AL-AHLIYYA AMMAN UNIVERSITY SUSTAINABILITY REPORT 2022-2023

Deans' council Decision No. : 2022- 2023
Date : 01/10/2023
Revision : C

About The Report

This report provides a review of our sustainability performance of academic year 2022-2023. It contains data regarding our owned activities. The report is aimed at stakeholders who have an interest in our sustainability performance, including professional and academic staff, students, local communities and local businesses. It focuses on our material sustainability issues and those that are of interest to our stakeholders, and reflects the University's award winning whole institutional approach to sustainability. This report has been submitted with the approval of the University Management.

Introduction

I am pleased to introduce Al-Ahliyya Amman University's Sustainability Report, which provides a broad review of our work during the academic year 2022-2023 and adopts the Global Reporting Initiative (GRI) Framework to provide a robust method of measuring performance across environmental, social and economic sustainability.

Sustainability Vision

AL-Ahliyya Amman University is committed to making a positive impact, on a national and international level, through serious environmental sustainability initiatives and activities.

Our sustainability approach

Sustainability is embedded within our refreshed Strategy 2019–2023, and at an operational level the University adopts a cross-institutional approach to support the management and delivery of financial, social and environmental sustainability activity across our operations, research, and teaching and learning activities. This is where we can have the greatest impacts: delivering world-leading research supporting solutions for global problems; innovative teaching and learning equipping graduates with the attributes and competencies necessary for applying sustainability principles in their civic and professional lives, and ensuring that we operate a sustainable campus.

Contents

[1] SETTING AND INFRASTRUCTURE (SI)

[1.1] NUMBER OF CAMPUS SITES

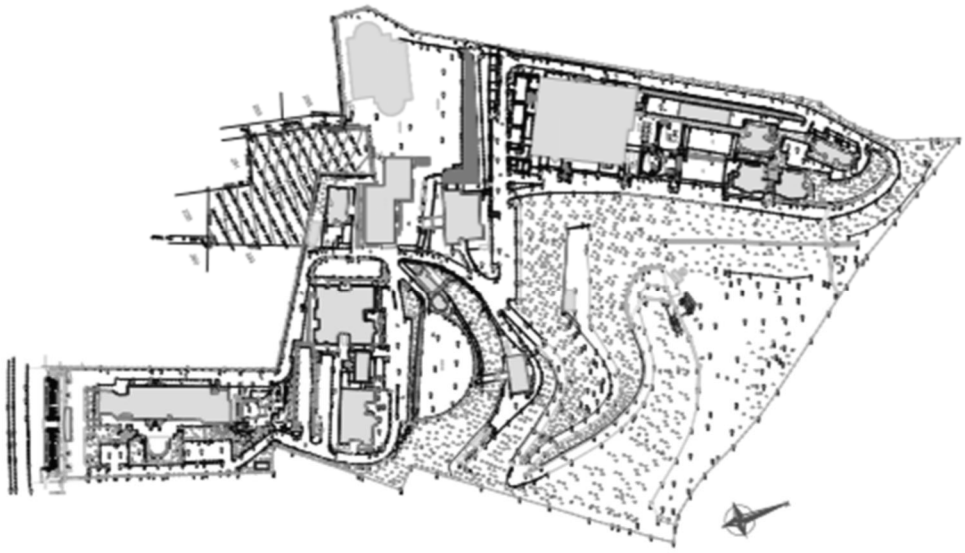
Al-Ahliyya Amman University (AAU) campus site

Faculty of Law

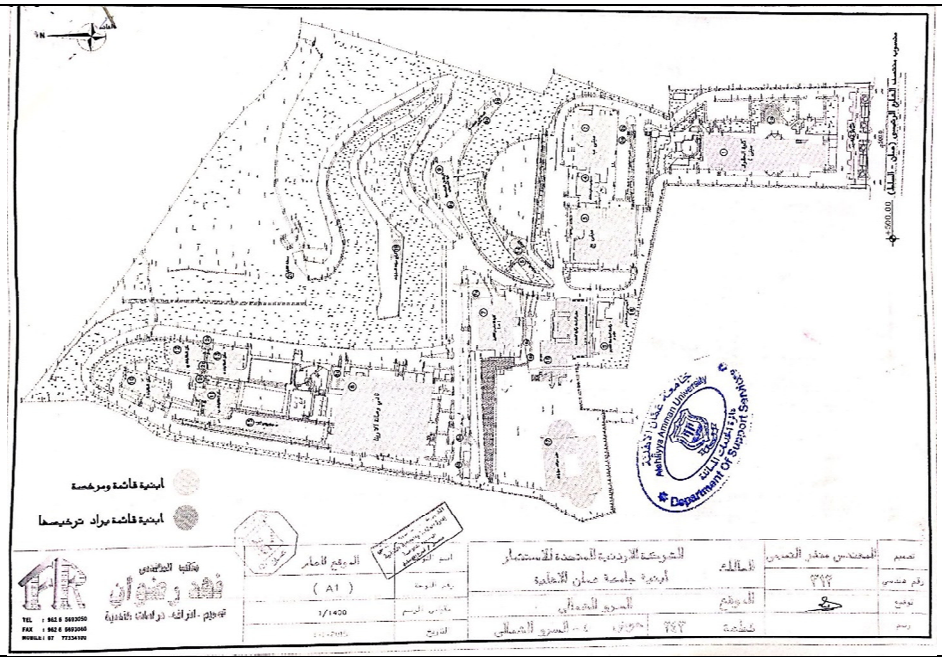
Faculty of Information Technology

	
Business School	Faculty of Pharmacy
	
Faculty of Nursing	Faculty of Engineering
	
Faculty of Architecture and Design	Faculty of Art and Sciences

	
Faculty of Allied Medical Sciences	Faculty of Agricultural Technology
	
Faculty of Educational Sciences	Faculty of Culinary Arts and Hospitality
	
Faculty of Dentistry	Arena Complex



Site plan of Al-Ahliyya Amman University (AAU)/ (Autocad file print)



