulsory	14	42	35%
		Elective	2	6	
5	Industrial Training	Compulsory	0	0	0.00%
		Elective	0	0	
	Total:		49	137	100.00 %

* The Project Courses Credit Hours are already added to the total credit hours with the faculty requirements.

19.1. University Requirements

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs	L	T	P	Prerequisites, Co-requisites
1.	1/1	06.11.702	English 101	اللغة الإنجليزية 101	2	2	0	0	
2.	1/2	06.11.701	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	2	2	0	0	
3.	1/1	06.11.703	Islamic Culture	الثقافة الإسلامية	2	2	0	0	
4.	1/2	06.11.704	English 102	اللغة الإنجليزية 102	2	2	0	0	
5.	1/1	07.01.705	Arabic 101	اللغة العربية 1	2	2	0	0	
6.	1/2	04.01.711	Arabic 102	اللغة العربية 2	2	2	0	0	
7.	1/1	04.01.710	National Culture	الثقافة الوطنية	2	2	0	0	
8.	1/1	04.02.712	Introduction to Information Technology	مقدمة في تقنية المعلومات	3	2	0	2	
Total					**17**	**16**	**0**	**2**	

Elective Courses: None

19.2. Faculty Requirements

Compulsory Courses

No.	Level/Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1.	1/1	07.11.707	Mathematics 1	رياضيات 1	3	2	2	-	
2.	1/1	07.11.705	Communication Skills	مهارات تواصل	2	-	-	-	
3.	1/2	07.11.704	Mathematics 2	رياضيات 2	3	2	2		
4.	1/2	07.11.708	Programming 1	برمجة 1	3	2	0	2	
5.	1/2	07.11.706	Logic Design	التصميم المنطقي	3	2	-	2	
6.	2/1	07.11.710	Programming 2	برمجة 2	3	2	0	2	
7.	2/1	07.11.711	Statistics and Probability	الإحصاء والاحتمالات	3	2	2	0	
8.	2/1	07.11.713	System Analysis and Design	تحليل وتصميم نظم	3	2	2	0	
9.	4/2	07.11.715	Occupational Ethics	الأخلاق المهنية	2	2	0	0	
10.	3/1	07.11.716	Research Methodology	مناهج البحث العلمي	2	2	0	0	
11.	4/1	07.11.717	Project 1	مشروع 1	3	1	0	4	
12.	4/2	07.11.718	Project 2	مشروع 2	3	0	0	6	
Total					**33**	**19**	**8**	**16**	

Elective Courses: None

19.3. Department Requirements

Compulsory Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs	L	T	P	Prerequisites, Co-requisites
1.	2/1	07.11.705	Linear Algebra	الجبر الخطي	3	2	2		-
2.	1/2	07.11.709	Fundamentals of Database Systems	أساسيات قواعد البيانات	3	2		2	
3.	2/2	07.11.712	Database Management Systems	نظم إدارة قواعد البيانات	3	2		2	
4.	2/2	07.11.706	Object Oriented Programming	البرمجة الهدفية التوجه	3	2		2	
5.	2/2	07.11.714	Operating Systems	نظم التشغيل	3	2		2	
6.	2/1	07.11.715	Data Structures and Algorithms	هياكل البيانات والخوارزميات	3	2		2	

7.	2/1	07.11.716	Computer Organization and Architecture	معمارية وتنظيم الحاسوب	3	2		2	
8.	2/2	07.11.717	Introduction to AI and DS	مقدمة الى الذكاء الاصطناعي وعلم البيانات	3	2		2	
9.	2/2	07.11.718	Computer Networks 1	شبكات الحاسوب 1	3	2		2	
10.	3/1	07.11.719	Web Design and Development 2	تطوير وتصميم الويب 1	3	2		2	
11.	2/1	07.11.721	Discrete Mathematics	رياضيات متقطعة	3	2	2		
12.	2/2	07.11.722	Programming for AI and DS	البرمجة للذكاء الاصطناعي	3	2		2	
13.	3/2	07.11.723	Information Security and audit	امن وتدقيق المعلومات	3	2		2	
Total					**39**	**26**	**4**	**22**	

Elective Courses: None

16.4 Program Major

Compulsory Courses

No.	Level/Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1.	2/2	07.13.723	Web Design and Development	تصميم وتطوير المواقع الإلكترونية 2	3	2		2	
2.	2/2	07.13.725	Computer Networking	شبكات الحاسوب 2	3	2		2	
3.	3/1	07.13.728	Business Intelligence	ذكاء الأعمال	3	2		2	
4.	3/1	07.13.729	Machine Learning	التعلم الالي	3	2		2	
5.	3/2	07.13.730	Mobile Application Development	تطوير تطبيقات الأجهزة المتنقلة	3	2		2	
6.	3/2	07.13.731	Data Mining and Data Warehousing	التنقيب عن البيانات وتخزينها	3	2		2	
7.	3/2	07.13.732	Software Engineering	هندسة البرمجيات	3	2	2		
8.	3/2	07.13.738	Video and Image Processing	معالجة الصور والفيديو	3	2		2	
9.	3/2	07.13.739	Distributed and Cloud Computing	الحوسبة السحابية والموزعة	3	2		2	
10.	3/2	07.13.740	Human Computer Interactions	تفاعل الانسان والحاسوب	3	2		2	
11.	4/1	07.13.741	Deep Learning and Artificial Neural Networks	الشبكات العصبية الاصطناعية والتعلم العميق	3	2		2	
12.	4/2	07.13.735	Robotics and Intelligence Systems	الروبوتات والانظمة الذكية	3	2		2	
13.	4/1	07.13.736	Elective-1	اختياري -1	3	3			
14.	4/2	07.13.737	Elective – 2	اختياري – 2	3	3			
15.	4/1	07.13.738	Decision Support Systems	نظم دعم القرار	3	3			

16.	3/2	07.13.739	Big Data analysis and Visulaization	تحليل وعرض البيانات الضخمة	3	3			
				Total	**48**	**36**	**2**	**22**	

Elective Courses

No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1.		07.13.741	Internet of Things (IOT)	إنترنت الأشياء	3	3			
2.		07.13.742	Computer Vision	الرؤية الحاسوبية	3	2		2	
3.		07.13.743	Expert Systems	النظم الخبيرة	3	3			
4.		07.13.744	Selected Topics in AI and DS	مواضيع مختارة في الذكاء الاصطناعي وعلم البيانات	3	3			
5.		07.13.745	Expert Systems	مقدمة الى الحوسبة الكمية	3	3			
6.		07.13.746	Optimization Techniques	Optimization Techniques	3	2		2	
				Total	**18**	16	--	4	

16.5 Study Plan:

16.6 Study Plan:

Level 1

Term 1									
No	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/1	07.13.701	Arabic 101	لغة عربية 101	2	2			
2.	1/1	07.13.702	English 101	لغة انجليزية 101	2	2			
3.	1/1	07.13.703	Islamic Culture	ثقافة إسلامية	2	2			
4.	1/1	07.13.704	National Culture	ثقافة وطنية	2	2		2	
5.	1/1	07.13.705	Introduction to Information Technology+D41	مقدمة الى تكنولوجيا المعلومات	3	2		2	
6.	1/1	06.11.701	Physics	فيزياء	2	2			
7.	1/1	06.11.707	Communication Skills and Presentation	مهارات الاتصال والتواصل	2	2			
8.	1/1	06.11.702	Mathematics 1	رياضيات 1	3	2	2		
Total					**18**	**16**	**0**	**4**	

Term 2									
No	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	1/2	07.13.706	Arabic 102	لغة عربية 102	2	2			
2.	1/2	07.13.707	English 102	لغة انجليزية 102	2	2			
3.	1/2	07.13.708	Arabic Israeli Conflict	الصراع العربي الإسرائيلي	2	2		2	
4.	1/2	07.13.709	Digital Logic Design	تصميم منطقي ورقمي	3	2		2	
5.	1/2	07.13.710	Fundamentals of Database Systems	أساسيات قواعد البيانات	3	2		2	
6.	1/2	06.11.705	Discrete Mathematics	رياضيات متقطعة	3	2	2		
7.	1/2	06.11.703	Programming 1	برمجة 1	3	2		2	
8.	1/2	06.11.706	Mathematics 2	رياضيات 2	**3**	2	2		
Total					**21**	**16**	**4**	**8**	

Level 2

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/1	07.13.711	Programming 2	برمجة 2	3	2		2	
2.	2/1	07.13.712	Data Structures and Algorithms	هياكل البيانات والخوارزميات	3	2		2	
3.	2/1	07.13.713	Database Management Systems	نظم ادارة قواعد البيانات	3	2		2	
4.	2/1	07.13.714	Linear Algebra	الجبر الخطي	3	2	2		
5.	2/1	07.13.715	Computer Organization and Architecture	معمارية وتنظيم الحاسوب	3	2		2	
6.	2/1	07.13.717	System Analysis and Design	تحليل وتصميم نظم	3	2	2		
7.	2/1	07.13.716	Statistics and Probability	احصاء واحتمالات	3	2	2		
Total					**21**	**14**	**6**	**8**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	2/2	07.13.717	Computer Networks 2	شبكات الحاسوب 1	3	2		2	
2.	2/2	07.13.718	Introduction to AI and DS	مقدمة الى الذكاء الاصطناعي وعلم البيانات	3	2		2	
3.	2/2	07.13.719	Object Oriented programming	برمجة هدفية موجهة	3	2		2	
4.	2/2	07.13.720	Programming for AI and DS	البرمجة للذكاء الاصطناعي	3	2		2	
5.	2/2	07.13.721	Operating System	نظم تشغيل	3	2		2	
6.	2/2	07.13.722	Software Engineering	هندسة البرمجيات	3	2	2		
7.	2/2	07.13.723	Business Intelligence	ذكاء الاعمال	3	2		2	
Total					**21**	**14**	**2**	**12**	

Level 3

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	3/1	07.13.722	Web Design and Development 2	تطوير وتصميم الويب 1	3	2		2	
2.	3/1	07.13.723	Machine Learning	تعلم الالة	3	2		2	
3.	3/1	07.13.724	Data Mining and Warehousing	التنقيب البيانات وتخزين البيانات	3	2		2	
4.	3/1	07.13.725	Computer Network 2	شبكات الحاسوب 2	3	2		2	
5.	3/1	07.13.726	Mobile Application Development	تطوير تطبيقات الأجهزة المتنقلة	3	2		2	
6.	3/1	07.13.726	Research Methodology	مناهج البحث العلمي	2	2			
Total					**17**	**12**		**10**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	3/2	07.13.727	Video and Image Processing	معالجة الصور والفيديو	3	2		2	
2.	3/2	07.13.728	Natural Language Processing	تطوير وتصميم الويب 2	3	2		2	
3.	3/2	07.13.729	Distributed and Cloud Computing	الحوسبة السحابية والموزعة	3	2		2	
4.	3/2	07.13.730	Human Computer Interactions	تفاعل الانسان والحاسوب	3	2		2	
5.	3/2	07.13.731	Big Data analysis and Visualizations	تحليل وعرض البيانات الضخمة	3	2		2	
6.	3/2	07.13.732	Information Security and audit	امن وتدقيق المعلومات	3	2		2	
Total					**18**	**12**		**12**	

Level 4

Term 1									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	4/1	07.13.733	Deep Learning and Artificial Neural Networks	الشبكات العصبية الاصطناعية والتعلم العميق	3	2		2	
2.	4/1	07.13.734	Decision Support Systems	نظم دعم القرار	3	3			
3.	4/1	07.13.735	Elective 1	مقرر اختياري 1	3	3			
4.	4/1	07.13.736	Final Project 1	مشروع التخرج 1	3	1	-	4	
Total					**12**	**9**		**6**	

