Data Science and Artificial Intelligence Program Specification

(2025-2026)

1. Basic Information

ProgramTitle (according to what is stated in the bylaw):	Data Science and artificial intelligence
Total number of credit hours/points of the program:	138 Hours
Number of academic years/levels (expected program duration):	4 Academic Years (8 Semesters)
Department (s) Participating (if any) in teaching the program:	
Faculty/Institute:	Faculty of Computers and information technology
University/Academy:	Tanta University
Program majors/divisions/tracks/specialties in the final year (if any):	
Partnerships with other parties and the nature of each (if any):	
Name of the program coordinator (attach the assignment decision):	Dr. Marian Wagdy
Program Specification Approval Date:	Click or tap to enter a date.
Council responsible for Program Specification Approval (Attach the Decision / Minutes):	

2. Program Aims (Brief description of the overall purpose the program)

The program aims to:

- Prepare graduates who possess the ability to program machines to simulate the human mind and its functioning, such as its capacity for thinking, discovery, and learning from past experiences.
- Prepare graduates who have the ability to accurately analyze complex data across various fields and effectively communicate the findings to specialists to assist in making optimal decisions.
- Enhance the scientific capabilities of students in their specializations through coordination with relevant business institutions.
- Develop the research abilities of students to prepare them for postgraduate studies in data science and artificial intelligence.
- Equip students with the knowledge, abilities, and skills that enhance their competitive opportunities in the job market.
- Create a distinguished and attractive educational environment in various fields of data science and artificial intelligence.
- Develop innovative schools and research groups in various fields of data science and artificial intelligence.
- Develop the community and provide scientific and technical consultations in the fields of data science and artificial intelligence.
- Provide professional training in various fields of data science and artificial intelligence.
- Enhance the building of Egyptian capabilities in data science and artificial intelligence, within the aspirations of Egypt's Vision 2030 and the National Strategy for Data Science and Artificial Intelligence, and in accordance with sustainable development and digital transformation plans.

3. Program Structure (Curriculum)

Program structure:

Program duration:138 credit hours. Four Years

Program structure:

studying 138 credit hours distributed as follows:

A- General requirements (12) credit hours:

• (6) compulsory hours

• (6) hours chosen by the student from among the elective general courses.

• Passing the community issues course.

B- College requirements (57) hours:

It is divided into two parts:

• Mathematics and basic sciences (18) compulsory credit hours.

• Basic computer science (39) compulsory credit hours.

C- Specialization requirements (63) hours:

It is divided into:

• Applied sciences (51) are compulsory accredited according to specialization.

• Applied sciences (12) optional accreditations within the specialization.

D- Project (6) compulsory credit hours.

E - Training (3) compulsory, non-accredited hours

Program Components

Subject Area	Tolerance%
Humanities, ethical and Social Sciences (Univ. Req)	8-10
Mathematics and Basic Sciences	16-18
Basic Computing Sciences (institution req.)	26-28
Applied Computing sciences (Specializations)	28-30
Training	3-5
Projects	3-5
Subtotal	84-96
Optional (institution character-identifying Subjects)	16-4
Total	

- **Program courses according to the expected study plan**

Level 1 semester 1

Level 1 Semester 1		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
UNV102	-	Societal issues	0	2	-
DA112	-	Programming(1)	3		
UNV103	-	English Language (1)	2	2	-
BS101	-	Math (1)	3	2	2
BS102	-	Discrete Mathematics	3	2	2
DA111	-	Fundamentals of Computer Science	3	2	2
DA121	-	Fundamentals of Information Systems and Data Analysis	3	2	2
Total			17		

Level 1 semester 2

Level 1 Semester 2		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
UNV104	-	Communication Skills	2	2	-
BS103	BS101	Math (2)	3	2	-
BS104	-	Electronics	3	2	-
DA211	DA112	Programming(2)	3	2	2
DA122	-	Introduction of Data Science	3	2	2
UNV106	-	Ethics and Professionalism	2	2	2
Total			16		

Level 2 semester 1

Level 2 Semester 1		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
-	-	Elective General Courses	2	2	2
UNV202	-	Technical Report Writing	2	2	2
BS201	-	Probability and Statistics	3	2	2
DA212	DA112	Data Structures and Algorithms	3	2	2
DA214	DA211	Artificial intelligence	3	2	2
DA231	BS104	Logic Circuit Design	3	2	2
Total			16		

Level 2 semester 2

Level 2 Semester 2		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
DA213	BS103	Introduction of Computer Security	3	2	2
DA222	DA121	Database Systems	3	2	2
BS202	BS103	Optimization methods	3	2	2
DA223	DA111	System Analysis	3	2	2
DA215	DA212	Operating Systems	3	2	2
DA216	-	Software Engineering	3	2	-
Total			18		