Site plan of Al-Ahliyya Amman University (AAU)/ (Official municipility document)

Description:

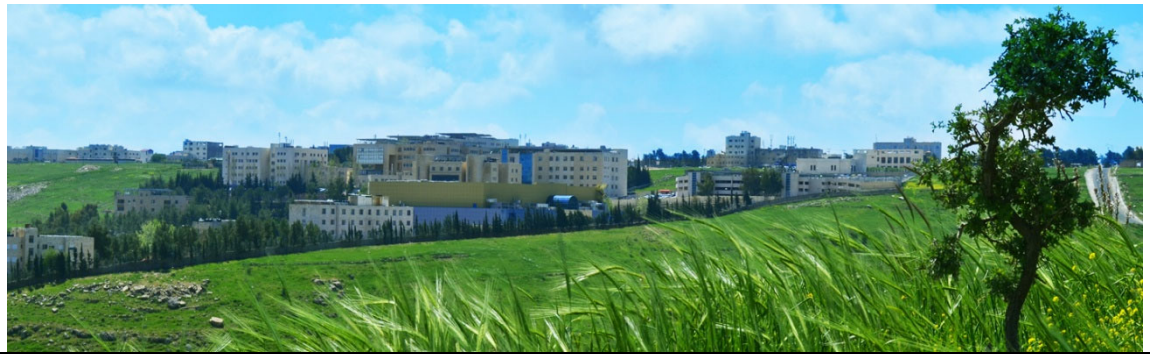
Al-Ahliyya Amman University (AAU) has one campus setting with a total land area of 185109.0 m^2. It is located in suburban setting between the capital Amman and the city of Al-Salt in a Mediterranean climate.

The campus consists of 22 permanent buildings (including academic activities facilities, student residence, and services) and 9 temporary structures (including caravans, kiosks, and shelters). The total main campus building footprint is 22476.2 m^2 (21490.0 m^2 of the buildings and 982.2 m^2 of the temporary structures). These buildings and structures accounts 95068.0 m^2 of total area.

The total number of regular students (part time and full time) is 5219. Furthermore, the number of university staff is 788 (312 academic staff and 476 administrative staff).

Regarding finances, the university budget has grown last year to reach around US$ 37,664,714. About US$ 3,766,850 was used for sustainability infrastructure and efforts.

[1.2] CAMPUS SETTINGS



Al-Ahliyya Amman University (AAU) campus setting

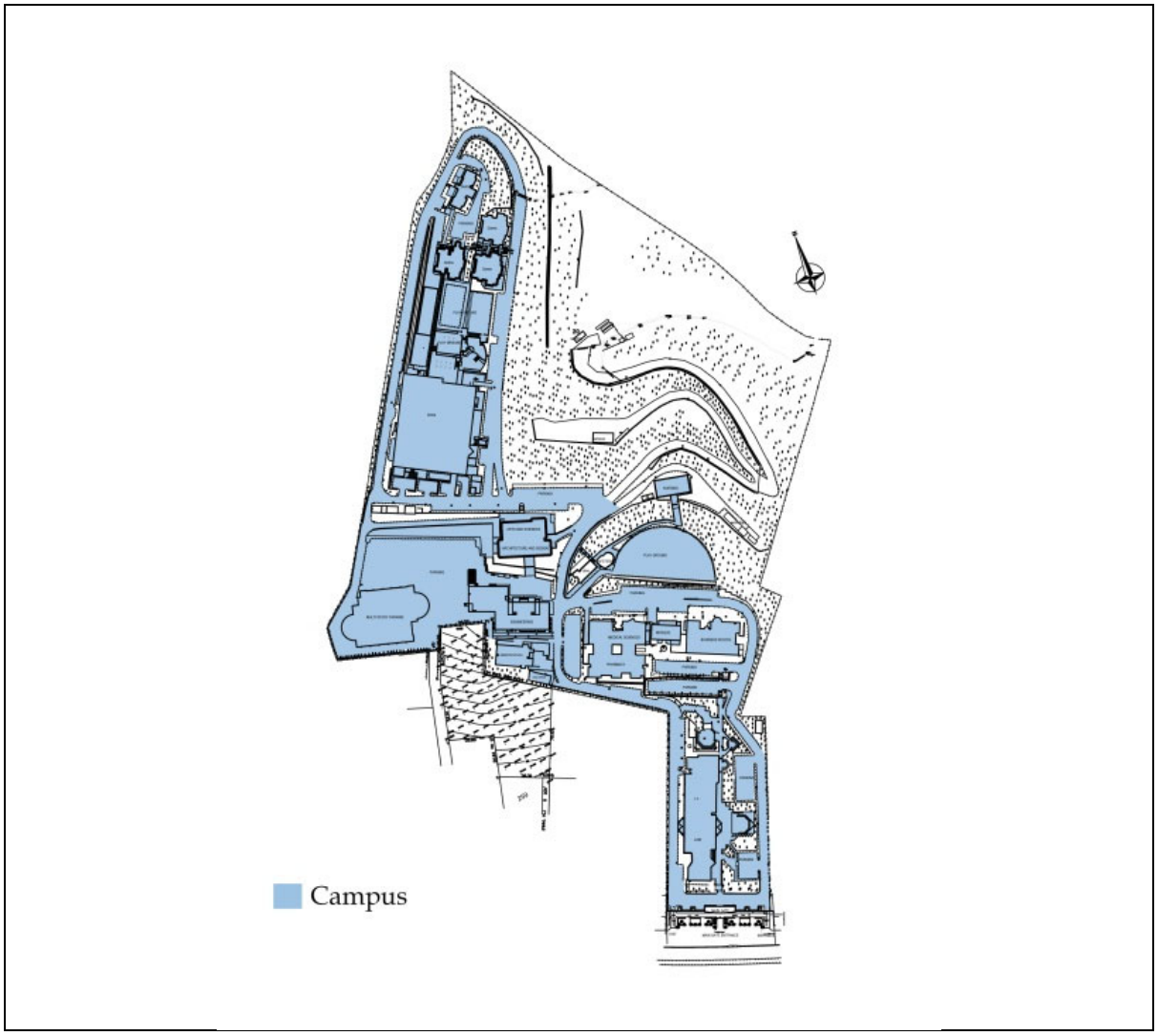
South-East side of Al-Ahliyya Amman University (AAU) campus