Term 2									
No.	**Level-Sem.**	**Course Code**	**Course Name**	**اسم المقرر**	**Cr. Hrs.**	**L**	**T**	**P**	**Prerequisites, Co-requisites**
1.	4/2	07.13.737	Final Project 2	مشروع التخرج 2	3	3		6	
2.	4/2	07.13.738	Occupational Ethics	اخلاقيات المهنة	2	2			
3.	4/2	07.13.739	Elective 2	مقرر اختياري 2	3	3			
4.	4/2	07.13.740	Robotics and Intelligence Systems	الروبوتات والانظمة الذكية	3	2	-	2	
Total					**12**	**9**		**6**	

16.7 Distribution of Total Credit Hours:

Level	Term	University Requirements		Faculty Requirements		Department Requirements		Program Requirements		Program Electives		Training		Project		Total Cr. Hrs.		Total Cr. Hrs./ Level
		No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	
First	**First**	3	6	2	6	2	6	1	3							8	21	44
	Second	4	8	3	9	2	6	-	-							9	23	
Second	**First**	0	0	1	3	2	6	2	6							5	15	30
	Second	0	0	-	-			5	15							5	15	
Third	**First**	0	0	2	6			3	9							5	15	33
	Second	-	-	2	6			4	12							6	18	
Fourth	**First**	0	0	0	0			2	6	1	3			1	3	4	12	24
	Second	0	0	0	0			2	6	1	3			1	3	4	12	
Total:		7	14	10	30	6	18	19	57	2	6	1	0	2	6	47	47	
Percentage:																**100%**		

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs
Annex- 16, Themes of Courses of Study and their Weightage
Annex- 17, Coding System
Annex- 18, Survey of Course Names per Academic Semesters of Similar Program
Annex- 19, Comparison of Program Courses and Similar Programs Courses

Annex- 20, Matrix of Mapping Program PILO's with Courses

16.8 Admission Requirements:

1. Admissions to the program shall be made as per the admission rules set by the Ministry of Higher Education and Scientific Research as well as 21 UMAS admission guidelines.
2. General Secondary school certificate (Science Section) or any equivalent certificate with grade as specified in the admission rules made by Ministry of Higher Education and Scientific Research.
3. Pass the aptitude test and personal interview.
4. Any necessary requirement for specialization, decided by the Scientific Section.

16.9 Attendance and Graduation Requirements:

1. Student attendance should not be less than 75%
2. Student will graduate after successfully passing all program requirements.
3. Total credit hours for the program is 131 credit hours**.**
4. Minimum score for any student to pass any credit hours' course is 48 degree.

16.10 Grading System:

From 90% to 100% of total marks	Excellent
From 83% to less than 90%	Very Good
From 66% to less than 83%	Good
From 50% to less than 66%	Pass
Less than 50%	Poor/Fail

16.11 Facilities Required for Running the Program:

1. Lecture rooms with facilities such as chairs and tables, data show, Smart Board, etc.
2. Lab with facilities such as chairs and tables, laboratory equipment, hardware and software, data show, Board, etc.
3. Library and study room.
4. Photography and Video Studio.
5. Academic and administrative staff offices.
6. Internet.

16.12 Program Assessment:

	Type of the Sample who Assess the program	Instruments used	Sample
1	**Graduates**	**Questionnaire**	20%
2	**Academic Staff**	**Interviews**	100%
3	**Employment agencies (views)**	**Questionnaires**	50%
4	**Final year students**	**Focus group discussions**	20%
5	**External Examiners**	**Interviews**	100%

6	**Others CAQA**	**Interviews/ Documents analysis**	100%

16.13 Program Quality Standards:

16.14 Internal and external training to satisfy program standards:

16.15 Program Policies:

Based on University Regulations

1.	**(Class Attendance):** A student should attend not less than 75 % of total hours of the subject; otherwise, he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hour, student will be required to retake the entire course again.
2.	**(Tardy) :** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3.	**(Exam Attendance/Punctuality) :** A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.
4.	**(Assignments & Projects) :** Assignments and projects are given as per course specification; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5.	**(Cheating) :** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6.	**(Plagiarism) :** Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7.	**(Other policies) :** - Mobile phones are not allowed to use during a class lecture. It must be closed; otherwise the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.

Artificial Intelligence & Data Science Program Specifications

Annex- 1, Survey on the Strategic Orientations of the Department and Similar Departments, and their Alignment to the Strategic Orientations of the University and Faculty:

Benchmarked Programs:

1. Bachelor of Science in Data Science and Artificial Intelligence, Department of Data Science and Artificial Intelligence, Al-Ahliyya Amman University, Jordan
   https://fit.ammanu.edu.jo/En/ProgramIntro.aspx?id=13&17
2. BSc (Hons) Data Science and Artificial Intelligence, Department of Engineering and Computing, University of East London, UK
   https://www.uel.ac.uk/undergraduate/courses/bsc-hons-data-science-artificial-intelligence
3. Bachelor of Applied Science in Data Science and Artificial Intelligence, Department of Data Science, Princess Sumaya University for Technology, Jordan
   https://psut.edu.jo/content/first-its-kind-jordan-bachelor-data-science-and-artificial-intelligence-psut
4. BSc (Hons) Data Science and Artificial Intelligence, Department of Innovative Technologies, University of Applied Sciences and Arts of Italian Switzerland (SUPSI), Switzerland
   https://www.supsi.ch/home_en/bachelor-diploma-master/bachelor/data-science-ai.html
5. BSc (Hons) Data Science and Artificial Intelligence, Department of Data Science and Knowledge Engineering, Maastricht University, Netherland
   https://www.maastrichtuniversity.nl/education/bachelor/data-science-and-artificial-intelligence
6. BSc (Hons) Data Science and Artificial Intelligence, School of Computer Science and Engineering, Nanyang University, Singapore
   https://www.ntu.edu.sg/index
7. BSc (Hons) Artificial Intelligence and Data Science, Department of Artificial Intelligence and Data Science, 21 UMAS, Yemen

1- Vision of the Corresponding Departments and Suggested Vision:

#	The Department	Vision
1.	Department of Data Science and Artificial Intelligence	
2.	Department of Information Technology	To maintain regionally leading and recognized reputation in the field of Health information technology by providing distinguished academic programs and quality education
3.	Department of Data Science	Achieve academic excellence and research in the field of data science and artificial intelligence at the national and global levels.
4.	Department of Innovative Technologies	To be a point of reference for the social and economic development of the territory by aiming for excellence in the field of engineering with an active role in local, federal and international training, research and innovation networks.
5.	Department of Data Science and Knowledge Engineering	
6.	School of Computer Science and Engineering	
7.	Department of Artificial Intelligence and Data Science	To be a leading department in Artificial Intelligence and Data Science, shaping the future of Artificial Intelligence through innovative and impactful data-driven solutions that enhance technology fields, contribute to national development, and uphold values of integrity and social responsibility.

2- Mapping of Department Vision to the University and Faculty Visions:

University Vision	Faculty of Medical Technology Vision	Department of Artificial Intelligence and Data Science Vision
A Contemporary University with National Responsibility and Faith Identity.	A contemporary medical technology faculty with sober academic dimensions, national responsibility and faith identity.	To be a leading department in Artificial Intelligence and Data Science, shaping the future of Artificial Intelligence through innovative and impactful data-driven solutions that enhance technology fields, contribute to national development, and uphold values of integrity and social responsibility.

3- Mission of the Corresponding Departments and Suggested Mission:

#	The Department	Mission
1.	Department of Data Science and Artificial Intelligence	provide a distinguished education in a creative environment which copes with the latest developments in the field of Data Science & Artificial Intelligence. It will meet quality assurance standards that fulfil the requirements of the national and international accreditation to obtain high quality outcomes, which fulfil the labor market needs. It will also strengthen cooperation with the local community and stimulate scientific research.
2.	Department of Engineering and Computing	To ensure our graduate are first choice for employers, and updating courses to reflect the changing world where technology dominates and industries move faster than ever before.
3.	Department of Data Science	Provide the local and international market with distinguished graduates with scientific knowledge and practical experience in the field of data science and artificial intelligence.
4.	Department of Innovative Technologies	▪ Offer innovative study paths to train highly qualified young engineers capable of contributing to the development and well-being of our society.

#	The Department	Mission
		▪ Offer training courses in favor of continuous updating of professionals and companies in the area in response to the challenges and rapid changes in the socio-economic context. ▪ To be recognized actor for its technical-scientific skills at federal and international level and to support, through them, the capacity for innovation and growth of the regional system, and of companies, in particular through applied research and technology transfer
5.	Department of Data Science and Knowledge Engineering	
6.	School of Computer Science and Engineering	
7.	Department of Artificial Intelligence and Data Science	To equip students with the advanced knowledge and skills necessary to drive the technological transformation of AI and data science, focusing on integrated solutions and creative research to meet the evolving needs of the Yemeni digital sector and contribute to regional development.

4- Mapping of Department Mission to the University and Faculty Missions:

University Mission	Faculty of Medical Technology Mission	Department of Artificial Intelligence and Data Science Mission
Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.	Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.	To equip students with the advanced knowledge and skills necessary to drive the technological transformation of AI and data science, focusing on integrated solutions and creative research to meet the evolving needs of the Yemeni digital sector and contribute to regional development.

5- Objectives (Educational) of the Corresponding Departments and Suggested Objectives:

#	The Department	Objectives
1.	Department of Data Science and Artificial Intelligence	▪ Analyze and solve problems using mathematical models, algorithms and new technologies to design, evaluate and develop and implement computing systems. ▪ Recognize the social impact of technology and ethical issues in computer science discipline, which helps making decisions regarding their professional and social responsibilities. ▪ Work collaboratively, function and communicate effectively, and think creatively in complex modern work environments. ▪ Prepare students for self-learning.
2.	Department of Engineering and Computing	
3.	Department of Data Science	Provide students with an outstanding education to build their skills and knowledge.
4.	Department of Innovative Technologies	▪ Constantly improve the quality of the training offer and the organization of the structure.

#	The Department	Objectives
		▪ Consolidate its role as a university development institute through national and international research projects. ▪ Maintain research institutes as a point of reference for Ticino and Swiss companies, through the development of projects. ▪ Propose a distinctive training offer thanks to the professional experience of the staff of teachers, assistants and researchers.
5.	Department of Data Science and Knowledge Engineering	
6.	School of Computer Science and Engineering	▪ **Competency** - Competent in solving technically complex problems within the given constraints and available resources. ▪ **Thinking Skills** - Capable of making sound and ethical engineering decisions based on high professional standards. ▪ **Leadership and Communication** - Demonstrate effective leadership and managerial skills within their professional sphere of influence. ▪ **Attitude** - Commitment to lifelong learning and engaged in professional development to keep abreast with technological advances in their field of choice
7.	Department of Artificial Intelligence and Data Science	1. **Academic Excellence**: Apply rigorous quality standards in Artificial Intelligence and Data Science education, research, and community service to establish a department known for academic excellence in technology sciences. 2. **Student-Centric Education**: Prioritize students in the educational process by fostering an environment of engagement, personal development, and lifelong learning, preparing them for meaningful careers in the field of data science. 3. **Talent Attraction**: Attract and develop highly skilled professionals and scholars in Artificial Intelligence and Data Science who will contribute to the academic, technological, and economic growth of the all sector and the wider community.

#	The Department	Objectives
		4. **State-of-the-Art Infrastructure**: Leverage modern infrastructure, academic resources, and research centers to enhance the educational and research outcomes in Artificial Intelligence and Data Science, ensuring that graduates are well-equipped to meet the evolving needs of the all sector. 5. **Partnership and Collaboration**: Strengthen the department's position as an ideal partner for both academic and healthcare institutions at local, regional, and international levels, fostering collaborations that lead to innovative AI solutions through data science and artificial intelligence.