Level 3 semester 1

Level 3 Semester 1		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
DA321	DA122	Data Science Programming	3	2	2
DA322	DA121	Principles of Information Retrieval	3	2	2
DA311	DA214	Machine Learning and Pattern Recognition	3	2	2
DA326	DA122	Data Mining	3	2	2
DA331	DA212	Image Processing	3	2	2
-		Major Elective course(1)	3	2	2
Total			18		

Level 3 semester 2

Level 3 Semester 2		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
DA312	DA331	Computer Vision	3	2	2
DA324	DA222	Big Data Analysis	3	2	2
DA325	DA321	Advanced Data Science	3	2	2
DA313	DA311	Natural Language Processing	3	2	2
DA323	BS201	Statistical Analysis Software	3	2	2
-	-	Major Elective course(2)	3	2	2
Total			18		

Level 4 semester 1

Level 4 Semester 1		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
DA421	DA321	Data Science Tools and Software	3	2	2
DA411	DA331	Social Networks Analytics	3	2	2
DA422	BS201	Information Theory and Data Compression	3	2	2
UNV401		Entrepreneurship	3	2	2
-	-	Major Elective course(3)	3	2	2
PR411	-	Graduation project(1)	3	-	3
Total			18		

Level 4 semester 2

Level 4 Semester 2		Course Title	Credits	No. of hours /week	
Code No	Prerequisites			Lec.	Prac.
DA423	DA323	Data Engineering	3	2	2
DA431	DA312	Robotics	3	2	2
DA412	DA311	Neural Networks and Deep Learning	3	2	2
DA424	DA324	Exploratory Data Analysis	3		
-	-	Major Elective course(4)	3	-	3
PR412	PR411	Graduation project(2)	3	2	2
Total			18		

Elective course

م	كود المقرر	إسم المقرر	عدد الساعات المعتمدة	عدد الساعات الفعلية		المتطلب السابق	
				محاضرة	/تمارين معامل		
1	DA314	أكتشاف المعرفة Knowledge Discovery	3	2	2	DA326	التنقيب في البيانات Data Mining
2	DA315	موضوعات مختارة في الذكاء الإصطناعي Artificial Intelligence	3	2	2	DA214	الذكاء الإصطناعي Artificial intelligence
3	DA413	معاجة اللغات الطبيعية المتقدمة Advanced Natural Language Processing	3	2	2	DA313	معالجة اللغات الطبيعية Natural Language Processing
4	DA414	إنترنت الأشياء Internet of Things (IoT)	3	2	2	DA311	تعلم الآلة والتعرف على الأنماط Machine learning and pattern recognition
5	DA415	تطوير البرمجيات للجهاز المحمول Software Development for Mobile Devices	3	2	2	DA211	Programming (2)برمجة-2
6	DA416	الاستدلال والوكلاء Reasoning and Agents	3	2	2	DA214	الذكاء الإصطناعي Artificial inteligence
7	DA327	تطوير نظام المعلومات على شبكة الإنترنت Web-Based Information System Development	3	2	2	DA222	نظم قواعد البيانات Database Systems
8	DA328	هندسة في مختارة موضوعات البيانات Selected Topics in Data Engineering	3	2	2	-	90 ساعة معتمدة
9	DA425	السحابية البيانات قواعد Cloud Databases	3	2	2	DA222	نظم قواعد البيانات Database Systems

هياكل البيانات والخوارزميات Data Structures and Algorithms	DA212	2	2	3	إدارة و معالجة الملفات File Management and Processing	DA426	10
مقدمة في علوم البيانات Introduction of Data Science	DA122	2	2	3	مستودع البيانات Data warehousing	DA427	11

4. Academic Standards

5. Adopted Academic Standards NARS

A. Knowledge and Understanding (A)

A1. Identify fundamental concepts and theories in data analysis, statistics, probability, and related mathematics.

A2. Understand the basic principles and algorithms in artificial intelligence, such as machine learning, deep learning, natural language processing, and computer vision.

A3. Be familiar with methodologies and tools for data collection, storage, processing, and cleaning.

A4. Understand the different types of data (structured, unstructured, big data), their characteristics, and challenges.

A5. Recognize the ethical, legal, and social considerations related to data analysis and AI applications.

A6. Understand the role of data analysis and AI in various sectors and their practical applications.

A7. Be familiar with academic accreditation and quality assurance standards in the field of data science and artificial intelligence.

A8. Understand the fundamentals of building and evaluating data analysis and AI models.

A9. Use high-level programming languages.

A10. Understand the fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems, compilers, parallel and distributed computing, systems and software tools.

A11. Information systems, data and Information Management, enterprise architecture, IS project management, IT infrastructure, systems analysis and design, and IS strategies.

A12. Principles and techniques of database management systems, management, data mining, geographical information systems, multimedia, application development, business process management, enterprise systems, human computer interaction, object-oriented analysis and design, e-technologies, multimedia, image processing, information and infrastructures security and computer graphics techniques.

