



**ARAB OPEN UNIVERSITY**

# FCS-Student Handbook

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**March, 2021**



**Arab Open University**  
**Faculty of Computer Studies**

**B.Sc. Degree Programme in**  
**Data Science**

**Data Science Programme**  
**Student Handbook**

**March, 2021**

*The BSc Programme in **Data Science** [BSc (Hons) Data Science] has been developed and is delivered by the Arab Open University (AOU). It has been validated through a process of external peer-review by the Open University (OU), UK, as being of an appropriate standard and quality validated award of the **BSc. (Hons) Data Science programme by the OUVP (Open University Validation Partnerships).***

# Note

**Please note that the information in this handbook is subject to change and continuous updating. Please check for further updates at our following website:**

**<http://www.arabou.edu.kw>**

## **Acknowledgement:**

The preparation of this handbook is a result of a great team effort at the Faculty of Computer Studies (FCS). The cooperation and collaboration of all team members of the Data Science Programme Team responsible for developing the Student Handbook including Dr Hussein Abdel-Jaber, Dr Mohammed Al-Madi, Dr Luai Al Shalabi, Dr Basela Hassan and Mr. Mohammed Suliman is highly appreciated. The hard work and dedication of the team has resulted in preparation of this handbook in support of students of the Data Science Programme. The assistance and administrative services provided by Ms. Mariam and Ms. Farah are also greatly appreciated. Lastly but not least, the guidance and support provided to the team by the General Programme Coordinators (GPCs) Dr Ahmed Gawish and Dr Hamayun Khan has been highly instrumental in the preparation of this handbook.

Prof. Omar Al Jarrah,  
Dean of the FCS,  
Arab Open University.

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# 1. Welcome and Introduction

## Welcome:

We, at the Faculty of Computer Studies (FCS) at Arab Open University (AOU), are delighted to welcome you to study on our BSc (Hons) Data Science degree Programme. The AOU is a premier institution of higher education in the Middle Eastern region and it is currently operating in 9 Arab countries including Kuwait, KSA, Oman, Bahrain, Jordan, Lebanon, Egypt, Sudan and Palestine with AOU headquarters in Kuwait. Students refer to their local country branch administrations for academic and administrative matters related to their local countries. The AOU uses a Blended Mode of education delivery consisting of at least 25% face to face tutorials and the remaining studies based on Independent Learning. The FCS is one of the major faculties of AOU in operation for the past about 18 years. The FCS offers majority of its programmes of study, including the BSc (Hons) Data Science degree programme, in partnership with the Open University (OU), UK. This partnership enables the FCS to offer quality programmes to its students which are well recognized locally as well as internationally. The graduates of this programme are entitled to receive a dual degree at the completion of their studies

The field of Data Science is in great demand and you have made a wise decision to study this major. The current significance and importance of the Data Science field is a direct result of the mass adoption of electronic, internet and web services in recent years. The result of this adoption has been the generation of vast amount of data that needs to be analyzed, interpreted, understood and valuable insights to be extracted from it. Hence the need for data scientists with relevant skills to perform this analysis and extraction.

The graduates of the Data Science programme are expected to find jobs and build useful careers in wide variety of sectors in the industry such as technology, finance, e-commerce, public health, education, the oil industry, transportation etc. The reason for this is that nearly all these sectors and fields generate data with the associated need for data analysis and interpretation. Along with building careers in the industry, we will encourage all our graduates to support their local communities by utilizing their skills and expertise to solve problems of the communities or enhancing existing solutions.

Throughout your studies and stay at FCS it will be emphasized to you to always use ethical practices in life, education and subsequently in your careers. Adoption of ethical practices will aid in the development of respectable and noble personality traits that will be invaluable and priceless to you throughout your life.

At the end we encourage you to put in your best effort and study hard to develop yourself to the best of your potential. We wish you a very fruitful and productive study period at FCS.

Good luck.

Prof. Omar Al Jarrah,  
Dean of the FCS,  
Arab Open University.

## **Introduction:**

### **Why Study Data Science?**

Data Science is currently one of the most important and in-demand field of study. There are a variety of reasons for this demand including the vast adoption of electronic systems and automation, the proliferation of the internet and web services, mobile computing, cloud computing and host of other factors. This has led to the generation of humongous amount of data and the need to process this data to extract meaningful insights from it and perform predictions. This in turn has resulted in high demand for Data Scientists with the relevant skills to perform the required data analysis. The demand for Data Scientist spans many sectors of life and industry including the healthcare sector, banking and financial services, telecommunications, web and internet services, digital advertisements, education, fraud detection, insurance and risk assessment etc.

The graduates of the Data Science programme can find employment in different fields such as government, ITC, business, healthcare, telecom, retail, education, agriculture, cyber security, aerospace, digital marketing, e-commerce, pharma, weather forecasting etc. These sectors require data scientists to process the vast amount of data generated every day. For this reason, Data Science graduates are expected to be in high demand to fulfill the requirements of Data Scientist of the numerous sectors generating vast amount of data.

The World today is predominantly digital in nature in which huge companies such as Google, Facebook, Twitter, Amazon, Walmart, Alibaba, Baidu etc. are generating huge amount of data with the associated need to process it. The data analysis and processing needs of modern companies now include advanced skills such as Machine Learning, Deep Learning and Artificial Intelligence (AI). Hence studying Data Science will enable you to develop skills required for the most in-demand filed in the present day digital World.



The Middle Eastern region is also experiencing vast adoption of electronic systems and services as a result of automation and digital transformations across the region. Due to the existence of many local companies that need the services of Data Scientists nowadays, this trend is expected to create a lot of Data Science jobs in the local markets. Therefore, studying Data Science will enable students to prepare themselves for jobs requiring Data Science skills. Additionally, the data science programme at the AOU not only prepares students to work in the conventional working environment, but can also provide them with the required skills to have their own independent entrepreneurial endeavors due to the Independent Learning emphasis of the programme. Our programme enables students to be independent and lifelong learners with skills to acquire needed knowledge to undertake challenging projects. Hence it is pertinent to say that our programme has an edge over the programmes offered by other institutions in that it provides students with skills to succeed in the conventional professions as well as to pursue Data Science based business/entrepreneurship endeavors.