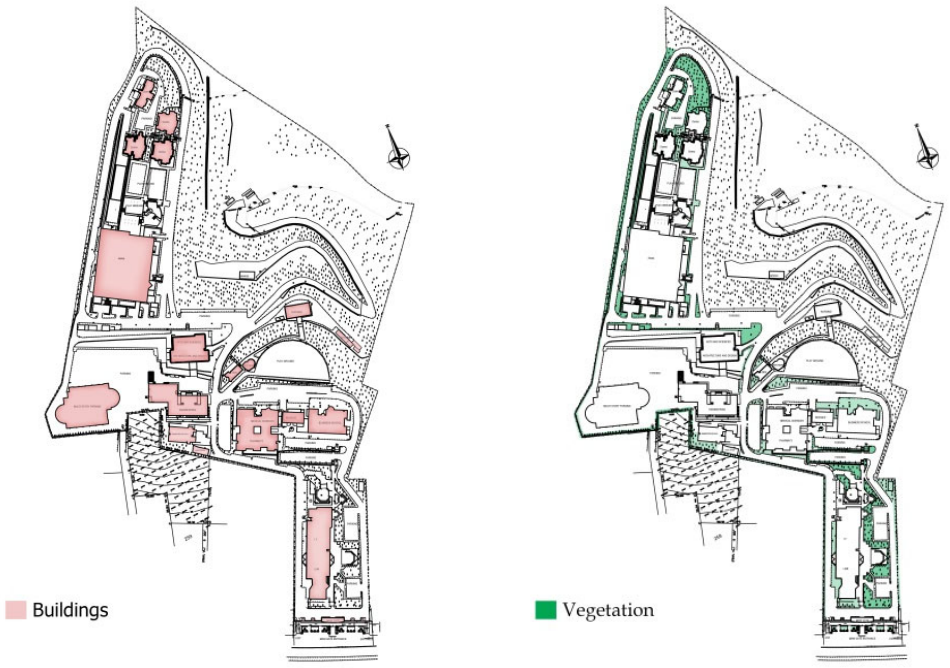
Description:

Al-Ahliyya Amman University (AAU) campus has a suburban setting. AAU is located between the capital Amman and the city of Al-Salt. Officially, it is part of Balqa highland governorate; located in Al-Salt district. This district is distinguished by its hills, agricultural and highly forest cover. The total area of Al-Salt is 48.0 Km^2 (19.0 mi^2) and has a total population of 91900. The density is 1479/km^2 (3830/mi^2).

[1.3] TOTAL CAMPUS AREA (METER²)

Total campus area of Al-Ahliyya Amman University (AAU)


Campus



Al-Ahliyya Amman University (AAU) campus

Description:

The total land area of Al-Ahliyya Amman University (AAU) campus is 0.185109 km^2 (0.07143 mi^2) = 185109.0 m^2. The total campus buildings area is 0.095068 km^2 (0.036706 mi^2) = 95068.0 m^2. The total ground floor area of buildings is 0.0224762 km^2 (0.0086782 mi^2) = 22476.2 m^2. The total area on campus covered in planted vegetation is about 0.015 km^2 (0.005792 mi^2) = 15000.0 m^2. However, the total campus area where academic activities occur is 100004.5 m^2.

Total area: 0.1000045 km^2 (0.038611953 mi^2) = 100004.5 m^2
Total distance/circumference: 2.2 km (1.37 mi) = 2200 m

[1.4] TOTAL AREA ON CAMPUS COVERED IN FOREST VEGETATION (METER2)

Plant species planted in our campus are chosen carefully to suit the to match the geo locational and climate condition in the middle east. Plants provide screening from Jordan's prevailing environmental conditions such as high winds and moreover the drought conditions. Careful consideration is given in the selection of species and its appropriateness. Most of the plants are predominantly Jordanian/ middle east species such as **Olive Trees, Palm Trees** etc.

Water conservation in our green areas:

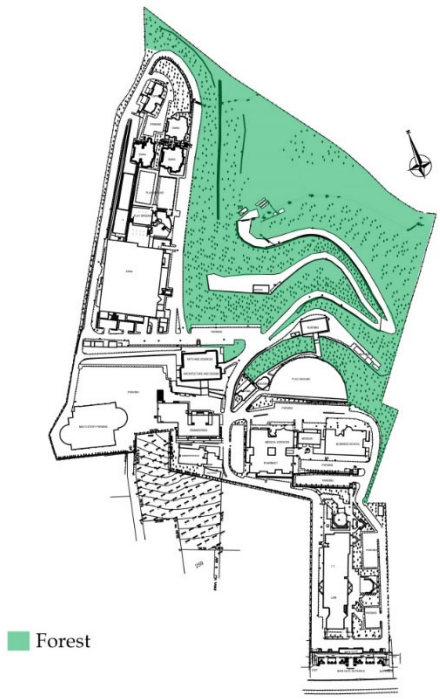
The gardens on our campus are much admired. A variety of water conservation measures are used to keep these looking good, but which reduce the amount of water that they use.