6- Mapping of Department Objectives to the University and Faculty Objectives:

University Objectives	Faculty of Medical Technology	Department of Artificial Intelligence and Data Science Objectives
1- Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service. 2- Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work. 3- Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens. 4- Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally.	1- Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service. 2- Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work. 3- Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens. 4- Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches and service centers and available educational laboratories to achieve the desired goals	1- **Academic Excellence**: Apply rigorous quality standards in Artificial Intelligence and Data Science education, research, and community service to establish a department known for academic excellence in technology sciences. 2- **Student-Centric Education**: Prioritize students in the educational process by fostering an environment of engagement, personal development, and lifelong learning, preparing them for meaningful careers in the field of data science. 3- **Talent Attraction**: Attract and develop highly skilled professionals and scholars in Artificial Intelligence and Data Science who will contribute to the academic, technological, and economic

University Objectives	Faculty of Medical Technology	Department of Artificial Intelligence and Data Science Objectives
5- Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	of the college of medical technology in order to meet the needs of the labor market. 5- Enhance the university and college position as an ideal partner for the academic and health sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.	growth of the all sector and the wider community. 4- **State-of-the-Art Infrastructure**: Leverage modern infrastructure, academic resources, and research centers to enhance the educational and research outcomes in Artificial Intelligence and Data Science, ensuring that graduates are well-equipped to meet the evolving needs of the all sector. 5- **Partnership and Collaboration**: Strengthen the department's position as an ideal partner for both academic and healthcare institutions at local, regional, and international levels, fostering collaborations that lead to innovative AI solutions through data science and artificial intelligence.

Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board

Council for Accreditation & Quality Assurance

National Academic Reference Standards (NARS) For Undergraduate Computing Programs

First Edition

Council for Accreditation & Quality Assurance, Yemen
May 2018

ACCREDITATION BOARD FOR ENFINEERING AND TECHNOLOGY (ABET)

CRITERIA FOR ACCREDITING ENGINEERING PROGRAMS 2020 (Data Science)

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Artificial Intelligence & Data Science Program Specifications

Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Attached Separately

Annex- 4, Survey of Similar Accredited Programs at National and International Universities (Benchmarks)

Program No.	The Academic Program	The University	Website	The Faculty	The Department	The Country	Degree Award at Program Completion	Program Accrediting Body	Year of Accreditation	Study Duration
Current Program	B.Sc. in (Hons) Artificial Intelligence and Data Science	21 UMAS		Medical Technology	Artificial Intelligence and Data Science	Yemen	BSc			4
The 1st Program	Bachelor of Applied Science in Data Science and Artificial Intelligence	Al-Ahliyya Amman University	https://www.ammanu.edu.jo/	Faculty of Information Technology	Department of Data Science and Artificial Intelligence	Jordan	BSc	Jordanian Accreditation and Quality Assurance Commission for Higher Education Institutions (AQACHEI	2020	3
The 2nd Program	BSc (Hons) Data Science and Artificial Intelligence	University of East London	https://www.uel.ac.uk/	School of Architecture, Computing and Engineering	Department of Engineering and Computing	UK	BSc	(British Computer Society (BCS)	2018	3
The 3rd Program	Bachelor of Science in Data Science and Artificial Intelligence	Princess Sumaya University for Technology	https://psut.edu.jo/	King Hussein School of Computing Sciences	Department of Data Science	Jordan	BSc	Jordanian Accreditation and Quality Assurance Commission for Higher Education Institutions (AQACHEI)	2019	4
The 4th Program	Bachelor of Science in Data Science and Artificial Intelligence	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	https://www.supsi.ch/home_en/bachelor-diploma-master/bachelor/data-science-ai.html	Faculty of Engineering and Information Technology	Department of Innovative Technologies	Switzerland	BSc	Swiss Accreditation Council	2020	3
The 5th Program	Bachelor of Science in Data Science and Artificial Intelligence	Maastricht University	https://www.maastrichtuniversity.nl/	Faculty of Science and Engineering	Department of Data Science and Knowledge Engineering	Netherland	BSc	Accreditation Organization of the Netherlands and Flanders (NVAO)	2020	3
The 6th Program	Bachelor of Science in Data Science and Artificial Intelligence	Nanyang Technological University	https://www.ntu.edu.sg/	College of Engineering	School of Computer Science and Engineering	Singapore	BSc	Singapore Computer Society (SCS)		4

Annex- 5, Survey on Mission and Objectives of the Program and Similar Accredited Programs and its Alignment to the University, Faculty, and Department Missions and Objectives

1- Survey on Mission and Objectives of the Program and Similar Accredited Programs

University	Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 September of medical and Applied sciences
Faculty	Faculty of Information Technology	School of Architecture Computing and Engineering	King Hussein School of Computing Sciences	Faculty of Engineering and Information Technology	Faculty of Science and Engineering	College of Engineering	Medical Technology
Department	Department of Data Science and Artificial Intelligence	Department of Engineering and Computing	Department of Data Science	Department of Innovative Technologies	Department of Data Science and Knowledge Engineering	School of Computer Science and Engineering	Department of Artificial Intelligence and Data Science
Program	Bachelor of Science in Data Science and Artificial Intelligence	Data Science and Artificial Intelligence	Bachelor of Science in Data Science and Artificial Intelligence	Data Science and Artificial Intelligence (B.Sc.)	Bachelor of Science in Data Science and Artificial Intelligence	Bachelor of Science in Data Science and Artificial Intelligence	Bachelor of Science in Artificial Intelligence and Data Science
Country	Jordan	UK	Jordan	Switzerland	Netherland	Singapore	Yemen
Program Mission	provide a distinguished education in a creative environment which copes with the latest developments in the field of Data Science & Artificial Intelligence. It will meet quality assurance standards that fulfill the requirements of the national and international accreditation to obtain high quality outcomes, which	Address the chronic shortage of suitably qualified data science and Artificial Intelligence specialists and, at the same time, prepare graduates for a fulfilling and varied career in fast-growing IT sector.	Preparing a highly qualified and specialized staff who keeps pace with modern technology in the field of data science and artificial intelligence, by providing a high-quality program to prepare students to meet the needs of the labor market, develop their skills in research and innovation, and contribute to the development of society		Provide students with a solid foundation in data science and Artificial Intelligence by training them in artificial intelligence (AI), computer science and mathematics.		The mission of the Artificial Intelligence & Data Science program is to provide students with a comprehensive education in AI and data science that empowers them to become leaders in developing innovative, data-

University	Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 September of medical and Applied sciences
	fulfill the labor market needs. It will also strengthen cooperation with the local community and stimulate scientific research.		and the achievement of national goals.				driven solutions for technology fields. By integrating advanced AI techniques and data science methodologies, the program aims to address the unique technological needs of Yemen and contribute to the national development of the country. Through a blend of technical expertise, ethical principles, and practical experience, the program seeks to prepare graduates who will drive the future of AI and data science,

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							advancing technology in Yemen and beyond.
Program Objectives	**POE1.** Analyze and solve problems using mathematical models, algorithms and new technologies to design, evaluate and develop and implement computing systems. **POE2.** Recognize the social impact of technology and ethical issues in computer science discipline which helps making decisions regarding their professional and social responsibilities. **POE3.** Work collaboratively, function and communicate effectively, and think creatively in complex modern work environments.	**POE1.** Gain a thorough understanding of the theoretical and practical skills of Data Science and Artificial Intelligence relevant to the specification, design, implementation and evaluation of information processing systems; **POE2.** Critically evaluate the management, economic, legal, social, professional and ethical dimensions of data-intensive systems and technologies; **POE3.** Develop the necessary study skills and knowledge to pursue further study	**POE1.** Providing students with the knowledge and skills necessary for development and creativity in various fields of work through the use of data science and artificial intelligence. **POE2.** Improve Students' ability to work effectively within a team and apply appropriate practices within a professional, legal and ethical framework, and the need to contribute positively to society. **POE3.** Enabling students to continuously self-learning to continue enhancing their skills, adopting new techniques and methods, and	**1.** Implement Data Science/Artificial Intelligence algorithms, making them operational within the company and efficiently analyzing even large amounts of data (Big Data). **2.** Achieve a fully-rounded professional profile, in addition to mastering statistical and computer skills, graduates should also acquire expertise in the fields of	**POE1.** To educate students at an academic level in Data Science and Artificial Intelligence based upon Mathematics, Computer Science, and Artificial Intelligence. **POE2.** To teach students how to analyze and to solve both Data Science and Artificial Intelligence problems in a variety of application domains. **POE3.** To prepare students to work in teams by organizing the education in Data Science and Artificial Intelligence according to the Project-Centered Learning system.	**POE1.** A strong foundation in computer science, statistics, and mathematics, through core and elective courses offered. **POE2.** An integrated application of knowledge in technology and business in the key industries of financial services, tourism-hospitality-retail, government services, healthcare, biotech, and manufacturing, through internships, major applied research project, industry speaker seminar series and mini-projects in the courses.	**POE1. Prepare Graduates for Successful Careers:** Equip students with the technical, analytical, and problem-solving skills necessary to excel in the rapidly evolving field of Artificial Intelligence and Data Science, ensuring they are prepared to contribute meaningfully to the workforce and technological advancements. **POE2. Foster Innovation and Research:** Encourage students to engage in innovative research and apply AI and data science techniques to real-world challenges, thus enabling them to make valuable contributions to the

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	POE4. Prepare students for self-learning	**POE4.** Develop the professional skills necessary for a career in the IT industry **POE5.** Develop communication skills, initiative, professionalism and the ability to work independently as well as with others.	advancing in postgraduate studies.	communications and ethics.	**POE4.** To prepare students for further study, or for a career in business (IT industry or IT-related application domains). **POE5.** To stimulate students to acquire an international academic orientation.	**POE3.** The development of problems-solving, and verbal and written communication skills, through extensive project work and presentations in courses. **POE4.** The development of breadth, creativity, and adaptability, through taking subjects outside the areas of computing and statistics under the General Elective Requirement.	development of AI-driven solutions within various sectors in Yemen and globally. **POE3. Promote Ethical and Social Responsibility:** Instill in students a strong sense of ethical responsibility, ensuring they approach AI and data science solutions with integrity and in a way that benefits society as a whole, contributing to the responsible use of technology for the greater good. **POE4. Encourage Lifelong Learning and Professional Development:** Develop students' abilities to continue learning and evolving throughout their careers by providing them with the tools and foundation necessary to stay current with emerging AI and data science trends, fostering a mindset of continuous

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							improvement and professional growth. **POE5. Strengthen Collaborative Partnerships:** Equip students with the skills to collaborate effectively with professionals across sectors, both locally and globally, fostering partnerships that promote the advancement of AI solutions and drive meaningful technological innovations within industries and society.
Program ILOs	**SLO-1.** Analyze a complex computing problem and to apply principles of computing and data science and artificial intelligence and other relevant disciplines to identify solutions. **SLO-2.** Design, implement, and evaluate a computing-based solution to meet a given set of computing	**A: Knowledge** **A1.** Knowledge and understanding of essential facts, concepts, theories and principles of data science and artificial intelligence technology. **A2.** Knowledge and understanding of contemporary tools and technologies to produce solutions relevant to the domain of data	**1.** The ability to analyze complex computing issues and apply computing principles and other related disciplines to define solutions. **2.** The ability to design, implement and evaluate computing-based solutions to meet a range of computing requirements related to data science and artificial intelligence.	**1.** Operate in the various data analysis phases, including: data collection, choice of analysis method, implementation and evaluation of results, evaluation of ethical, legal and privacy implications; **2.** Implement software libraries	I. ***Knowledge and understanding*** **1.** Basic understanding of key areas in Data Science; **2.** Advanced knowledge of a specific area in Data Science up to a level that without further requirements grants access to a Master programme in this area; **3.** Basic understanding of key areas in Artificial Intelligence;	**a)** Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. **b) Problem Analysis:** Identify, formulate, research literature, and analyze complex	**A. Knowledge and Understanding:** Upon successful completion of the Program, graduates should be able to: **A1.** Demonstrate an understanding of the essential facts, concepts, principles and theories related to the fundamental sciences and the field of Artificial