The Data Science programme at FCS provides its graduates an opportunity to study exciting and most updated modules to develop in-demand skills in a variety of subjects including:

1. Mathematics,
2. Statistics,
3. Python Programming Language,
4. Algorithms, Data Structures and Computability,
5. Data Management and Analysis,
6. Data Visualization,
7. Machine Learning,
8. Artificial Intelligence,
9. Big Data,
10. Data Mining,

11. Data Presentation,
12. Relational Databases: Theory and Practice,
13. Graduation Project Work

The Data Science programme is a nice blend of Computing, Mathematics and Statistics. The relative weights of these important fields in the Data Science programme are Mathematics (16.67%), Statistics (20.83%) and Computing (62.5%).

## **2. Academic Calendar (Including Term and Assessment Dates)**

The FCS follows the general academic calendar of the AOU, which consists of two main semesters of the fall and spring semesters, including a short summer semester. Fall and spring semesters are normally 16-week duration, whereas the summer semester is around 10-week duration. The fall semester usually starts in September and ends in February whereas the spring semester runs from February till June. The summer semester usually runs from July till September. The assessment dates are clearly marked in the academic calendar. The module calendars for individual modules are based on the academic calendar of the AOU. A representative sample of the academic calendar is available at:

<https://www.arabou.edu.kw/students/pages/academic-calendar.aspx>

## **3. Teaching and Learning Methodology**

### **Blended Mode of Education Delivery**

The AOU uses a Blended Mode of education delivery consisting of at least 25% face to face tutorials and the remaining studies based on Independent Learning. The face to face tutorials are usually conducted in well equipped classrooms during which the Tutor acts as a guide and facilitator. The Blended Mode of education delivery is basically based on the principle of Independent

Learning on part of the students with the tutors mainly acting as facilitators during the face to face tutorial sessions.

Knowledge and understanding are acquired from specially prepared teaching texts for the majority of modules, which are supported by self-assessment and in-text questions, reference texts, multi-media packages, directed reading, computer mediated conferencing, web-based resources, and video and audio recordings. Students work independently with the teaching materials, but they are encouraged to form self-help groups with other students, communicating face-to-face, by telephone, email and computer conferencing. Details about learning and teaching strategy at the AOU can be accessible through the following link:

<https://www.arabou.edu.kw/blended-learning/Pages/about.aspx>

#### **4. A List of Programme Directors and Academic Staff: Their Contact Details and Availability Arrangements**

The programme team leader for the BSc. (Hons) degree programme in Data Science is the Dean of the FCS, Prof. Omar Al-Jarrah (dean.it@arabou.edu.kw). The lists of programme directors at the AOU headquarters and academic staff at the branches are available electronically through the AOU's website at <https://www.arabou.edu.kw/Pages/default.aspx>. The academic staff at the FCS is available to you during the 25% face-to-face tutorial sessions and during the office hours.

#### **5. A List of the Support Staff (Technical and Administrative Staff)**

The support staff at the headquarters and the branches are willing to support you throughout your studies. Support is available to students on registration, admission, computer labs, LMS, E-Lib and so on, across all AOU country branches. In terms of the FCS modules, the technical support related to the labs, LMS, SIS, etc. is available to students. The contact details of support staff are available across the entire AOU country branches' websites:

## 6. Details of External Examiners

External Examining is an essential component of the Quality Assurance mechanisms at FCS, AOU. All assessment components are reviewed and evaluated by a team of External Examiners (EEs) at the start of every semester. The external examiners are also provided samples of students' work at the end of the semester for evaluation of the marking process. The EEs are members of the various exam board committees at FCS. Information about the current team of EEs at FCS is provided below in Table 6.1.

**Table 6.1 Team of External Examiners at FCS**

<b>Name</b>	<b>Position</b>	<b>Institution</b>
<b>Prof. Alistair Duffy</b> (Chief External Examiner)	Professor of Electromagnetics, Faculty Head of Research and Innovation	De Montfort University, The Gateway, Leicester. <a href="mailto:apd@dmu.ac.uk">apd@dmu.ac.uk</a>
<b>Prof. Ahmed Al-Dubai</b> (External Examiner)	Professor in the School of Computing	Edinburgh Napier University, UK <a href="mailto:A.Al-Dubai@napier.ac.uk">A.Al-Dubai@napier.ac.uk</a>
<b>Dr. Rahat Iqbal</b> (External Examiner)	Senior academic- Associate Professor	Coventry University, UK <a href="mailto:aa0535@coventry.ac.uk">aa0535@coventry.ac.uk</a>
<b>Dr. Tariq Abdullah</b> (External Examiner)	Academic lead Computing and IT and research fellow	University of Derby, UK <a href="mailto:mtariqabdullah@gmail.com">mtariqabdullah@gmail.com</a>
<b>Dr. Salem Al-Jareh</b> (External Examiner)	Senior Lecturer	University of Portsmouth, UK <a href="mailto:salem.aljareh@port.ac.uk">salem.aljareh@port.ac.uk</a>

## **7. An Introduction to the Programme**

The Data Science programme of study presents to students the fundamental concepts of Computer Science, Mathematics and Statistics. Students also study about the computing, software and computer technologies related to the field of Data Science. It uses mathematics, statistics, machine learning, artificial intelligence and computing techniques to solve practical problems. Modern programming languages such as Python are used to help in analyzing, processing and visualizing complex data and datasets. The Data Science programme consists of a total of 131 Credit Hours (CHs) of study which includes 96 CHs (360 Points) of Core Modules and 35 CHs of AOU requirements. The details about the complete structure of the Data Science programme are provided in Section 8 of this document.