These include:

- Organic composts, mulch, wetting agents and water retention gels are added to soils to increase their water-holding capacity.
- Verti-draining is used to ensure deeper plant roots, so meaning that less watering is required.
- Treegators are also used to reduce the amount of water required.
- In times of water shortage, watering of newly planted trees and rare/exotic species is prioritized. Plants are also watered less often but for longer, to encourage deep roots.
- Automated water systems have been installed. These allow controlled application at night, so increasing absorption and reducing evaporation

The use of root barriers provides protection to the surrounding infrastructure against disruption from tree roots, with minimal impact on the tree. Properly installed root barriers protect pavement, footings and kerbs from cracking and lifting caused by certain tree species.

Land of Al-Ahliyya Amman University campus covered in forest vegetation



Total area of Al-Ahliyya Amman University campus covered in forest vegetation

View of the forest vegetation in Al-Ahliyya Amman University / Spring 2022

Description:

The total land area of Al-Ahliyya Amman University (AAU) campus is 0.185109 km^2 (0.07143 mi^2) = 185109.0 m^2. However, the total area covered with forest vegetation is 75000.0 m^2.

Total area: 0.075000 km^2 (0.028958 mi^2) = 75000.0 m^2
Total distance/circumference: 1.44 km (0.89477 mi) = 1440 m

[1.5] SUSTAINABLE BUILDINGS DESIGN, CONSTRUCTION AND REFURBISHMENT.

Design Approach

The University expects consultants and contractors to provide designs that meet the project briefs. The following are priorities that consultants and contractors are aware of and consider in their designs:

A. Take a long term balanced view of capital costs, energy costs, maintenance costs and longevity
B. As educational and research both progress at rapid rates, usage of buildings and areas within buildings can change a number of times within the life of a building, systems must be designed to be adaptable for such changes
C. Ensure that plant and equipment is designed with access and visual impact in mind

Design Inputs and Process

The University expects consultants and contractors to proactively inform, advise and contribute to the design process. In particular, the following aspects:

A. **Building Physics** - provide advice to the project team, including other design team members that would improve the inherent building performance, which may lead to reductions in both capital and energy costs. This may initially take the form of simple advice relating to existing infrastructure capacity and location, which may affect the siting of the building, and subsequently backed up by modelling or similar methods. The process may take a number of iterative steps. The consultant or designer is expected to advice, contribute and if necessary lead such processes.

B. **Planning and architecture** – Provide advice on the appropriate location of plant rooms and reticulation strategy to assist in both the planning of the building and the facilitation of better maintenance in the future. Such advice must be provided in the early stage of the design and planning process so that this is taken into consideration of the architect's design, such that it can be incorporated into his planning. Late advice will lead to poor location of plant and lack of maintenance access, thus a building of poor quality that will suffer from either poor or lack of maintenance and high operational costs to the University.

C. **The University** – Provide advice on the availability of options, assist in assessing the advantages and disadvantages, provide analysis of life cycle costs and life expectancies, offer recommendations and assist in making decisions.

Engineering Process

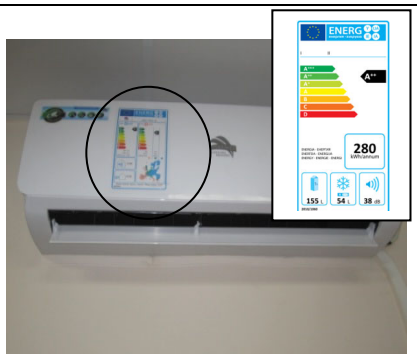
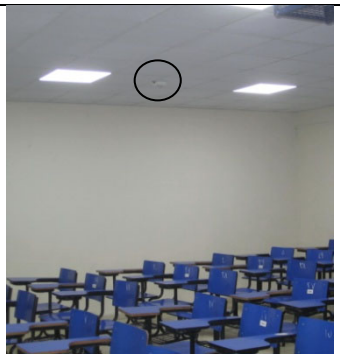
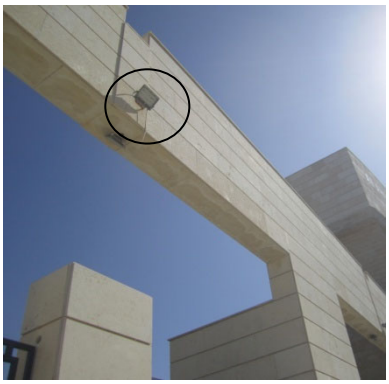
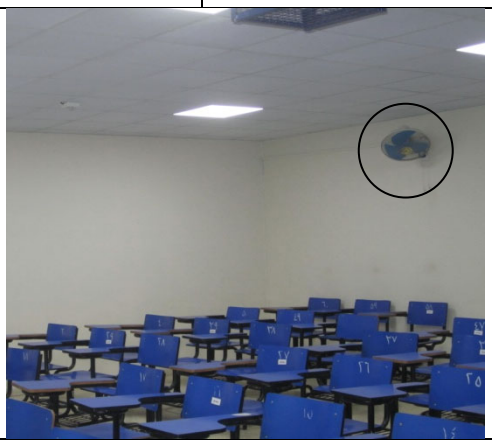
The University expects consultants and contractors to be fully qualified, experienced and capable of carrying out all engineering design, calculations, equipment selection and construction quality checks. In selecting equipment, the University expects consultants and designers to select products and system configurations of proven and reliable quality. In the designing of all systems, the University expects consultants and designers to follow good industry practice.