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	requirements in the context of the program's discipline. **SLO-3.** Communicate effectively in a variety of professional contexts. **SLO-4.** Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. **SLO-5.** Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline. **SLO-6.** Apply computer science theory, data science and artificial intelligence and software development fundamentals to analyze, design and develop algorithms intelligent solutions.	science/artificial intelligence **A3.** Understand the roles and responsibilities of a professional working within the computing profession. **A4.** Appreciate the social, environmental, ethical, economic and commercial considerations that impact on the computer/data science solutions. **B. Thinking skills:** **B1.** Demonstrate independent thought in the study of data science and artificial intelligence. **B2.** Analyze, interpret, synthesize and evaluate information. **B3.** Identify, select, design and apply appropriate design methods to the solution of problems. **B4.** Evaluate resource requirements of alternative solutions.	**3.** The ability to communicate effectively within a diverse work group related to the professional framework. **4.** The ability to distinguish professional responsibilities and make informed judgments in the practice of computing based on legal and ethical principles. **5.** The ability to work effectively as a member or leader of a team involved in appropriate activities related to the data science and artificial intelligence program. **6.** The ability to apply the theories and fundamentals of data science and artificial intelligence to produce solutions based on artificial intelligence.	based on machine learning; **3.** Evaluate and optimize the accuracy and scalability of such libraries; **4.** Communicate the results to a non-specialist audience; **5.** Build automatic and efficient systems for dealing with Big Data; **6.** Fit into a multidisciplinary team, e.g., as a link between a senior Data Science researcher and a computer engineer, particularly when customized methods developed by the company must be put into production; **7.** Act in a professional and ethically-responsible manner;	**4.** Advanced knowledge of a specific area in Artificial Intelligence up to a level that without further requirements grants access to a Master programme in this area; **5.** Basic understanding of key areas in Computer Science and in Applied Mathematics; **6.** Advanced knowledge of a specific area in Computer Science and in Applied Mathematics up to a level that without further requirements grants access to a Master programme in this area. **II**. ***Applying knowledge and understanding*** **7.** The ability to understand, apply, formulate, and validate models from the domains of Artificial Intelligence; **8.** The ability to extract information from data, to interpret results and to convey them; **9.** The ability to apply knowledge from the key areas of Artificial Intelligence;	engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. **c) Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. **d) Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including	Intelligence and Data Science. **A2.** Recognize the recent trends of technology and its impacts on the individuals, organizations, and society in the area of Artificial Intelligence and Data Science. **A3.** Demonstrate a profound knowledge in utilizing and adapting computing tools, techniques, practices, and methods for solving the real-world computing problems. **A4.** Demonstrate knowledge and understanding of contemporary tools and technologies to produce solutions relevant to the domain of Artificial Intelligence and Data Science to meet a set of agreed requirements.

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		C. Subject-Based Practical skills: **C1.** Retrieve, select and evaluate information from a variety of sources **C2.** Specify the requirements and practical constraints of data science/artificial intelligence solutions considering a wide range of aspects including legal, ethical and social issues. **C3.** Plan, monitor, and evaluate the progress of an IT project. **D. Skills for life and work (general skills)**: **D1.** Structure and communicate ideas effectively, both orally and in writing, **D2.** Learn independently in complicated contexts, **D3.** Work professionally as an individual to develop		**8.** Continuously update their knowledge.	**10.** The ability to apply the support modules for Artificial Intelligence; **11.** The ability to apply methods and tools from applied mathematics and operations research in particular; **12.** The ability for constructing and evaluating mathematical and computational methods for a range of application domains; **13.** The ability to submit an argument in the exact sciences to critical appraisal; **14.** The ability to think analytically and critically, and to apply logical reasoning; **15.** The ability to cooperate in a group and to participate effectively as an academic professional; **16.** The ability to create an effective project plan for solving a Data Science and/or Artificial Intelligence problem in a supervised context; **17.** The ability to apply Data Science and	design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. **e) Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations. **f) The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional	**B. Cognitive/ Intellectual Skills:** Upon successful completion of the program, graduates should be able to: **B1.** Critically analyze complex computing problems using the basic concepts, principles, analytical and mathematical models, algorithms and software tools related to the field of Artificial Intelligence and Data Science. **B2.** Evaluate emerging data analysis technologies and their application to different types and amounts of data related to Artificial Intelligence and Data Science. **B3.** Select an appropriate model/framework for developing and managing

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		creative solutions to problems. **D4.** Work professionally in teams to develop creative solutions to problems.			Artificial Intelligence methods and techniques in a business-related practice; **18.** The ability to transpose academic knowledge and expertise in a variety of application domains; **19.** Readiness to address new problems in new areas, emerging from scientific and professional fields. **III**. **Making judgments** **20.** The ability to review critically (a) results, (b) arguments, and (c) problem statements from accepted perspectives in the field of Data Science and Artificial Intelligence; **21.** A reasonable level of competence in searching and critically processing the professional literature in Data Science and Artificial Intelligence; **22.** A reasonable familiarity with the standards of academic criticism;	engineering practice. **g) Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. **h) Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings. **i) Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective	intelligent-based solutions. **B4.** Evaluate a computing-based solution in the context of Artificial Intelligence and Data Science and related disciplines. **C. Practical and Professional Skills:** Upon successful completion of the program, graduates should be able to: **C1.** Apply computer science theory, Artificial Intelligence and Data Science, and software development fundamentals to design and develop intelligent-based solutions. **C2.** Design, implement, and test a computing-based solution to meet a given set of computing requirements in the context of Artificial

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					23. An awareness of, and responsibility for ethical, normative and social consequences of developments in science and technology, particularly resulting from Data Science and Artificial Intelligence. IV. **Communication** **24.** Academically appropriate communicative skills, i.e., the ability to (a) communicate ideas effectively in written form, (b) give effective presentations, both formally and informally, and (c) understand and offer constructive criticism of the presentations of others; **25.** International communication skills; **26.** Elementary effectiveness in leading group-wise communication. **V. Learning skills** The recipient of a Bachelor of Science degree in Data Science and Artificial	presentations, and give and receive clear instructions. **j) Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **k) Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	Intelligence and Data Science. **C3.** Deploy effectively computing tools and techniques used for the construction and documentation of intelligent applications of varying complexity. **D. General and Transferable Skills:** Upon successful completion of the program, graduates should be able to: **D1.** Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the Artificial Intelligence and Data Science discipline to accomplish a common goal. **D2.** Commit to professional ethics, responsibilities, and

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					Intelligence should be able to: **27.** Reflect on (a) one's own style of thought, (b) one's own working methods, and (c) one's own readiness to take the necessary corrective action; **28.** Recognize the need for continued learning throughout a professional career; **29.** The ability to manage one's own learning and development.		norms of professional computing practices. **D3.** Communicate effectively in writing and verbally in a variety of professional contexts. **D4.** Engage in continuing professional development and lifelong learning as a computing professional.

2- Mapping of Program Mission with the University, Faculty and Department Missions:

University Mission	Faculty of Computer Science & Information Technology Mission	Department of Computer Science Mission	Artificial Intelligence & Data Science Program Mission
Leadership of transformation in managing and providing the health care with all partners via having the distinction standard in education and applied and medical researches that meet the needs of Yemeni people and regional influence.	Participation in leading the medical technological transformation to provide technically and informatically integrated health care, through the provision of scientific educational programs with solid and contemporary academic dimensions, and research services of a creative nature that meet the needs of the Yemeni health sector, its specificity and regional needs.	Driving the transformation of Artificial Intelligence and Data Science through the integration of cutting-edge Artificial Intelligence and Data Science techniques, providing innovative educational programs and research services that address the unique needs for all of the Yemeni sector. Our mission is to empower students with the technical skills and ethical grounding needed to lead in the field of data-driven Artificial Intelligence and Data Science solutions, contributing to the advancement of technology in Yemen and beyond.	The mission of the Artificial Intelligence & Data Science program is to provide students with a comprehensive education in AI and data science that empowers them to become leaders in developing innovative, data-driven solutions for technology fields. By integrating advanced AI techniques and data science methodologies, the program aims to address the unique technological needs of Yemen and contribute to the national development of the country. Through a blend of technical expertise, ethical principles, and practical experience, the program seeks to prepare graduates who will drive the future of AI and data science, advancing technology in Yemen and beyond.

3- Mapping of Program Objectives with the University, Faculty and Department Objectives:

University Objectives	Faculty of Computer Science &Information Technology Objectives	Department of Computer Science Objectives	Artificial Intelligence & Data Science Program Objectives
1. Ensuring the application of quality standards and having the distinction standards in medical and applied sciences, scientific research and community service. 2. Adopting student-centered learning, the partnership with them for life, consolidating the principles of national responsibility and faith identity, looking after them and developing their capabilities after graduation and during work. 3. Attracting and Eemploying scientists, cadres and talents to gain minds and put an end for the "brain drain" in a way that promotes and ensures the availability of thinkers, businessmen and good citizens. 4. Developing the distinguished academic infrastructure continuously and establishing modern research and service centers with high efficiency that can give a real effect locally and regionally.	1. Applying Total Quality Standards, and setting an academic excellence in medical technology sciences, scientific research and community service. 2. Centrality of students in the educational process, their participation, as well as, looking after them, establishing originality values and developing their potential after graduation and during work. 3. Attracting highly scholars cadres, and highly specialized talents in medical technology thus enhances and ensures that there are thinkers, businessmen, and good citizens. 4. Harnessing all available capabilities of infrastructure, academic, training centers, as well as, modern researches	1. Academic Excellence: Apply rigorous quality standards in Artificial Intelligence and Data Science education, research, and community service to establish a department known for academic excellence in technology sciences. 2. Student-Centric Education: Prioritize students in the educational process by fostering an environment of engagement, personal development, and lifelong learning, preparing them for meaningful careers in the field of data science. 3. Talent Attraction: Attract and develop highly skilled professionals and scholars in Artificial Intelligence and Data Science who will contribute to the academic, technological, and economic growth of the all sector and the wider community.	**POE6. Prepare Graduates for Successful Careers:** Equip students with the technical, analytical, and problem-solving skills necessary to excel in the rapidly evolving field of Artificial Intelligence and Data Science, ensuring they are prepared to contribute meaningfully to the workforce and technological advancements. **POE7. Foster Innovation and Research:** Encourage students to engage in innovative research and apply AI and data science techniques to real-world challenges, thus enabling them to make valuable contributions to the development of AI-driven solutions within various sectors in Yemen and globally. **POE8. Promote Ethical and Social Responsibility:** Instill in students a strong sense of ethical responsibility, ensuring they approach AI and data science solutions with integrity and in a way that benefits society as a

University Objectives	Faculty of Computer Science &Information Technology Objectives	Department of Computer Science Objectives	Artificial Intelligence & Data Science Program Objectives
5. Enhancing the university status as a preferred partner for local, regional and international partnership through implementing creative styles of education, exchanging researches and knowledge, and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	and service centers and available educational laboratories to achieve the desired goals of the college of medical technology in order to meet the needs of the labor market. 5. Enhance the university and college position as an ideal partner for the academic and health sectors at the local, regional and international levels by providing educational programs for developing professional practices and useful health-care services.	4. State-of-the-Art Infrastructure: Leverage modern infrastructure, academic resources, and research centers to enhance the educational and research outcomes in Artificial Intelligence and Data Science, ensuring that graduates are well-equipped to meet the evolving needs of the all sector. 5. Partnership and Collaboration: Strengthen the department's position as an ideal partner for both academic and healthcare institutions at local, regional, and international levels, fostering collaborations that lead to innovative AI solutions through data science and artificial intelligence.	whole, contributing to the responsible use of technology for the greater good. **POE9. Encourage Lifelong Learning and Professional Development:** Develop students' abilities to continue learning and evolving throughout their careers by providing them with the tools and foundation necessary to stay current with emerging AI and data science trends, fostering a mindset of continuous improvement and professional growth. **POE1. Strengthen Collaborative Partnerships:** Equip students with the skills to collaborate effectively with professionals across sectors, both locally and globally, fostering partnerships that promote the advancement of AI solutions and drive meaningful technological innovations within industries and society.