The Data Science programme provides a strong theoretical foundation, along with a deep technical focus to ensure that graduates have the right combination of the theoretical background and technical ability. This unique combination of theoretical knowledge and technical capabilities enable students to be equipped with the required skills to enjoy significant rewards in the world's most in-demand field.

The FCS Deanship and the corresponding departments in AOU operating country campuses have an excellent network of contacts within the industry, which can ensure a smooth transition for our graduates from university to the real world labor markets.

The Deanship FCS at the AOU plays a significant role in satisfying the market/industry needs by providing them with graduates who have knowledge and skills that qualify them to be productive members within the society. Nowadays, the market/industry are in demand for graduates from the Data Science programme in order to fill many jobs, which require the knowledge and skills of Data Science. The graduates of this programme can have the option to work in many sectors such as in government, business, healthcare etc..

## Philosophy

The FCS Deanship philosophy of running the programme is to keep it up-to-date with the latest technical advancements by satisfying the relevant markets' needs. Additionally, the AOU in general is keen to keep its programmes validated from the OU in the UK in order to provide our students with additional international recognition for maximizing their employability possibilities and chances.

### 7.1 The Data Science Programme

During the study of this programme, you will gain in-depth knowledge regarding different areas of Data Science such as introduction to statistics, analyzing data, algorithms, data structures and computability, mathematical methods, practical modern statistics, applied statistical modeling, data management and analysis, machine learning and artificial intelligence.

### 7.2 A Graphical Representation of the Data Science Programme

The following figure illustrates the Data Science programme, including the different levels of modules along with their classifications.

Level	Programme Structure		
Level 0	University Requirements (Student may select from variety of modules)		
Level 1 (AOU) = Level 4 (OU)	Faculty Requirements		
	MST129 Applied Calculus (4 CHs)		
	Specialization/Core Requirements		
	MT131 Discrete Mathematics (4 CHs)	MT132 Linear Algebra (4 CHs)	M110 Python Programming (8 CHs)
	M140 Introducing Statistics (8 CHs)	TM112 Introduction to computing and information technologies (8 CHs)	
	Faculty Elective		
	M115 Python for Data Science and Machine Learning (3 CHs)		
Level 2 (AOU) = Level 5 (OU)	Faculty Requirements		
	TM260 Ethics, Law and the Governance in IT (4 CHs)		
	Specialization/Core Requirements		
	MT248 Analysing Data	MT249 Practical Modern Statistics	MST224 Mathematical Methods

	(4 CHs)	(4 CHs)	(8 CHs)
	M269 Algorithms, Data Structures and Computability (8 CHs)	M218 Relational Databases (4 CHs)	M238 Data Visualization (4 CHs)
	<b>Specialization/Core Requirements</b>		
<b>Level 3 (AOU) = Level 6 (OU)</b>	M348 Applied Statistical Modelling (8 CHs)	TM358 Machine learning and artificial intelligence (8 CHs)	
	TM351 Data management and analysis (8 CHs)	TM471 Graduation Project (8 CHs)	
	<b>Faculty Electives</b>		
	TM338 Data Mining (3 CHs)	TM339 Big Data Analytics (3 CHS)	

**Figure 7.1: A graphical representation of various modules in the Data Science programme**

### Attendance Requirements

The FCS follows the hybrid and blended model of education at the AOU, which requires 25% of a face-to-face tutorial's attendance in a class room environment. The 25% face-to-face tutorial sessions are mandatory, and if you fail to attend three consecutive tutorial sessions without due cause, you will be suspended from the module. The 25% face-to-face tutorial sessions are clearly marked in an individual module calendar by using the following guidelines:

**Table 7.1: Relationship between Module Credit Hours and Tutorial Sessions**

No. of Credit Hours	Points	No. of Hours/Tutorial Sessions
3	10	1 hour tutorial every week
4	15	1 hour tutorial every week
8	30	2 hours tutorial every week
16	60	4 hours tutorial every week

### Opportunities that are Available to Students Upon the Completion of their Intended Programme (Employment, Further Academic Studies etc)

On successful completion of the B.Sc. (Hons) degree in Data Science, you will be able to get various employment opportunities in both the Middle Eastern markets and the international markets since this degree would be validated by

the OUVV. In fact, the degree opens up the world of technology and an array of exciting careers in a wide range of sectors for you.

Further, it will assist you in becoming a dominant player in the field of Data Science, which will enable you to potentially analyze, develop, test, maintain, integrate and use hardware and/or software or hybrid systems for participating in new different innovating Data Science solutions that can meet needs of markets or organizations. Choosing the Data Science programme will enable you to concentrate your studies on the Data Science field. In particular, some of the key areas in which you can find employment opportunities may include, but are not limited to, the followings:

- Data analyst,
- Data engineer,
- Data scientist,
- Machine learning engineer,
- Machine learning scientist,
- Applications architect,
- Enterprise architect,
- Data architect,
- Infrastructure architect,
- Business Intelligence (BI) developer,
- Statistician,
- Business analyst- data science,
- Senior associate - data scientist/ml engineer,
- Senior data scientist,
- Python developer (data scientist),
- R developer (data scientist),
- System modeling, analysis, development and integration, including hardware, software and web-based systems,
- Software industry,
- Network design, development and maintenance,
- Network and cyber security,
- Storage management,
- Big data analytics,
- Mobile technology,
- Web development, internet of things, cloud technologies,
- Health informatics,
- Financial sector including banking,
- Management informatics and
- Digital advertising and media sector.