A13. Specification, analysis, design, implementation and operation and maintenance of IS solutions.

A14. Modeling organizational processes and data, defining and implementing technical and process solutions, managing projects, and integrating systems.

B. Intellectual skills (B)

B1. Ability to analyze complex problems in data analysis and AI contexts and define the necessary requirements for their solution.

B2. Ability to design, develop, and implement data analysis and AI-based solutions to address specific challenges.

B3. Ability to select and apply appropriate algorithms and tools for analyzing different types of data and extracting meaningful insights.

B4. Ability to evaluate the performance of data analysis and AI models, identify strengths and weaknesses, and suggest improvements.

B5. Ability to think critically and evaluate the results derived from data analysis and AI models.

B6. Ability to connect theoretical concepts with practical applications in the fields of data analysis and artificial intelligence.

B7. Ability to think creatively and innovate new solutions in the fields of data science and artificial intelligence.

B8. Ability to analyze and evaluate the potential risks associated with AI applications.

B9. Solve computer science problems with pressing commercial or industrial constraints.

B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.

B11. Perform comparisons between (methods, techniques…etc).

B12. Identify attributes, components, relationships, patterns, main ideas, and errors.

B13. Select the suitable tools, methods and techniques for modeling, analyzing IS, establishing criteria, and verify solutions.

B14. Identify a range of solutions and critically evaluate and justify proposed design solutions.

B15. Define traditional and nontraditional information systems problems, set goals towards solving them, and observe results.

B16. Perform problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis).

C. Professional and Practical Skills (C)

C1. Ability to use programming languages, tools, and platforms commonly used in data analysis and AI (e.g., Python, R, SQL, TensorFlow, PyTorch, Spark).

C2. Ability to apply data processing, cleaning, and transformation techniques.

C3. Ability to build, train, and evaluate machine learning and deep learning models.

C4. Ability to visualize data and present findings effectively using various visualization tools.

C5. Ability to work effectively within a multidisciplinary team on data analysis and AI projects.

C6. Ability to manage data analysis and AI projects effectively.

C7. Ability to communicate effectively (orally and in writing) with specialists and non-specialists about data analysis results and AI applications.

C8. Adhere to professional ethics and legal standards in data collection, analysis, and AI application.

C9. Use appropriate programming languages, web-based systems and tools, design methodologies, and knowledge and database systems.

C10. Use appropriate programming languages, web-based systems and tools, design methodologies, and database systems.

C11. Produce acceptable reports and technical and user system documentation.

C12. Perform information acquisition and management, using the scientific literature and Web sources.

C13. Analyze and documenting the feasibility of various options and comparing solution options.

C14. Use quantitative analysis techniques appropriately.

C15. A core of analysis, algebra, applied mathematics and statistics.

C16. Principles of Information communication and information security.

D. General and Transferable Skills (D)

D1. Ability to engage in self-learning and continuous professional development to keep pace with the rapid advancements in data analysis and AI.

D2. Ability to solve problems and make decisions in complex situations.

D3. Ability to manage time and organize tasks effectively.

D4. Ability to work under pressure and adapt to changing circumstances.

D5. Ability to use information and communication technology effectively.

D6. Ability to lead and take responsibility.

D7. Demonstrate the ability to make use of a range of learning resources and to manage one's own learning.

D8. Demonstrate skills in group working, team management, time management and organizational skills.

D9. Reveal communication skills, public speaking and presentation skills, and delegation, writing skills, oral delivery, and effectively using various media for a variety of audiences.

D10. Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for life-long learning.

D11. Show the use of information-retrieval.

D12. Use an appropriate mix of tools and aids in preparing and presenting reports for a range of audiences, including management, technical, users, industry or the academic community.

D13. Exhibit appropriate numeracy skills in understanding and presenting cases involving a quantitative dimension.

D14. Demonstrate an appreciation of the need to continue professional development in recognition of the requirement for life-long learning.

B. Matrix of Academic Standards (Program Outcomes POs) with Courses

Compulsory Courses (Name and code)	Academic Standards (Mention code only)																												
	A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11

C. Teaching and Learning strategies/methods to achieve Program Outcomes:

- Lectures
- Practical laboratories
- Case studies
- Project-based learning
- Interactive discussions
- E-learning activities

7. Student Assessment strategies/methods to verify and ensure students' acquisition of Program Outcomes:

- Midterm exams
- Final exams
- Oral examinations
- Practical exams
- Assignments and quizzes
- Course projects
- Presentations
- Graduation project evaluation

8. Program Key Performance Indicators (if any)

No.	Performance Indicator	Target Level	Method	Measurement
1.				
2.				
3.				

Name & Signature Program Coordinator Dr. Marian Wagdy	Name & Signature Vice Dean for Education and Student Affairs