Annex- 6, Alignment of Program Intended Learning Outcomes (PILOs) to the Faculty Objective

Program PILOs	Faculty Objectives				
	FObj1	FObj2	FObj3	FObj4	FObj5
A1	√		√		
A2		√		√	
A3	√		√	√	
A4	√			√	
B1	√	√			√
B2				√	√
B3			√	√	√
B4					
C1			√	√	
C2				√	
C3	√		√		
C4					
D1	√	√			√
D2		√			√
D3		√			√
D4			√	√	√

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Annex- 7, Alignment of Program Intended Learning Outcomes (PILOs) to the Department Objective

Program PILOs	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
A1	√				
A2	√	√			
A3	√				
A4		√			√
B1	√	√			
B2		√			
B3		√			√
B4		√			√
C1	√		√		
C2		√	√		
C3	√	√	√		
C4					
D1				√	
D2					
D3				√	
D4	√				√

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Annex- 8, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)

Program PILOs	Program Objectives				
	POBj1	POBj2	POBj3	POBj4	POBj5
A1	√			√	
A2		√			
A3	√	√	√	√	
A4			√	√	
B1		√		√	
B2		√		√	
B3	√		√		
B4		√			
C1	√	√		√	
C2				√	
C3				√	
C4					
D1				√	
D2					√
D3					
D4					

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Annex- 9, Mapping of Program Objectives to the Faculty Mission

Program Objectives	Faculty Mission				
	Highly qualified graduates	Professional skills	Knowledge contribution	Society needs	Excellent academic programs
PObj1	√				√
PObj2		√	√		√
PObj3	√	√	√		
PObj4			√	√	√
PObj5	√	√		√	

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Annex- 10, Mapping Program Objectives to the Department Mission

Program Objectives	Department Mission			
	Professional education	Excellent academic programs	Competitive graduates	Employment needs
POobj1		√	√	
POobj2	√	√		
POobj3	√		√	
POobj4		√		√
POobj5	√		√	√

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Annex- 11, Mapping of Program Objectives (POs) to the Department Objectives

Program Objectives	Department Objectives				
	DObj1	DObj2	DObj3	DObj4	DObj5
PObj1	√		√		
PObj2	√	√			
PObj3		√			
PObj4	√		√		
PObj5		√	√		

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Annex- 12, Survey of PILOs for Similar Accredited Programs at National and International Universities

Program PILOs	Similar Accredited Programs					
	Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University
A1		A1			1,5,6	
A2					2	
A3						
A4		A2			11,19	e
B1	SLO-1	B2	1	1,3	8,11,14,20	b, d
B2				5	12	
B3		B3			10	
B4	SLO-2	B4	2	3		d, e
C1	SLO-6		6	1	7,8,17	a
C2	SLO-2	C2	2	2	12,17	c
C3						
C4						
D1	SLO-5	D4	5	7	15,26	h
D2	SLO-4	D3	4	1,7	23	f, g
D3	SLO-3	D1	3	4	24	
D4		D2		2	28,29	k

Artificial Intelligence & Data Science Program Specifications

Annex- 13, Alignment of Program PILOs with Council of Accreditation and Standards

Accreditation Body: National Academic Reference Standards (NARS), Yemen, May 2018 If Any

Program PILOs	NARS (Yemen), ILOs for Programs	ABET Criterion-3 Student Outcome
A1	A1	--
A2	--	--
A3	A3	--
A4	--	--
B1	B1	1
B2	--	--
B3	B2	1
B4	B3	2
C1	--	6
C2	C2	2
C3	C4	--
D1	D1	5
D2	D6	4
D3	D4	3
D4	D3	4

1- National Academic Reference Standards Computing Programs, Yemen, May 2018:

I. GRADUATE ATTRIBUTES

Upon successful completion of an undergraduate Computing program, the graduates will be able to:

1. Demonstrate a sound understanding of the body of knowledge in the field of computing.
2. Employ mathematics and logic in the field of computing.
3. Utilize problem-solving, critical thinking skills and techniques effectively to solve computing problems.
4. Apply and evaluate various computing tools and techniques.
5. Evaluate the current computing systems and applications based on specific criteria to meet the requirements of developing new computing systems and applications.
6. Demonstrate efficient communication, teamwork, leadership and interpersonal skills.
7. Engage in self and life-long learning personally and academically, in scientific research and career development.
8. Display commitment to professional, ethical, legal, security and social responsibilities.
9. Adhere to quality standards in computing field.

II. LEARNING OUTCOMES

A. Knowledge and Understanding

Upon successful completion of the undergraduate computing programs, the graduates will be able to demonstrate understanding of:

A1. Show an understanding of the essential facts, concepts, principles and theories related to the field of computing.
A2. Demonstrate a strong knowledge in mathematics and logic needed in the field of computing
A3. Demonstrate a profound knowledge in utilizing and adapting computing tools, techniques, practices, and methods for solving the real-world computing problems
A4**.** Exhibit a sound understanding of the concepts related to analysis and design, implementation and evaluation of secured computer-based systems.
A5. Identify user and business needs relevant to the field of computing.
A6. Demonstrate an understanding of research fundamentals in the field of Computing.

B. Cognitive / Intellectual Skills

Upon successful completion of an undergraduate computing program, the graduates will be able to:

B1. Critically analyze a problem using the mathematical principles, appropriate tools and techniques.
B2. Select an appropriate model/framework for solving a computing problem in hand.
B3. Compare and evaluate different alternative solutions related to a particular computing problem.
B4. Critically understand, summarize and evaluate relevant information in computing.

C. Practical and Professional Skills:

Upon successful completion of an undergraduate computing program, the graduates will be able to:

C1. Evaluate quality attributes in the systems, provide suitable solutions for problems and propose appropriate implementable plans for improvement.
C2. Implement and test computer programs and applications.
C3. Use effectively operating systems, programming languages and software tools.
C4. Deploy computing tools and techniques to solve technical problems in work environment.
C5. Assess risks, their subsequent implications and safety aspects within a specific context**.**

D. General and Transferable Skills

Upon successful completion of an undergraduate engineering education program, the graduates will be able to:

D1. Work effectively individually or within a team, and in stressful environments.
D2. Demonstrate key skills such as creative thinking, analytical study, employment and interpersonal skills.
D3. Acquire life-long learning and professional development skills.
D4. Write and present a technical report effectively.
D5. Communicate effectively using various communication media and technologies.
D6. Demonstrate commitment to moral, ethical, legal, social norms and responsibilities in the computing practices.

2- Proposed Program Criteria for Data Science and Similarly Named Computing Programs

These program criteria apply to computing programs using data science, data analytics or similar terms in their titles.

1- Criterion 3. Student Outcomes

The program must have documented and publicly stated student outcomes that include (1) through (5) below and any outcomes required by applicable Program Criteria. The program may define additional outcomes.

Graduates of the program will have an ability to:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply theory, techniques, and tools throughout the data analysis lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.

2- Criterion 5. Curriculum

The curriculum requirements specify topics, but do not prescribe specific courses. These requirements are:

(a) At least 45 semester credit hours (or equivalent) of data science course work that must cover:

1. Fundamental data analysis lifecycle topics
    a) Data acquisition
    b) Data management
    c) Data preparation and integration
    d) Data analysis
    e) Model development and deployment
    f) Visualization
2. Concepts that span and are applied to the data analysis lifecycle
    a) Data privacy, governance, and stewardship
    b) Statistics and mathematics
    c) Computing, including substantial coverage of data structures, algorithms, and at least one programming language
3. Advanced data science coursework that provides depth.
4. Coverage of at least one application domain area to provide a context for data science activities.
5. A major project that:
    a) incorporates an application domain area.
    b) requires integration and application of knowledge and skills acquired in earlier course work.

Artificial Intelligence & Data Science Program Specifications

Annex- 14, Survey of Credit Hours of Similar Programs

Benchmarking		21 september University of Medical and Applied Science	Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technologica l University	Average Cr. Hrs.
University Requirements	Credit Hours	14	12		12		-	17	11
	Percentage	12.5%	9%		9%		-	13%	9%
University Electives	Credit Hours	-	12		15		-	21	9.6
	Percentage	-	9%		11%		-	16%	7%
Faculty Requirements	Credit Hours	36	19		25		-	5	17
	Percentage	26.8%	14%		19%		-	4%	13%
Faculty Electives	Credit Hours	-	-		-		-	-	0
	Percentage	-	-		-		-	-	0
Department Requirements	Credit Hours	24	-		-		-	-	4.8
	Percentage		-		-		-	-	0
Major Requirements	Credit Hours	57	72	360 ECTS	58	164 ECTS	104 ECTS	52	123.86
	Percentage		55%	100%	44%		58 % +	39%	48%
Major Electives	Credit Hours	9	9		12	3 ECTS	28 ECTS	18	13.17
	Percentage		7%		9%		15.5 % +	14%	11%
Practical Courses	Credit Hours		5		4		30 ECTS	-	9.75
	Percentage		4%		3%		17 %	-	6%
Training Courses	Credit Hours		0	120	3		-	10	26.6
	Percentage		0%		2%		-	8%	3%
Project Courses	Credit Hours		3		3	13 ECTS	18 ECTS	8	9
	Percentage		2%		2%		10 %	6%	5%
Total Credit Hours	Credit Hours	131	132	360 ECTS	132	180 ECTS	180 p	131	178

Artificial Intelligence & Data Science Program Specifications

Annex- 15, Survey of Number of Courses and Credit Hours of Similar Programs

University		21 september University of Medical and Applied Science		Al-Ahliyya Amman University		University of East London		Princess Sumaya University for Technology		University of Applied Sciences and Arts of Italian Switzerland (SUPSI)		Maastricht University		Nanyang Technological University		Average	
Total Courses and Cr. Hrs.		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
University Requirements	Compulsory	14	7	12	4			12	8			-	-	17	7		
	Electives	-	-	12	4			15	5			-	--	21	7		
Faculty Requirements	Compulsory	36	12	21	9			25	8			-	-	5	2		
	Electives	-	-	-	-			-	-			-	-	-	-		
Department Requirements	Compulsory	24	8	-	-			-	-					-	-		
	Electives	-	-	-	-			-						-	-		
Major Requirements	Compulsory			72	24	360 ECTS	17	58	20	164 ECTS	39	104 ECTS	26	52	18		
	Electives			9	3			12	4	3 ECTS	1	28 ECTS	7	18	3		
	Graduation Project			3	2			3	2	13 ECTS	1	18 ECTS	1	8	2		
	Summer Training			-	-	120 p	1	-	-			-	-	-	-		
	Industrial Training			0	1			3	1			-	-	10	1		
	Practical Skills			3	3			4	4			30 ECTS	5	-	-		
Other Courses				-	-	--			--	--					--	--	
Total		Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses	Cr. Hrs.	Courses
				132	50	360 ECTS	17	132	48	180ECTS		180 p	39	131	40		