## 8. Programme Specifications

Students seeking a BSc (Hons) Data Science (DS) degree at AOU must complete at least 131 Credit Hours (CHs) including the 96 CH core modules and 35 CH of AOU requirements. The structure of the complete DS Programme is as follows:

1. Overall DS Programme Requirements (AOU) (Table 8.1)
2. University Requirements/ Mandatory (Table 8.2)
3. University Requirements/ Electives (Table 8.3)
4. Faculty Requirements/ Mandatory (Table 8.4)
5. Faculty Requirements/ Electives (Table 8.5)
6. Specialization Requirements/ Mandatory (Table 8.6)

### Overall DS Programme Requirements (131 CHs)

**Table 8.1: Overall DS Programme Requirements**

Requirement type	Credit Hours
University Requirements/ Mandatory	18
University Requirements/ Electives	3
Faculty Requirements/ Mandatory	8
Faculty Requirements/ Electives	6
Specialization Requirements/ Mandatory	96
Total Credit Hours	131

The details of the above requirements are described as follows:

### University Requirements/ Mandatory (60 points) (18 Credit Hours)

**Table 8.2: Details of University Requirements (Mandatory)**

Module	Module Title	Credit	Pre-requisites
AR113	Arabic Communication Skills	3	--
GB102	Principles of Entrepreneurship for	3	--
GR118	Life Skills and Coexistence	3	--
GT101	Learning and Information	3	--
EL111	English Communication Skills I	3	--
EL112	English Communication Skills II	3	EL111

Total	18	
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*\* The list of modules and/or the modules contents may be updated/replaced as per AOU university council decision or local accreditation requirements*

### University Requirements/ Electives (10 points) (3 Credit Hours)

**Table 8.3: Details of University Requirements (Electives)**

Module Code	Module Title	Credit Hours	Pre-requisites
GR111	Arabic Islamic Civilization	3	--
GR112	Issues and Problems of Development in the	3	--
GR115	Current International Issues and Problems	3	--
GR116	Youth Empowerment	3	--
GR117	Women Empowerment	3	--
GR121	Environment and Health	3	--
GR131	General Branch Requirement	3	--
CH101	Chinese for Beginners (I)	3	--
CH102	Chinese for Beginners (II)	3	CH101
SL101	Spanish for Beginners (I)	3	--
SL102	Spanish for Beginners (II)	3	SL101
FR101	French for Beginners (I)	3	--
FR102	French for Beginners (II)	3	FR101

*\* The list of modules and/or the modules contents may be updated/replaced as per AOU university council decision or local accreditation requirements.*

### Faculty Requirements / Mandatory (30 points) (8 Credit Hours)

**Table 8.4: Details of Faculty Requirements (Mandatory)**

Module code	Module title	Credit Hours	Points	Source	Pre-requisites
MST129	Applied Calculus	4	15	AOU	EL099
TM260	Ethics, Law and the Governance in IT	4	15	AOU	M110

*\*The TM260 may be replaced by an applied module as per the local accreditation requirement.*

### Faculty Requirements / Elective (20 points) (6 Credit Hours)

**Table 8.5: Details of Faculty Requirements (Electives)**

Module code	Module title	Credit Hours	Points	Source	Pre-requisites
M115*	Python for DS and ML	3	10	AOU	M110
TM338	Data Mining	3	10	AOU	MT249
TM339	Big Data Analytics	3	10	AOU	MT249
MS102	Physics	3	10	AOU	EL111
M109	.NET Programming	3	10	AOU	EL111
MT101	General Mathematics	3	10	AOU	None

**Note- It is strongly recommended that students study M115 for Data Science at Level 1 as recommended by the Validation Panel. This will be ensured by proper academic advising. The student will not be allowed to take more than one elective module per level from the above Table-8.5, according to proper Academic Advising.**

### **The Data Science Programme Specialization/ Core Requirements (96 Credit Hours)**

The core modules of the Data Science programme are shown in Table 8.6 below. The table shows the 360 points (96 CHs) of the core modules of study for this programme. It is clear from the table that the programme shares introductory modules at the Level-1 stage of study. However, the programme has more specialized modules at the higher Level-2 and Level-3 stages. The programme requires students to complete the project module, namely, TM471 (Parts 1 & 2) in order to successfully complete this programme of study. The TM471 module includes the completion of an extensive piece of practical project, which has to be completed on an individual basis. The table also shows the pre-requisites for each of the core modules of the Data Science programme. The elective modules that are involved in the study of the Data Science programme are shown in the electives table below. Level-1 electives are available for the entire programme. In fact, it is clear from the table that the students are not allowed to select more than one elective module from Level-2 and Level-3.

**Table 8.6: BSc (Honors) Data Science, Specialization/ Core Modules (360 points/96 CHs)**

Level	Code	Module Title	Source	Point	CHs	Prerequisite
	M140	Introducing	OU	30	8	EL111

Level 1 (AOU) = Level 4 (OU)		statistics				
	MT131	Discrete Mathematics	AOU	15	4	EL111
	MT132	Linear Algebra	AOU	15	4	EL111
	M110	Python Programming	AOU	30	8	EL111
	TM112	Introduction to Computing and Information Technology	OU	30	8	M110
Level 2 (AOU) = Level 5 (OU)	M218	Relational Databases	AOU	15	4	M110 & MT131
	M238	Data Visualization	AOU	15	4	M110
	MT248	Analysing Data	OU	15	4	M140
	M269	Algorithms, Data Structures and Computability	OU	30	8	M110 and MT131
	MST224	Mathematical Methods	OU	30	8	MST129 & MT132
	MT249	Practical Modern Statistics	OU	15	4	MT248
Level 3 (AOU) = Level 6 (OU)	M348	Applied Statistical Modelling	OU	30	8	MT248
	TM358	Machine learning and artificial intelligence	OU	30	8	M269
	TM351	Data management and analysis	OU	30	8	M269
	TM471	Graduation Project	AOU	30	8	M348 or TM351 or TM358

For further details, please refer to the AOU's website at <http://www.arabou.edu.kw/>.