Equipment Selection and Sizing

In selecting equipment, the University expects consultants and contractors to select products of proven and reliable quality, with reputable support and after sales service. Products which are of closed systems and proprietary in nature, thus locking the University into exclusive dependence of one manufacturer must be avoided and only used if there are no other options. The provision of 20% spare capacity for future use must be provided when designing and sizing all hydraulic services infrastructure, pipework and equipment. In making such considerations careful analysis of spare capacity against the application of diversity and balance must be considered.

[2] ENERGY AND CLIMATE CHANGE (EC)

[2.1] ENERGY EFFICIENT APPLIANCES USAGE

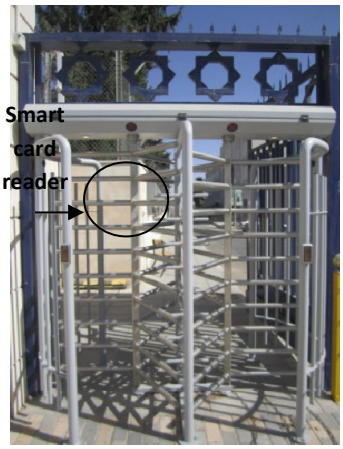
		
A++ Rated- energy efficient air conditioning units with inverter technology	LED indoor lighting units	Occupancy detectors inside lecture rooms
		
LED outdoor lighting units	Fans inside lecture rooms	

Description:

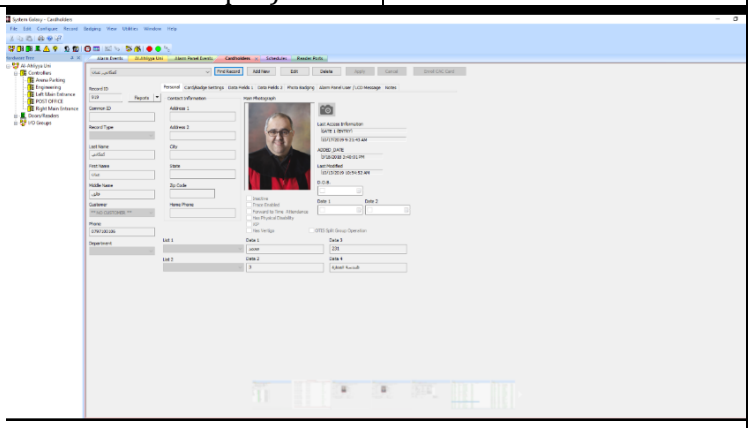
Al-Ahliyaa Amman University employs different energy saving strategies for its campus. Energy efficient appliances are an important part of the university's sustainability efforts. A rated air conditioning units, LED indoor and outdoor lighting units, occupancy detectors and fans in lecture hall are installed in most buildings.

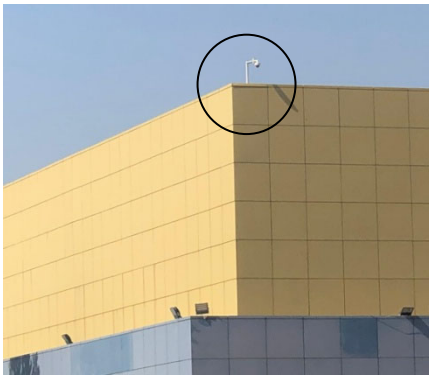
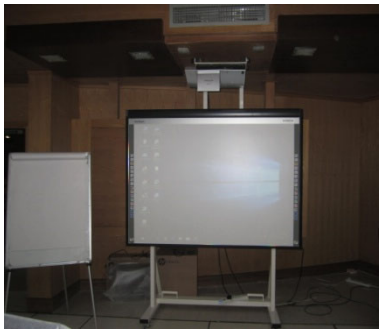
Appliance	Total number	Total number of energy efficient appliances	Percentage
Air conditioning units	250	247	99%
LED indoor lighting units	5600	5600	100%
LED outdoor lighting units	700	700	100%
Fans	1080	1004	93%

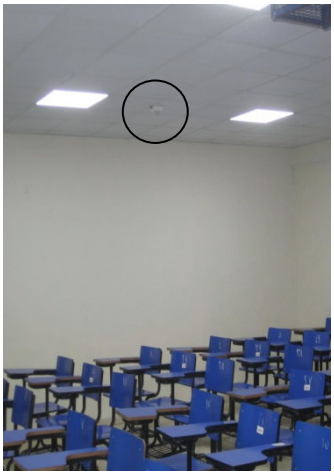
[2.2] SMART BUILDING IMPLEMENTATION

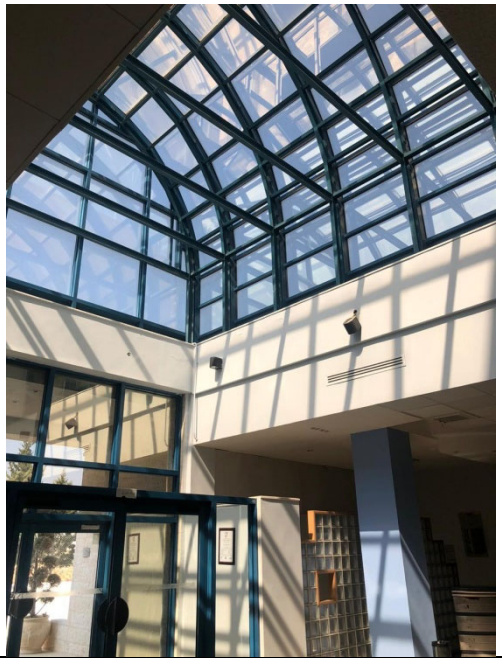


Smart gates (reading student or staff cards)