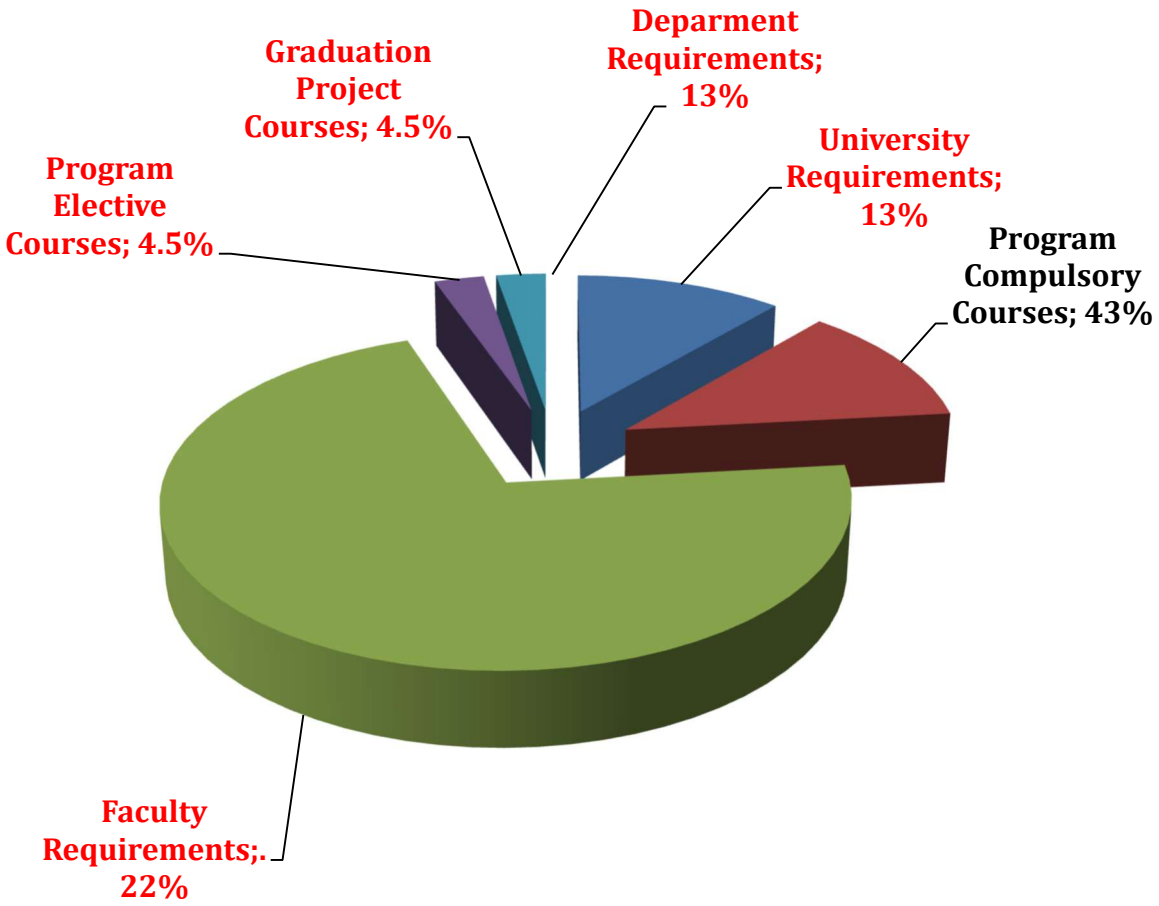
Artificial Intelligence & Data Science Program Specifications

Annex- 16, Themes of Courses of Study and their Weightage

#	Themes	No. of Courses	Credit Hours	Percentage of Cr. Hrs.
0	General Culture (Univ. Requirements)	7	14	13%
1	General Courses (Department Requirements)	6	18	13%
2	General Courses (Faculty Requirements)	12	36	27%
3	General Courses (Program Requirements)	21	63	47%
Program Total		47	131	100

* The Project Courses Credit Hours are already added to the total credit hours with the faculty requirements.

Themes of Courses of Study and their Weightage



Artificial Intelligence & Data Science Program Specifications

Annex- 17, Coding System

Program	Level	Semester	Theme	No. of the course in the list
			0 (no pre) / 1(have pre)	

Example: DAI3612

Program	Level	Semester	Theme	No. of the course in the list
DAI	3	6	1	2

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
General Culture (Univ. Requirements)	0	**1.**	English 101	06.11.701	2	2	0	0		1/1
		2.	Arabic Israeli Conflict	06.11.702	2	2	0	0		1/1
		3.	English 102	06.11.703	2	2	0	0		1/2
		4.	Islamic Culture	06.11.704	2	2	0	0		1/2
		5.	Arabic 101	06.11.705	2	2	0	0		1/1
		6.	Arabic 102	06.11.706	2	2	0	0		1/2
		7.	National Culture	06.11.707	2	2	0	0		1/2
Total					14	14	0	0		

Themes		No.	Course Title		Credit Hours		Level/Term

	Theme Code			Course Code	Cr. Hrs.	L	T	P	Prerequisites/ Co-requisites	
General Courses (Department Requirements)	1	**1.**	Discrete Mathematics	07.11.701	3	3				1/1
		2.	Calculus (1)	07.11.702	3	3				1/1
		3.	Calculus (2)	07.11.703	3	3				1/2
		4.	Logic Design	07.11.704	3	2	2			1/2
		5.	Linear Algebra	07.11.705	3	3				2/1
		6.	Object Oriented Programming	07.11.706	3	2		2		2/1
Total					**18**	**16**	**2**	2		

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
General Courses (Faculty Requirements)	2	**1.**	Introduction to Information Technology	07.11.707	3	2	0	2		1/1
		2.	Programming 1	07.11.708	3	2	0	2		1/1
		3.	Fundamentals of Database Systems	07.11.709	3	2	0	2		1/2
		4.	Programming 2	07.11.710	3	2	0	2		1/2
		5.	Statistics and Probability	07.11.711	3	3	0	0		1/2
		6.	Database Management Systems	07.11.712	3	2	0	2		2/1
		7.	System Analysis and Design	07.11.713	3	2	2	0		3/1
		8.	Operating Systems	07.11.714	3	3	0	0		3/5
		9.	Occupational Ethics	07.11.715	3	3	0	0		3/2
		10.	Research Methodology	07.11.716	3	3	0	0		3/2
		11.	Project 1	07.11.717	3	0	0	6		4/1
		12.	Project 2	07.11.718	3	-	0	6		4/2
Total					**36**	**27**	**2**	**16**		

Themes		No.	Course Title		Credit Hours		Level/Term

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	Theme Code			Course Code	Cr. Hrs.	L	T	P	Prerequisites/ Co-requisites	
General Courses (Program Requirements)	3	**1.**	Computing and Problem Solving	07.13.719	3	3				1/1
		2.	Data Structures	07.13.720	3	2		2		2/1
		3.	Computer Organization and Architecture	07.13.721	3	2		2		2/1
		4.	Introduction to Artificial Intelligence	07.13.722	3	3		0		2/2
		5.	Web Design and Development	07.13.723	3	2		2		2/2
		6.	Design and Analysis of Algorithms	07.13.724	3	2		2		2/2
		7.	Computer Networking	07.13.725	3	2		2		2/2
		8.	Statistical Analysis for Data Science	07.13.726	3	3				2/2
		9.	Programming for AI and Data Science	07.13.727	3	2		2		3/1
		10.	Business Intelligence	07.13.728	3	3		0		3/1
		11.	Machine Learning	07.13.729	3	2		2		3/1
		12.	Mobile Application Development	07.13.730	3	2		2		3/2
		13.	Data Mining and Data Warehousing	07.13.731	3	3		0		3/2
		14.	Software Engineering	07.13.732	3	2	2	0		3/2
		15.	Information Security	07.13.733	3	2		2		3/2
		16.	Artificial Neural Networks	07.13.734	3	3				4/1
		17.	Introduction to Robotics	07.13.735	3	2		2	-	4/1
		18.	Elective-1	07.13.736	3	3			-	4/1
		19.	Natural Language Processing	07.13.737	3	3			-	4/2
		20.	Elective – 2	07.13.738	3	3			-	4/2
		21.	Data Analytics	07.13.739	3	3			-	4/2
Total					63	50				

Themes	Theme Code	No.	Course Title	Course Code	Credit Hours				Prerequisites/ Co-requisites	Level/Term
					Cr. Hrs.	L	T	P		
	5	**1.**	Project 1	07.11.717	3	-	-	6	Completing Sem6	4/1

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Graduation Project Courses		**2.**	Project 2	07.11.718	3	-	-	6		4/2
Total										

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Annex- 18, Survey of Course Names per Academic Semesters of Similar Programs

University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
No of Courses		50	18	55	27	39	11	49
Total Cr. Hrs.		132	480 CP	132	213 CP	180 ECTS	131	137
Total Years		4	4 Year	4 Years	3 Years	3 Years	4 Years	4 Years
Level 1								
Semester	No	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name
1	1	Introduction to Information Technology	Information Systems Modelling and Design	Arabic Language (Remedial)	Introduction to Computer Programming	Introduction to Computer Science 1	Introduction to Computational Thinking & Programming	Arabic 101
	2	Mathematics (1)	Software Development	English Language (Remedial)	Ethics and Artificial Intelligence	Introduction to Data Science and Artificial Intelligence	Calculus	English 101
	3	Discrete Mathematics	Web Technologies	Introduction to Computer Science	Linear Algebra	Computational and Cognitive Neuroscience	Discrete Mathematics	Islamic Culture
	4	Arabic Communication Skills		Calculus (1)	Calculus	Introduction to Computer Science 2	Inquiry and Communication in an Interdisciplinary World	National Culture
	5	English Communication Skills		Discrete Mathematics (1)	Probability and Statistics	Calculus	Navigating the Digital World	Introduction to Information Technology
	6				Operating Environments	Discrete Mathematics	Broadening & Deepening Elective	Physics
	7					Project 1-1		Communication Skills and Presentation
	8	Elective University Requirements 1						Mathematics 1
	9							
--		--	--	--	--	--	--	--

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University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
2	1	Introduction to Programming	Maths for Computing	Arabic Language	Numerical Analysis and Optimization	Data Structures and Algorithms	Data Structures & Algorithms	Arabic 102
	2	Introduction to programming Lab	Computer Systems and Networks	English Language	English B2	Linear Algebra	Object Oriented Design and Programming	English 102
	3	Networks and Information Security Essentials	Mental Wealth; Professional Life 1 (IT Project Pitching)	Military Science	Communication and Presentation	ICT and Knowledge Management	Introduction to Data Science & AI	Arabic Israeli Conflict
	4	Digital Logic Design A		Structured Programming	Project Management	Logic	Ethics & Moral Reasoning in a Multi-Cultural World	Digital Logic Design
	5	Statistics & Probability		Calculus (2)	Data Challenge: Annual Practical Project in Applied Data Science	Numerical Mathematics	Healthy Living & Mental Well-being in an Aging Society	Fundamentals of Database Systems
	6	National Education		Statistical Methods	Hackathon	Software Engineering	Broadening & Deepening Elective	Discrete Mathematics
	7			Structured Programming Lab		Project 1-2		Programming 1
	8	Visual Programming			Applied Operations Research	Elective 1	Science & Technology for Humanity	Mathematics 2
	9	Internet Applications Development Lab(1)*		Digital Image Processing	Applied Case Studies of Machine Learning and Deep Learning in Key Areas	Elective 3		
		--	--	--	--	--	--	--