### Data Science Programme-Study Plan

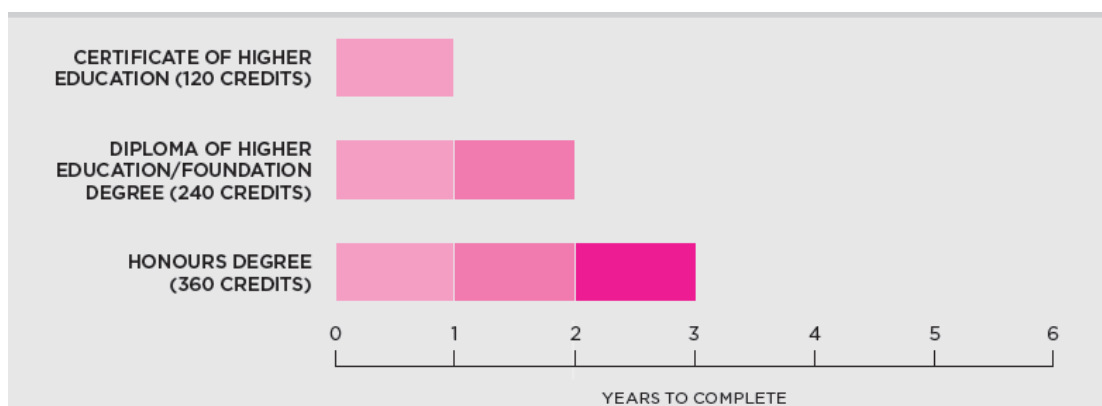
First Year				
Semester	Modules	Title	Credit	Prerequisite

			Hours	
<b>1<sup>st</sup></b> <b>(13 CHs)</b>	EL111	English Communication Skills I	3	-
	GR118	Life Skills and Coexistence	3	-
	GT101	Computing Essentials	3	-
	MST129	Applied Calculus	4	EL099
<b>2<sup>nd</sup></b> <b>(14 CHs)</b>	AR113	Arabic Communication Skills	3	-
	EL112	English Communication Skills II	3	EL111
	MT131	Discrete Mathematics	4	EL111
	MT132	Linear Algebra	4	EL111
<b>Second Year</b>				
Semester	Modules	Title	Credit Hours	Prerequisite
<b>1<sup>st</sup></b> <b>(14 CHs)</b>	GB102	Principles of Entrepreneurship for Non-Specialists	3	-
	M110	Python Programming	8	EL111
		A module from University Requirement/Elective	3	-
<b>2<sup>nd</sup></b> <b>(20 CHs)</b>	TM112	Introduction to Computing and Information Technology	8	M110
	M140	Introducing statistics	8	EL111
	TM260	Ethics, Law and the Governance in IT	4	M110
<b>Third Year</b>				
Semester	Modules	Title	Credit Hours	Prerequisite
<b>1<sup>st</sup></b> <b>(16 CHs)</b>	M218	Relational Databases	4	M110 & MT131
	MT248	Analysing Data	4	M140
	M269	Algorithms, Data Structures and Computability	8	M110 & MT131
<b>2<sup>nd</sup></b> <b>(19 CHs)</b>	MST224	Mathematical Methods	8	MST129 & MT132
	M238	Data Visualization	4	M110
	MT249	Practical Modern Statistics	4	MT248
		Faculty Elective	3	
<b>Fourth Year</b>				
Semester	Modules	Title	Credit Hours	Prerequisite
<b>1<sup>st</sup></b> <b>(20 CHs)</b>	M348	Applied Statistical Modelling	8	MT248
	TM351	Data management and analysis	8	M269
	TM471A	Graduation Project-A	4	M348 or TM351 or TM358
<b>2<sup>nd</sup></b> <b>(15 CHs)</b>	TM358	Machine learning and artificial intelligence	8	M269
	TM471B	Graduation Project-B	4	TM471A
		Faculty Elective	3	

## 8.1 Types of the Programme's Awards

The AOU basically offers two types of B.Sc. awards as classified below:

1. Degree Award: BSc (Hons) Data Science (360 points) validated by the local authorities of Ministries of higher educations in the AOU branches. This is a dual degree award and the student gets a second degree from The Open University, UK as well.
2. Exit Awards: Two different types of exit awards validated by The Open University, UK, based on the completed credits as below (see figure 8.1):
  - Diploma of Higher Education in Data Science (240 points)
  - Certificate of Higher Education in Data Science (120 points)



**Figure 8.1. Types of Awards Offered by AOU and The Open University, UK.**

The **exact titles** of the Exit Awards available for the Data Science programme are given below:

1. DipHE IT & Computing (Data Science) (240 points)
2. CertHE IT & Computing (Data Science) (120 points)

Please note that the Certificate and Diploma awards are exit awards only.

## 9. Module Specifications

Each module of the Data Science programme has module specifications that describe the module, its aims and objectives, Learning Outcomes, Teaching and Learning strategy, assessment methods, indicative contents etc. For details about Module Specifications of the individual modules, please refer to AOU's website at:

<https://www.arabou.edu.kw/faculties/computer/Pages/course-catalogue.aspx>

## 10. Students' Support, Guidance and Advice

Well-experienced tutors are available across different AOU campuses in order to provide a proper academic advice and guidance to students. The contact information of those staff members is made available at the local country campuses. The following table provides an overview about the available services to support the Data Science students across the AOU country campuses. You are encouraged to identify your academic advisor who is available to all students in order to reflect on your own learning needs and you are offered the following support as appropriate to those needs.

**Table 10.1: Summary of Students' Support and Guidance Services.**

Service	Details
Student induction day	Students' induction day that focuses on the requirements for the B.Sc. (Hons) Data Science modules and graduation project.
Student handbook	AOU's student handbook contains the main information that is related to the university, including various programmes of study.
LMS	A virtual learning environment aims to support students remotely via the teaching/learning material, supplementary material, frequently asked questions and collaborative tools and technologies.
Support/Teaching/Management Staff	Access to support, teaching and management staff.
Online Resources	An access to the AOU resources e.g. physical library/digital library, e-Learning materials – outside normal class times.
Appeals and Complaints System	An online access to different student services through the Student Support System (SSS) can be found at: <a href="https://sisonline.arabou.edu.kw/">https://sisonline.arabou.edu.kw/</a>
Support for Special Needs Students	The AOU provides all students with the necessary services to enable them to fulfill the intended learning outcomes of their study in a friendly educational and social environment. Students with disabilities and learning difficulties are given special attention. The services provided to our students are dealt with confidentially and anonymously, and are not disclosed to a third part without a written consent from a student. This 'Support for Special Needs Students' provides students with all information about the services and facilities that are made available to them by the AOU where students with special needs are supported whenever required. In fact, each branch is supported with such services, which are within a convenient reach.
Financial aids	Financial aid and advice are provided to our students.