Smart car gates that reads staff car sticker	Smart sticker for staff cars (No student cars allowed inside campus)	Lecture hall card reader for students and academic staff
		
Card activity history report	Cardholders identification system	

		
Elevator card reader for staff and the disabled	Finger print reader for adminstrative staff	Outdoor surveillance cameras in campus
		
Smart boards		Surveillance camera and smoke detector in all buildings

	
Control room	Presence sensors for lighting classrooms
	
Internal courtyard in buildings for natural lighting	External courtyard between buildings for natural lighting



Natural lighting through skylight openings

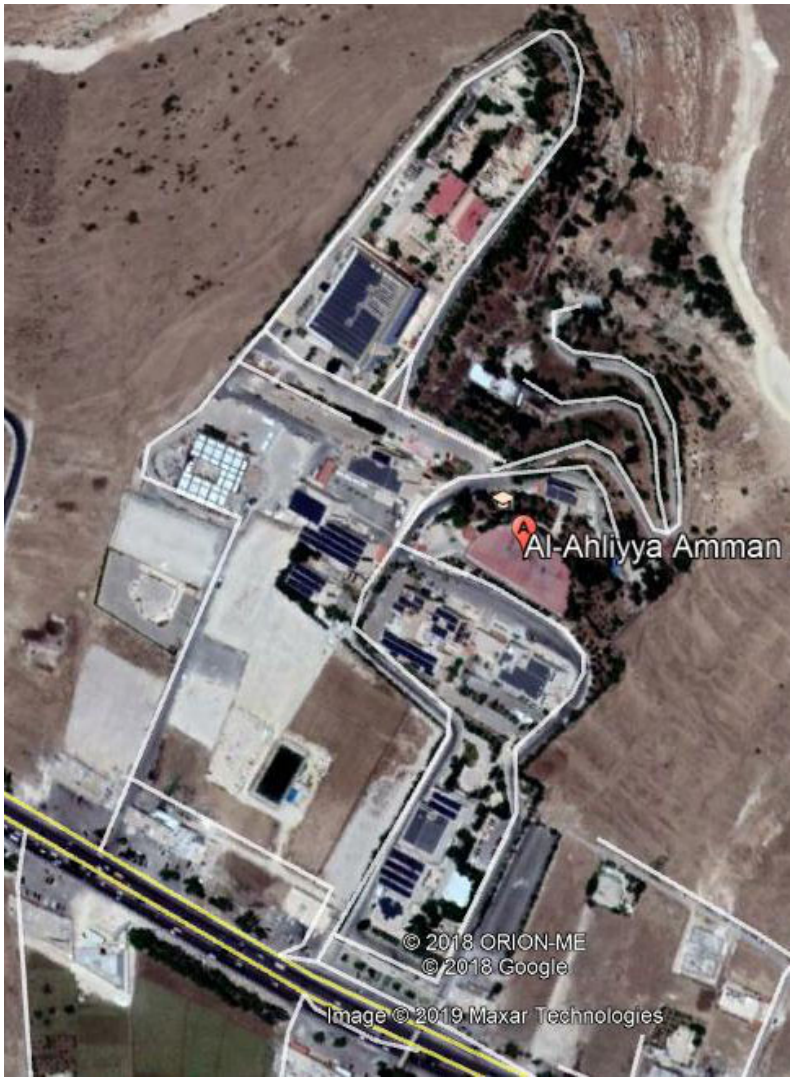
No.	Name	Place	auto		Safety				Ener		Water		Indoor environ				lighting				Building Area (m^2)
			B1	B2	S1	S2	S3	S4	E1	E2	A1	A2	I1	I2	I3	I4	L1	L2	L3	L4	
1	AAU Building 1	Assalt - Jordan			X	X	X		X			X			X		X	X		X	9569
2	AAU Building 2	Assalt - Jordan			X	X	X		X			X			X		X	X		X	6756
3	AAU Building 3	Assalt - Jordan			X	X	X		X			X			X		X	X		X	10171
4	AAU Building 4	Assalt - Jordan			X	X	X										X				1058
5	AAU Building 5	Assalt - Jordan			X	X	X		X			X			X		X	X		X	2672
6	AAU Building 6	Assalt - Jordan			X	X	X		X			X			X		X	X		X	746
7	AAU Building 7	Assalt - Jordan			X	X	X		X			X			X		X	X		X	8447
8	AAU Building 8	Assalt - Jordan			X	X	X		X			X			X		X	X		X	19897
9	AAU Building 9	Assalt - Jordan			X	X	X		X			X			X		X	X		X	2141
10	AAU Building 10	Assalt - Jordan			X	X	X		X			X			X		X	X		X	1809
11	AAU Building 11	Assalt - Jordan			X	X	X		X			X			X		X	X		X	2437
12	AAU Building 12	Assalt - Jordan			X	X	X		X			X			X		X	X		X	2236
13	AAU Building 13	Assalt - Jordan			X	X	X		X			X			X		X	X		X	2236
14	AAU Building 14	Assalt - Jordan			X	X	X										X				148

15	AAU Building 15	Assalt - Jordan			X	X	X		X			X			X		X	X		X	3568
16	AAU Building 16	Assalt - Jordan			X	X	X		X			X			X		X	X		X	11522
17	AAU Building 17	Assalt - Jordan			X	X	X		X			X			X		X	X		X	7598
18	AAU Building 18	Assalt - Jordan			X	X	X										X				198
19	AAU Building 19	Assalt - Jordan			X	X	X										X				196
20	AAU Building 20	Assalt - Jordan			X	X	X										X				45
21	AAU Building 21	Assalt - Jordan			X	X	X		X			X			X		X	X		X	622
22	AAU Temporary buildings	Assalt - Jordan																			986

Total smart area: 92,437 m^2

Total building area: 95,068 m^2

Smart building implementation: (92437/94082)*100% = 97%



Map showing university buildings top view

Description:

One of the smart applications in Al-Ahliyya Amman University is the **smart card,** which was applied in the campus in 2016. The idea came to make students campus life easier, enhancing students and staff safety and increasing campus security.