Level 2								
Semester	**No**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Object Oriented Programming	Database Systems	Community Service	Supervised Learning	Databases	Algorithm Design and Analysis	Programming 2
	2	Object-oriented Programming Lab*	Data Structures & Algorithms	National Education	Software Modelling with Applications	Graph Theory	Software Engineering	Data Structures and Algorithms

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University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
	3	Fundamentals of Databases	Artificial Intelligence	Arabic Islamic Civilization	Calculus and Algebra 2	Probability and Statistics	Probability and Introduction to Statistics	Database Management Systems
	4	Fundamentals of Databases Lab*		Technical Writing and Communication Skills	Data Visualization	Linear Programming	Linear Algebra for Scientists	Linear Algebra
	5	Artificial Intelligence		Linear Algebra	Data Management	Machine Learning	Sustainability: Human Society Economic & Environment	Computer Organization and Architecture
	6	Introduction to Data Science		Statistics and Probability for Data Science	Communication and Reporting	Reasoning Techniques	Career and Entrepreneurial Development for the Future World	System Analysis and Design
	7			Object Oriented Programming Lab		Project 2-1		Statistics and Probability
	8							
--		--	--	--	--	--	--	--
2	1	Data Engineering	Mental Wealth; Professional Life 2 (Computing in Practice)	Introduction to Society, Technology and Environment Protection	Unsupervised Learning	Human Computer Interaction & Affective Computing	Introduction to Database Systems	Computer Networks 1
	2	Data Engineering Lab	Business Intelligence Analysis	Contemporary Issues in the Arab World	Parallel and Concurrent Programming	Mathematical Modelling	Artificial Intelligence	Introduction to AI and DS
	3	Machine Learning & Deep Learning	Programming for Data Science	Data Structures and Introduction to Algorithms	Algorithm Design	Theoretical Computer Science	Statistics	Object Oriented programming
	4	Systems Analysis & Design		Introduction to Data Science	Vertical Domain Application in Key Areas	Philosophy & Artificial Intelligence	Data Analysis with Computer	Programming for AI and DS
	5	Data Structures			Data Challenge: Annual Project in Applied Data Science	Simulation and Statistical Analysis	Scientific Communication	Operating System

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University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
	6	Elective University Requirements2			Hackathon	Project 2-2		Business Intelligence
	7							
--		--	--	--	--	--	--	--
		Level 3						
Semester	No	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Data Mining	Placement	Algorithms Design and Analysis	Advanced Machine Learning	Parallel Programming Elective	Machine Learning	Web Design and Development 2
	2	Big Data		Database Systems	Deep Learning and Computer Vision	Robotics and Embedded Systems Elective	Data Analytics and Mining	Machine Learning
	3	Natural Language Processing		Operating Systems	Big Data Processing	Semantic Web	Calculus III	Data Mining and Warehousing
	4	Algorithms Analysis and Design		Database Systems Lab	Bayesian Data Analysis and Probabilistic Programming	Elective 1	Major Prescribe Elective	Computer Network 2
	5	Internet Applications Development (1)		Operating Systems Lab	Ethics, Law and Privacy in Data and Analytics	Elective 2	Broadening & Deepening Elective	Mobile Application Development
	6	Computer Organization & Architecture		Artificial Intelligence	Data Challenge: Annual Project in Applied Data Science	Project 3-1		Research Methodology
	7				Hackathon			
	8							
--		--	--	--	--	--	--	--
2	1	Operating Systems	Placement	Data Engineering	Natural Language Processing and Text Mining	Data Analysis	Professional Internship	Video and Image Processing
	2	Data Visualization		Data Engineering Lab	Time Series, Analytics and Forecasting	Operations Research Case Studies		Natural Language Processing

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University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
	3	Pattern Recognition		Software Engineering	Data Security and Blockchain	Intelligent Systems		Distributed and Cloud Computing
	4	Internet Applications Development (2)		Distributed Systems	Applied Case Studies of Machine Learning and Deep Learning in Key Areas	Bachelor's Thesis		Human Computer Interactions
	5	Linear Algebra		Natural Language Processing	Thesis			Big Data analysis and visualization
	6	Elective Major Requirements 1		Computer Architecture for Machine Learning				Information Security and Audit
	7			Special Topic in Data Science and AI (1)				
	8			Scientific Research Methods				
--		--	--	--	--	--	--	--

Level 4								
Semester	**No**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**	**Course Name**
1	1	Business Intelligence	Big Data Infrastructure & Manipulation	Entrepreneurship for Business			Final Year Project	Deep Learning and Artificial Neural Networks
	2	Parallel Computing and Distributed Systems	Project Management	Advanced Topics in Internet Programming			Major Prescribe Elective	Decision Support Systems
	3	Statistics and Probability for Data Science		High Performance Computing for Big Data			Broadening & Deepening Electives	Elective 1
	4	Graduation Project (1)		Information Systems Security				Final Project 1
	5	Elective Major Requirements 2		Computer and Society				
	6	Elective University Requirements 3		Practical Training				

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University		Al-Ahliyya Amman University	University of East London	Princess Sumaya University for Technology	University of Applied Sciences and Arts of Italian Switzerland (SUPSI)	Maastricht University	Nanyang Technological University	21 UMAS
	7			Graduation Project 1				
--		--	--	--	--	--	--	--
2	1	Graduation Project (2)	Mental Wealth; Professional Life 3 (Project)	Data Visualization			Final Year Project	Final Project 2
	2	Practical Training	Enterprise Architecture and Cloud Computing	Pattern Recognition			Major Prescribe Elective	Occupational Ethics
	3	Ethical and Professional Issues in Computing	Advanced Topics in Data Science and AI	Data Mining			Broadening & Deepening Electives	Elective 2
	4	Military Sciences		Business Intelligence				Robotics and Intelligence Systems
	5	Elective Major Requirements 3		Computer Vision				
	6	Elective University Requirements 4		21st Century Skills				
	7			Graduation Project 2				
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Artificial Intelligence & Data Science Program Specifications

Annex- 19, Comparison of Program Courses and Similar Programs Courses

#	Al-Ahliyya Amman University					University of East London					Princess Sumaya University for Technology					University of Applied Sciences and Arts of Italian Switzerland (SUPSI)					Maastricht University					Nanyang Technological University					21 umas				
	Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours				Course	Course Hours			
		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P		CH	L	T	P
	Level 1																																		
1	Introduction to Information Technology	3				Information Systems Modelling and Design	20				Arabic Language (Remedial)	0				Introduction to Computer Programming	9				Introduction to Computer Science 1	4				Introduction to Computational Thinking & Programming	3				Discrete Mathematics	**3**	**3**		
2	Mathematics (1)	3				Software Development	20				Arabic Language (Remedial)	0				Ethics and Artificial Intelligence	4				Introduction to Data Science and Artificial Intelligence	4				Calculus	4				Calculus (1)	**3**	**3**		
3	Discrete Mathematics	3				Web Technologies	20				English Language (Remedial)	0				Linear Algebra	6				Computational and Cognitive Neuroscience	4				Discrete Mathematics	3				Computing and Problem Solving	**3**	**3**		
4	Arabic Communication Skills	3									Introduction to Computer Science	3				Calculus 1	9				Introduction to Computer Science 2	4				Inquiry and Communication in an Interdisciplinary World	2				Introduction to Information Technology	**3**	**2**		**2**
5	English Communication Skills	3									Calculus (1)	3				Probability and Statistics	6				Calculus	4				Navigating the Digital World	2				Programming 1	**3**	**2**		**2**
6											Discrete Mathematics (1)	3				Operating Environments	4				Discrete Mathematics	4				Broadening & Deepening Elective	3				English 101	**2**	**2**		
7																					Project 1-1	6									Arabic Israeli Conflict	**2**	**2**		

1	Introduction to Programming	4				Math for Computing	20				Arabic Language	3				Numerical Analysis and Optimization	6				Data Structures and Algorithms	4				Data Structures & Algorithms	3				Calculus (2)	**3**	**3**		
2	Introduction to Programming lab	1				Computer Systems and Networks	20				English Language	3				English B2	6				Linear Algebra	4				Object Oriented Design and Programming	3				Logic Design	**3**	**2**	**2**	
3	Networks and Information Security Essentials	3				Mental Wealth; Professional Life 1 (IT Project Pitching)	20				Military Science	3				Communication and Presentation	2				ICT and Knowledge Management	4				Introduction to Data Science & AI	3				Fundamentals of Database System	**3**	**2**		**2**
4	Digital Logic Design A	3									Structured Programming	3			1	Project Management	2				Logic	4				Ethics & Moral Reasoning in a Multi-Cultural World	2				Programming 2	**3**	**2**		**2**
5	Statistics & Probability	3									Calculus (2)	3				Data Challenge: Annual Practical Project in Applied Data Science	4				Numerical Mathematics	4				Healthy Living & Mental Well-being in an Aging Society	3				Statistics and Probability	**3**	**3**		
6	National Education	3									Statistical Methods	3				Hackathon	2				Software Engineering	4				Broadening & Deepening Elective	3				English 102	**2**	**2**		
7																					Project 1-2	6									Islamic Culture	**2**	**2**		
	Level 2																																					
1	Object Oriented Programming	3				Database Systems	20				Community Service	0				Supervised Learning	6				Databases	4				Algorithm Design and Analysis	3				Data Structures	**3**	**2**		**2**
2	Object-oriented Programming Lab*	1				Data Structures & Algorithms	20				National Education	3				Software Modelling with Applications	5				Graph Theory	4				Software Engineering	3				Computer Organization and Architecture	**3**	**2**		**2**
3	Fundamentals of Databases	3				Artificial Intelligence	20				Arabic Islamic Civilization	3				Calculus and Algebra 2	5				Probability and Statistics	4				Probability and Introduction to Statistics	4				Linear Algebra	**3**	**3**		
4	Fundamentals of Databases Lab*	1									Technical Writing and Communication Skills	3				Data Visualization	4				Linear Programming	4				Linear Algebra for Scientists	3				Object Oriented Programming	**3**	**2**		**2**

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5	Artificial Intelligence	3									Linear Algebra	3				Data Management	5				Machine Learning	4				Sustainability: Human Society Economic & Environment	3				Database Management Systems	**3**	**2**		**2**
6	Introduction to Data Science	3									Statistics and Probability for Data Science	3				Communication and Reporting	2				Reasoning Techniques	4				Career and Entrepreneurial Development for the Future World	2				Arabic 101	**2**	**2**		
7	Elective University Requirements 1	3									Object Oriented Programming	3			1	Hackathon	2				Project 2-1	6													
8																																					
1	Data Engineering	3				Mental Wealth; Professional Life 2 (Computing in Practice)	20				Introduction to Society, Technology and Environment Protection	0				Unsupervised Learning	4				Human Computer Interaction & Affective Computing	4				Introduction to Database Systems	3				Introduction to Artificial Intelligence	**3**	**2**		**2**
2	Data Engineering Lab	1				Business Intelligence Analysis	20				Contemporary Issues in the Arab World	3				Parallel and Concurrent Programming	4				Mathematical Modelling	4				Artificial Intelligence	3				Web Design and Development	**3**	**2**		**2**
3	Machine Learning & Deep Learning	3				Programming for Data Science	20				Data Structures and Introduction to Algorithms	3				Algorithm Design	6				Theoretical Computer Science	4				Statistics	4				Design and Analysis of Algorithms	**3**	**2**		**2**
4	Systems Analysis & Design	3									Introduction to Data Science	3				Vertical Domain Application in Key Areas	4				Philosophy & Artificial Intelligence	4				Data Analysis with Computer	3				Computer Networking	**3**	**2**		**2**
5	Data Structures	3														Data Challenge: Annual Project in Applied Data Science	4				Simulation and Statistical Analysis	4				Scientific Communication	2				Statistical Analysis for Data Science	**3**	**3**		
6	Visual Programming	3														Applied Operations Research	4				Elective 1	4				Science & Technology for Humanity	3				Arabic 102	**2**	**2**		
7	Elective University Requirements 2	3														Hackathon	2				Project 2-2	6													
Level 3																																					