Learning support	An access to a large collection of reading materials, simulations, Java applets, video clips, e-library, LMS and secrets of students' success to enhance their study skills is made available to our students at: <a href="http://www.arabou.edu.kw/">http://www.arabou.edu.kw/</a> .
Career Advice	<p>A collection of career links on choosing a career, writing a CV and the preparations for interviews can be accessible at:</p> <p><a href="https://career-advice.jobs.ac.uk/cv-and-cover-letter-advice/10-things-not-to-do-on-your-cv/">https://career-advice.jobs.ac.uk/cv-and-cover-letter-advice/10-things-not-to-do-on-your-cv/</a></p> <p><a href="https://www.topresume.com/career-advice/5-tips-to-help-students-prepare-for-their-careers">https://www.topresume.com/career-advice/5-tips-to-help-students-prepare-for-their-careers</a></p> <p><a href="https://www.monstergulf.com/">https://www.monstergulf.com/</a></p> <p><a href="https://www.bayt.com/en/jobs/locations/">https://www.bayt.com/en/jobs/locations/</a></p> <p><a href="https://www.jobs.ac.uk/">https://www.jobs.ac.uk/</a></p> <p><a href="https://www.internationalstudent.com/jobsearch/canada_article/">https://www.internationalstudent.com/jobsearch/canada_article/</a></p> <p><a href="https://www.internationalstudent.com/jobsearch/usa_article/">https://www.internationalstudent.com/jobsearch/usa_article/</a></p> <p><a href="https://www.internationalstudent.com/jobsearch/australia_article/">https://www.internationalstudent.com/jobsearch/australia_article/</a></p> <p><a href="https://www.internationalstudent.com/jobsearch/europe_article/">https://www.internationalstudent.com/jobsearch/europe_article/</a></p> <p><a href="https://www.internationalstudent.com/resume_writing/">https://www.internationalstudent.com/resume_writing/</a></p>

## 11. Opportunities for the Personal Development Planning

By virtue of being an Open Education institution, the AOU encourages its students to prepare Personal Development Planning (PDP) for themselves. The PDP provides the opportunity for students to plan for their studies according to the goals and objectives they want to achieve from their studies. Further, it enables them to track their achievements and goals in a systematic manner. It also provides a platform for them to reflect on their studies and measure their progress towards the intended objectives that they want to achieve. In fact, the PDP is a valuable tool in Open Education since it supports the process of developing an independent learning, which is the key for success in an open educational environment.



## **12. Opportunities and Support for Studying Abroad**

The current proposal of the B.Sc. (Hons) Data Science degree programme requires the completion of all modules of study at the FCS at the AOU. In case you wish to transfer to another institution, you will be required to inquire about the transfer of credits' provisions at that institution.

## **13. Work Placement information**

There is no work placement requirement in the current study plan of the B.Sc. (Hons) Data Science programme. The main practical work involved is an individual practical work, which is required during the preparations for the Tutor Marked Assignment (TMA), one of the assessment components per module, and the practical work that is required for the final graduation project (i.e. the TM471 module).

## **14. Facilities and Services**

The AOU has invested heavily in physical infrastructure as well as IT infrastructure to provide its students with state of the art facilities and services. Since the AOU uses the 25% face to face blended mode of education delivery, all branches of AOU are operating from modern branch buildings with classrooms and labs that are equipped with state of the art facilities. The classrooms are equipped with modern IT facilities that enable the tutors to deliver their tutorial sessions in an efficient and effective manner. The labs at branches have the necessary computer systems with the needed software and hardware features to enable the students to perform their computing assignments and tasks.

### **Minimum Technical Specifications for Students and the Laboratories**

The AOU has invested substantially in the construction of branch buildings in all country branches in order to support the students in the 25% face to face requirement of blended mode of education delivery. The branch

buildings are equipped with computer labs that provide computing facilities to the students. In order to support students studying in Data Science programme the computers in the computer labs should have the following minimum technical specifications;

- CPU: Intel core i5 or higher
- RAM: 8 GB minimum
- Storage: 500 GB minimum
- 1 Gbps Ethernet adapter and/or Wireless adapter 802.11b/g/n/ac

The above minimum technical specifications are also applicable to students own computer equipment as well. The above technical specifications are applicable to the majority of Data Science modules. Additionally, some specialized programming and computing types of modules have special requirements and these are given below:

**Table 10.2: Technical specifications, HW and SW requirements.**

S.No	Module Code	Module Title	HW Requirements	SW Requirements
1	M110	Python Programming	Minimum technical specifications as listed above	Python Programming Language
2	M140	Introducing statistics	Minimum technical specifications as listed above	Minitab® Statistical Software + Predictive Analytics Module, Or  IBM SPSS Statistics Premium (Standard as Minimum) Edition
3	M218	Relational Databases	An appropriate desktop or Laptop with suitable specifications is required.	The main software is an open-source product called MySQL.  Students are encouraged to install XAMPP. XAMPP is a