We began this project by delivering the smart card to the students, each card with unique Identifier and we stored this identifier into our database system along with student's information.

After this step we started the phase 1 for the electronic gates and the project was in 2017, the phase consisted 4 double pedestrians gates, and 3 vehicle barrier gates and all of these

gates were connected to access control panels with open database connectivity, that allowed us to import the students access rules to the access system directly from our own database in blink of eye without any remarkable issues.

The phase 2 project we added another 4 double gate in different locations in order to make easier to reach their campus.

All above the gates we built with highest safety rates to prevent any false incident.

Since the student have their smart with them we did the phase 3 project it all was about to mark the students entry /exit time to their class rooms in order and safe time and prevent any manipulation from any side for students absence and attendance. We accomplished this phase in two faculties and the vision is to cover the all for the class rooms and labs in near future.

The phase 4 was to add the access control gates to our transportation system so each bus was equipped with access control system in order to prevent any false entry to enhance students' safety because along with each system there is GPS with speed limiter and location control in order to maintain the correct route.

Since we believe in smartness and organizing, we did the phase 5 in order to organize the traffic for the elevators by adding smart readers for staff and the disabled to each elevator in the whole campus.

The phase 6 was adding barrier gates for the university campus, these gates will act automatically based on small UHF sticker mounted inside the vehicle of the university staff; for certain time and gates entrance in order to organize traffic.

We do like to add that all of above doors are connected to single platform. With this platform can perform in smart way in case of fire alarm, or robbery to take certain procedure automatically, with huge amount of logs and reports.

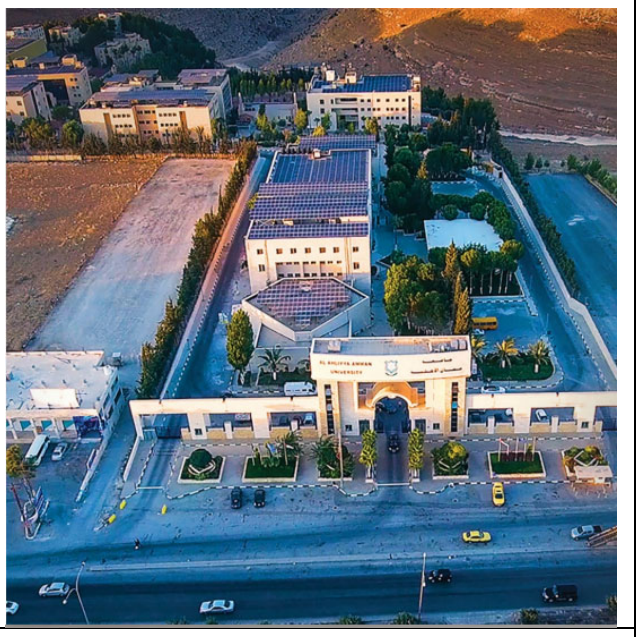
For the upcoming the future we will expand the smart card appliances in near future, such as bookshop printing services, library book renting, library entry and exit.

Finally we do believe that the safety and security for our students and staff is vital. Therefore, smart application to achieve this goal is necessary.

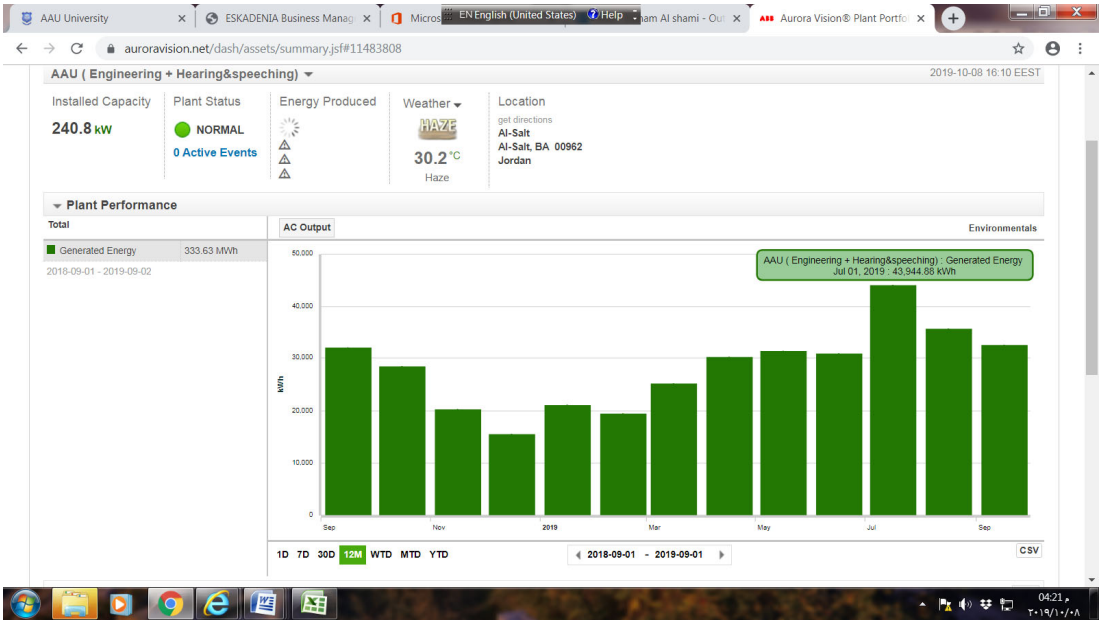
[2.3] RENEWABLE ENERGY SOURCES IN CAMPUS