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1	Data Mining	3				Placement					Algorithms Design and Analysis	3				Advanced Machine Learning	4				Parallel Programming	4				Machine Learning	3				Programming for AI	**3**	**2**		**2**
2	Big Data	3									Database Systems	3			1	Deep Learning and Computer Vision	4				Robotics and Embedded Systems	4				Data Analytics and Mining	3				Business Intelligence	**3**	**3**		
3	Natural Language Processing	3									Operating Systems	3			1	Big Data Processing	4				Semantic Web	4				Calculus III	4				Machine Learning	**3**	**2**		**2**
4	Algorithms Analysis and Design	3									Digital Image Processing	3				Bayesian Data Analysis and Probabilistic Programming	4				Elective 1	4				Major Prescribe Elective	6				System Analysis and Design	**3**	**3**		
5	Internet Applications Development (1)	3									Artificial Intelligence	3				Ethics, Law and Privacy in Data and Analytics	2				Elective 2	4				Broadening & Deepening Elective	3				Operating Systems	**3**	**2**	**2**	
6	Internet Application Development Lab (1)	1														Applied Case Studies of Machine Learning and Deep Learning in Key Areas	6				Elective 3	4									National Culture	**2**	**2**		
7	Computer Organization & Architecture	3														Data Challenge: Annual Project in Applied Data Science	4																		
8																Hackathon	2																		
1	Operating Systems	3				Placement					Data Engineering	3			1	Natural Language Processing and Text Mining	4				Data Analysis	4				Professional Internship	10				Mobile Application Development	**3**	**2**		**2**
2	Data Visualization	3									Software Engineering	3				Time Series, Analytics and Forecasting	4				Operations Research Case Studies	4									Data Mining and Data Warehousing	**3**	**2**		**2**
3	Pattern Recognition	3									Distributed Systems	3				Data Security and Blockchain	4				Intelligent Systems	4									Software Engineering	**3**	**3**		
4	Internet Applications Development (2)	3									Natural Language Processing	3				Applied Case Studies of Machine Learning and Deep Learning in Key Areas	4				Bachelor's Thesis	18									Information Security	**3**	**2**		**2**

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5	Linear Algebra	3									Computer Architecture for Machine Learning	3				Major Elective	3													Occupational Ethics	**3**	**3**		
6	Elective Major Requirements 1	3									Special Topic in Data Science and AI (1)	3				Thesis	13													Research Methodology	**3**	**3**		
7											Scientific Research Methods	3																							
Level 4																																
1	Business Intelligence	3				Big Data Infrastructure & Manipulation	20				Entrepreneurship for Business	3													Final Year Project	4				Artificial Neural Networks	**3**	**2**		**2**
2	Parallel Computing and Distributed Systems	3				Project Management	20				Advanced Topics in Internet Programming	3													Major Prescribe Elective	6				Introduction to Robotics	**3**	**3**		
3	Statistics and Probability for Data Science	3									High Performance Computing for Big Data	3													Broadening & Deepening Electives	6				Elective-1	**3**	**-**	**-**	**-**
4	Graduation Project (1)	1									Information Systems Security	3																		Project 1	**3**	**-**	**-**	**6**
5	Elective Major Requirements 2	3									Computer and Society	1																							
6	Elective University Requirements 3	3									Practical Training	3																							
7											Graduation Project 1	1																							
1	Graduation Project (2)	2				Mental Wealth; Professional Life 3 (Project)	20				Data Visualization	3													Final Year Project	4				Elective – 2	**3**	**-**	**-**	**-**
2	Practical Training	0				Enterprise Architecture and	20				Pattern Recognition	3													Major Prescribe Elective	6				Natural Language Processing	**3**	**3**		

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						Cloud Computing																										
3	Ethical and Professional Issues in Computing	1				Advanced Topics in Data Science and AI	40				Data Mining	3												Broadening & Deepening Electives	6				Data Analytics	**3**	**2**		**2**
4	Military Sciences	3									Business Intelligence	3																	Project 2	**3**	**-**	**-**	**6**
5	Elective Major Requirements 3	3									Computer Vision	3																				
6	Elective University Requirements 4	3									21st Century Skills	3																				
7											Graduation Project 2	2																				

Artificial Intelligence & Data Science Program Specifications

Annex- 20, Matrix of Mapping Program PILO's with Courses

I =Introduction; E=Extension; A=Application

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)													
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills			D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
1.	1/1	07.13.701	Discrete Mathematics	3	3		-	√				√										
2.	1/1	07.13.702	Calculus (1)	3	3			√														
3.	1/1	07.13.703	Computing and Problem Solving	3	3			√				√				√	√	√				
4.	1/1	07.13.704	Introduction to Information Technology	3	2		2	√		√		√			√	√	√			√		√
5.	1/1	07.13.705	Programming 1	3	2		2	√		√		√				√	√					
6.	1/1	07.13.706	English 101	2	2																√	√
7.	1/1	07.13.707	Arabic Israeli Conflict	2	2															√		
8.	1/2	07.13.708	Calculus (2)	3	3			√														
9.	1/2	07.13.709	Logic Design	3	2	2		√		√		√				√	√					

#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)													
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills			D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
10.	1/2	07.13.710	Fundamentals of Database Systems	3	2		2	√				√					√					
11.	1/2	07.13.711	Programming 2	3	2		2	√				√					√					
12.	1/2	07.13.712	Statistics and Probability	3	3			√														
13.	1/2	07.13.713	English 102	2	2																√	√
14.	1/2	07.13.714	Islamic Culture	2	2															√		
15.	2/1	07.13.715	Data Structures	3	2		2	√		√		√				√	√					
16.	2/1	07.13.716	Computer Organization and Architecture	3	2		2	√	√			√						√				√
17.	2/1	07.13.717	Object Oriented Programming	3	2		2	√				√					√					
18.	2/1	07.13.718	Linear Algebra	3	3			√														
19.	2/1	07.13.719	Database Management Systems	3	2		2	√				√			√		√		√			
20.	2/1	07.13.721	Arabic 101	2	2																√	√
21.	2/2	07.13.722	Introduction to Artificial Intelligence	3	2		2	√	√	√		√							√			
22.	2/2	07.13.723	Web Design and Development	3	2		2	√				√				√	√		√			
23.	2/2	07.13.724	Design and Analysis of Algorithms	3	2		2	√				√				√		√				

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#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)													
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills			D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
24.	2/2	07.13.725	Computer Networking	3	2		2	√		√		√					√		√			
25.	2/2	07.13.726	Statistical Analysis for Data Science	3	3			√				√										
26.	2/2	07.13.727	Arabic 102	2	2																√	√
27.	3/1	07.13.728	Programming for AI	3	2		2	√				√						√	√	√		
28.	3/1	07.13.729	Business Intelligence	3	3			√				√			√		√					
29.	3/1	07.13.730	Machine Learning	3	2		2	√	√	√		√							√			
30.	3/1	07.13.731	System Analysis and Design	3	2	2		√				√					√					
31.	3/1	07.13.732	Operating Systems	3	3			√	√	√		√				√	√					
32.	3/1	07.13.733	National Culture	2	2															√		
33.	3/2	07.13.734	Mobile Application Development	3	2		2	√	√		√	√		√		√	√	√	√			√
34.	3/1	07.13.735	Data Mining and Data Warehousing	3	3			√	√	√		√										
35.	3/2	07.13.736	Software Engineering	3	2	2		√				√					√		√	√		√
36.	3/2	07.13.737	Information Security	3	2		2	√		√		√				√			√			
37.	3/2	07.13.738	Occupational Ethics	3	3														√	√	√	√
38.	3/2	07.13.739	Research Methodology	3	3					√	√	√	√	√	√				√	√		
39.	4/1	07.13.740	Artificial Neural Networks	3	2		2	√	√	√		√				√						

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#	Level/ Semester	Course Code	Course Title	Credit Hours	Theory Hours		Lab Hours	Program Intended Learning Outcomes (PILOs)													
					Lecture	Exercise		A. Knowledge & Understanding				B. Intellectual Skills				C. Practical Skills			D. Transferable Skills			
								A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
40.	4/1	07.13.741	Introduction to Robotics	3	2		2	√	√		√	√				√	√	√				
41.	4/1	07.13.742	Elective-1	3	-	-	-	√				√										
42.	4/1	07.13.743	Project 1	3	-	-	6		√			√		√					√	√	√	√
43.	4/2	07.13.744	Natural Language Processing	3	3			√		√		√				√	√					
44.	4/2	07.13.745	Elective – 2	3	-	-	-	√				√										
45.	4/2	07.13.746	Data Analytics	3	3			√			√	√	√	√	√		√	√				
46.	4/2	07.13.747	Project 2	3	-	-	6			√		√	√	√	√	√	√	√	√	√	√	√

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Program Intended Learning Outcomes (PILOs): Artificial Intelligence and Data Science Program

A. Knowledge and Understanding:

Upon successful completion of the undergraduate Artificial Intelligence and Data Science Program, the graduates will be able to:

A1. Demonstrate an understanding of the essential facts, concepts, principles and theories related to the fundamental sciences and the field of Artificial Intelligence and Data Science.

A2. Recognize the recent trends of technology and its impacts on the individuals, organizations, and society in the area of Artificial Intelligence and Data Science.

A3. Demonstrate a profound knowledge in utilizing and adapting computing tools, techniques, practices, and methods for solving the real-world computing problems.

A4. Demonstrate knowledge and understanding of contemporary tools and technologies to produce solutions relevant to the domain of Artificial Intelligence and Data Science to meet a set of agreed requirements**.**

B. Cognitive/ Intellectual Skills:

Upon successful completion of the undergraduate Artificial Intelligence and Data Science Program, the graduates will be able to:

B1. Critically analyze complex computing problems using the basic concepts, principles, analytical and mathematical models, algorithms and software tools related to the field of Artificial Intelligence and Data Science.

B2. Evaluate emerging data analysis technologies and their application to different types and amounts of data related to Artificial Intelligence and Data Science.

B3. Select an appropriate model/framework for developing and managing intelligent-based solutions.

B4. Evaluate a computing-based solution in the context of Artificial Intelligence and Data Science and related disciplines.

C. Practical and Professional Skills:

Upon successful completion of the undergraduate Artificial Intelligence and Data Science Program, the graduates will be able to:

C1. Apply computer science theory, Artificial Intelligence and Data Science, and software development fundamentals to design and develop intelligent-based solutions.

C2. Design, implement, and test a computing-based solution to meet a given set of computing requirements in the context of Artificial Intelligence and Data Science.

C3. Deploy effectively computing tools and techniques used for the construction and documentation of intelligent applications of varying complexity.

D. General and Transferable Skills:

Upon successful completion of the undergraduate Artificial Intelligence and Data Science Program, the graduates will be able to:

D1. Function effectively individually, as a member, or leader of a team engaged in activities appropriate to the Artificial Intelligence and Data Science discipline to accomplish a common goal.

D2. Commit to professional ethics, responsibilities, and norms of professional computing practices.

D3. Communicate effectively in writing and verbally in a variety of professional contexts.

D4. Engage in continuing professional development and lifelong learning as a computing professional.

Attached separately.

Prepared by

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Approved by

Department Head | Faculty Dean | Quality Unit | Vice President