			An i5 processor from the 5th generation is a minimum requirement. Also, 4 GB RAM will be sufficient for the installation of the needed tools and software, for the development and testing processes.	<p>free and open-source cross-platform web server solution stack package.</p> <p>XAMPP is a software distribution which provides the Apache web server, MySQL database, PHP- all in one package.</p> <p>It is available for Windows, MAC and Linux systems.</p>
4	M238	Data Visualization	Minimum technical specifications as listed above	Tableau Desktop or Plotly Python Advanced Excel
5	MT248	Analysing Data	Minimum technical specifications as listed above	<p>Minitab® Statistical Software + Predictive Analytics Module, Or</p> <p>IBM SPSS Statistics Premium (Standard as Minimum) Edition</p>
6	MT249	Practical Modern Statistics	Minimum technical specifications as listed above	<p>Minitab® Statistical Software + Predictive Analytics Module, Or</p> <p>IBM SPSS Statistics Premium (Standard as Minimum) Edition</p> <p>LearnBayes and WinBUGS</p>
7	M269	Algorithms, Data	Minimum technical	Python Programming Language

		Structures and Computability	specifications as listed above	
8	M348	Applied Statistical Modelling	Minimum technical specifications as listed above	Minitab® Statistical Software + Predictive Analytics Module, Or  IBM SPSS Statistics Premium (Standard as Minimum) Edition
9	TM351	Data management and analysis	Minimum technical specifications as listed above	Anaconda Python, Jupyter Notebook, OpenRefine, PostGreSQL, MongoDB
10	TM358	Machine learning and artificial intelligence	GPU available from Google free Colab environment	Python Programming Language, TensorFlow, Keras, Jupyter Notebook,
11	M115	Python for DS and ML	Minimum technical specifications as listed above	Any Python (version 3+), Jupyter and other libraries.
12	TM338	Data Mining	Minimum technical specifications as listed above	Rapidminer
13	TM339	Big Data Analytics	Minimum technical specifications as listed	R Programming Language

			above	
14	TM471	Graduation Project	The minimum hardware requirements as listed above. Any specific hardware requirements of the project are fulfilled at the branch	The student software needs and requirements are specific to their project and these are fulfilled at the branch

### **The Learning Management System (LMS)**

The LMS is the main electronic system through which students receive extensive facilities and services related to educational activities. The tutors make extensive use of the LMS to post course related educational materials including the course calendar, TMA, Tutorial Slides, any video recordings and supplementary material for students. Students use the LMS to download educational material for their courses, get course related announcements and information and upload their TMA work. The LMS is one of the most important system for students to get familiar with in order to receive extensive facilities and services:

<https://mdl.arabou.edu.kw/>

### **The Student Information System (SIS)**

The SIS is also an essential electronic system which provides extensive services to students. Students receive all online registration related services, financial services, online payment services, scheduling and examination results information etc. through the SIS at AOU. Students receive the Appeal and Complaints facilities through the SIS. Additionally, students with special needs receive facilities and services through the SIS:

<https://sisonline.arabou.edu.kw/>

### **Student Guidance and Support Facilities**

Guidance and support is available for students in order to support them fully during their studies at FCS. Induction Programmes and Orientation Sessions are conducted for new students to make them familiar with the AOU educational system. Academic advising is available to students to guide them during the registration process. The AOU makes extensive use of the university's website to provide information, guidance and support to students:

[www.arabou.edu.kw](http://www.arabou.edu.kw)

In summary, all branches of AOU enjoy adequate resources and provide extensive support to students as is clear from the following:

- Operating in a new building for most branches, including Kuwait, Egypt, Jordan, Bahrain, KSA (Riyadh) and Lebanon.
- Meeting the local standards of the local accreditation bodies and ministries of higher education.
- Continuously updating the physical and electronic resources, including e-library, Learning Management System (LMS), Student Information System (SIS), and etc. in order to support our students. Additionally, a wide range of supplementary materials and video recordings are offered through the LMS.
- The AOU provides sufficient computer labs for its students, which are equipped with hardware and software resources for supporting the curriculum of Data Science programme.
- Specialized labs are provided to the AOU campuses through different involved countries. Such labs comprise Cisco labs for supporting a number of networking modules. The new buildings offer a number of seminar halls and dedicated spaces for libraries with at least one lab for accessing the e-library. It is interesting to point out that well-trained human resources are provided to assist students, and access either the physical resources or e-library resources. Regular workshops are held for students, particularly, for newcomers, in order to train them on how to use the LMS and e-library resources, and to provide them with the fundamental background about the appropriate academic behavior.
- The e-Library resource can be accessed via the AOU's website through the following URL: <http://www.aou-elibrary.com/>

## **15. Assessment and Progression Regulations**

The assessment and progression regulations have been made available to you through the AOU's website at <http://www.arabou.edu.kw/>. Additionally, an assessment guide will be provided to you with the module material packages.

### **Assessment Components, Weights, and Criteria**

For all regular modules, the FCS follows the AOU's assessment policies, rules and regulations. The assessments at AOU comprise of 3 essential components with their relative weight as follows:

- Tutor Marked Assignment (TMA) → 20%
- Mid-Term Assessment (MTA) → 30%
- Final Exam → 50%

### **Assessments and Progression**

The requirements for progression in studies at FCS are clearly stated in 'The Bachelor Degree Award Requirements Bylaws' document of AOU available to you at <http://www.arabou.edu.kw/>. Articles 21, 24 and 25 contain useful information for you concerning passing requirements of modules, maintaining a minimum Grade Point Average (GPA) in order to progress in your studies and any academic warnings in case you do not maintain the academic requirements and standards. Article 21 clearly states the requirements for passing a module of study at AOU. In order to pass the module, you must obtain at least 30% on the continuous assessment (TMA + MTA), at least 40% on the final exam and at least 50% on the overall result. Article 24 clearly states the methodology used at AOU to compute the GPA of students. Article 25 states that a student is required to maintain a GPA of 2 on a scale of 4 in order to successfully progress through studies.

## **16. Graduation Project**

This section contains useful information about the final year graduation project that students are required to accomplish through undertaking the module TM471 work.

### **Selection and Management of Graduation Project Work**

The TM471 module is the final component of the Data Science programme of study at FCS at AOU. Students undertake and complete the TM471 project work on an individual basis. You can select a project by submitting a project proposal, which needs to be approved by your supervisor. You will be working closely with your project supervisor and you will be required to show regular progress on your project in order to complete it successfully. The graduation project is spread over two semesters with the associated milestones that students have to achieve as discussed below in the assessment components.

### **Graduation Module's Assessment Components**

For the graduation module TM471 the assessment components and the associated weightages are as follows:

- Preliminary presentation: 5 %
- Project Report Part-1: 25%
- Project Presentation (Final): 10%
- Project Report (Final): 35%
- Project deliverable: 25%

In order to undertake the TM471 Project various software tools and packages would be required. It is your duty to consult your supervisor well in advance of project selection regarding the availability of both the software tools and the expertise available at FCS regarding the usage of the tools. You should agree with your supervisor regarding the Software Tools that would be required for TM471 projects in advance to avoid any problems.

In the TM471 module, you will apply the knowledge and skills in Data Science that you gained throughout your study on a problem from real life scenario. You will be required to apply your skills in many Data Science tools catering to different stages of the Data Science project lifecycle.

### **17. Determination of Results**

For various modules, the assessment usually consists of three components, which comprise; Tutor Marked Assignment (TMA), Midterm Assessment (MTA) and final examination. As stated earlier, the weighting of the assessment components is as follows:

- TMA: 20%



- MTA: 30%
- Final Exam: 50%

In order to pass the module, you must obtain at least 30% on the continuous assessment (TMA + MTA), at least 40% on the final exam and at least 50% on the overall result.

Your final result will be processed centrally at the Headquarters. Results will be communicated to you by your branch authorities after their approval from the Central Examination Committee (CEC) at the headquarters. The FCS at the AOU follows a tiered approach to the examination boards and committees. There exist mainly four examination committees at the AOU named as follows:

- The Branch Examination Committee (BEC).
- The Course Assessment Committee (CAC).
- The Faculty Examination Committee (FEC).
- The Central Examination Committee (CEC).

External Examiners are members of the FEC and the Chief External Examiner is member of the CEC. The main role of the assessment boards is to standardize the assessment processes and procedures at the AOU and to ensure fair processing of students' grades.

### **17.1 How Results are Communicated**

Final module results are announced on the university website (<http://www.aou.edu.kw/>). You can look at your results by logging in to the Student Information System (SIS) with your credentials. This link can be found under the student services menu. The various steps involved are as follows:

1. Login to the online student services with your student number as User ID and your password and select the correct branch.
2. Once you have entered the system, you can avail the benefits of the available services provided within the system.
3. You can select the box titled grades box in the 2<sup>nd</sup> row in order to view your grades. On selecting the grades' box, the grades details will appear on your computer screen.

## **18. Other Institutional Policies and Regulations**

Some of the information below may be given in the form of general brief statements that refer you to a separate generic institutional policy document:

- Disability statement.
- Grounds and procedures for appeals.
- Equal opportunities statement.
- Data protection.
- Health and safety issues.

The AOU strongly believes in providing equal opportunities to all students studying at the university. It also makes efforts to provide a safe, secure, healthy and confidential environment to you. You have the right to appeal to the branch authorities. Processes and procedures for your appeals /complaints are contained in the rules and regulations of the AOU.

## **19. Students' Participations and Evaluations**

You are strongly encouraged to participate in and evaluate the academic activities at the AOU. Your feedback is solicited through various surveys such as students' views on the Data Science modules, tutors, facilities etc. Further, some students are members of the Student Staff Liaison Committee (SSLC). Your views are considered as a very important instrument, which is continuously solicited and used in enhancing your learning experience in the Data Science programme at the AOU.

### **Continuous Students Participation and Feedback**

Students are encouraged to participate in the in-class activities and provide feedback to their tutors on any aspect of their studies at FCS. AOU strongly encourages students participation during in-class discussions and it provides opportunity to students to provide feedback during the semester to their tutors, so that any issues that maybe hampering students progress can be flag during

the semester. In this way, students will not have to wait till the end of semester to provide feedback. Also, the local dean is available at all branches for students to meet and provide feedback to him/her regarding any issue related to his/her study. The student can also provide the feedback to his/her academic adviser and get support throughout the semester regarding his/her studies at FCS.

Students' feedback represents an essential element of the Quality Assurance (QA) process at the AOU. The QA department solicits feedback from students through a variety of questionnaires and feedback forms, which are offered through the Learning Management System (LMS). The QA department has Branch QA Coordinators (BQACs) who are responsible for collecting students' feedback at each branch. The aforementioned feedback is subjected to detailed analysis by both the AOU\_QA department as well as by the Deanship to be included in the annual programme evaluation that is submitted to the OUVF.

The major areas on which students' feedback is obtained include the following:

- Students' evaluation of tutors,
- Students' evaluation of modules, and
- Students' evaluation of branch resources and service.

Students can also file appeals, which are dealt with through the online appeals and complaints' system (a part of the SIS). The Arab Open University's Alumni Association (AOUAA) is an association, which aims at maintaining relations between the AOU and its former students and between graduates and their fellows. The alumni's website at the AOU is <https://www.arabou.edu.kw/alumni/Pages/default.aspx>.

The AOUEA is a forum for forming relationships among people of common interests. The AOUEA is organized into nine chapters at the KSA, Kuwait, Bahrain, Oman, Egypt, Jordan, Lebanon, Sudan and Palestine. The AOU alumni association Bylaws could be found on the university's website. The FCS encourages you to register in the AOUEA.

## **20. General Reading List Including Electronic Resources**

A general reading list has been compiled by the FCS's staff. The list indicates some important books and journals. This list has been made available to you at the following link:

<https://www.arabou.edu.kw/faculties/computer/Pages/general-reading-list.aspx>

Electronic resources are made available on the LMS at the AOU's website (<http://www.arabou.edu.kw/>).