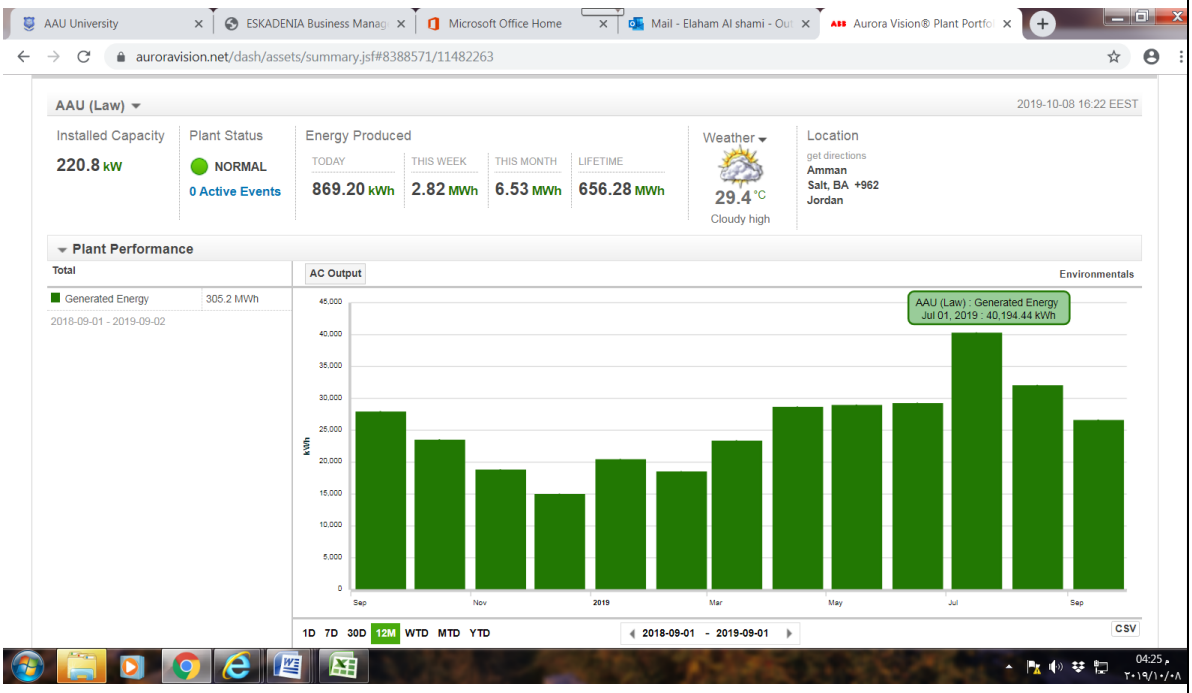
Photovoltic roof for vertical car parking building

Solar power convertor



Photovoltic panels on top of all building roofs





Monthly electricity generated by photovoltaic panels in some of the buildings at Al-Ahliyya Amman University – A monitoring software is used for each building

Description:

Jordan receives a large amount of solar radiation. Hence, most electricity in the campus is generated using solar power, through photovoltaic panels. The panels are installed on the roof of all buildings. Furthermore, the car parking building roof consists of solar panels that shade the cars, so overheating is reduced and the building is provided with necessary electricity.

[2.4] ELECTRICITY USAGE PER YEAR (IN KILOWATT HOUR)

Achievement of 100% Renewable Energy Usage by 2025

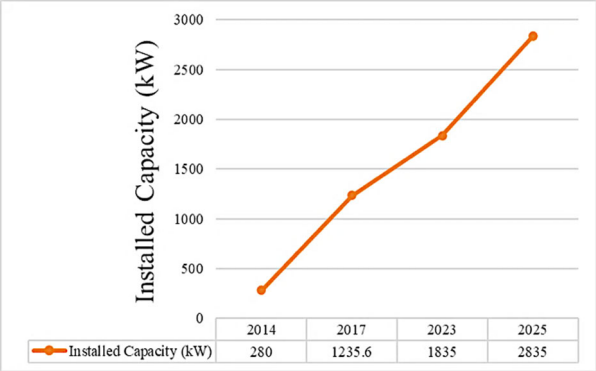
Al-Ahliyya Amman University has made significant strides toward achieving 100% renewable energy usage by 2025, progressing through a meticulously planned and executed journey in several phases. The transition began with the installation of the solar energy system in three distinct stages, each marked by an increase in capacity and production.

The first phase, launched in 2014, introduced a 280-kW capacity system that successfully connected to the grid, laying the groundwork for future expansions. This was followed by a more ambitious second phase in 2017, which added 955.6 kW of capacity, dramatically increasing the university's renewable energy output. The third phase, currently underway with a capacity of 600 capacity kW, has received all necessary approvals and is in the final stages of completion.

To date, the combined output from these phases covers 75% of the university's electricity consumption. To reach the 100% mark by 2025, a fourth phase is planned, which will add an additional 1 MW of capacity. This future expansion is essential not only to meet the current electricity needs but also to accommodate the expected increase in demand due to ongoing campus development.

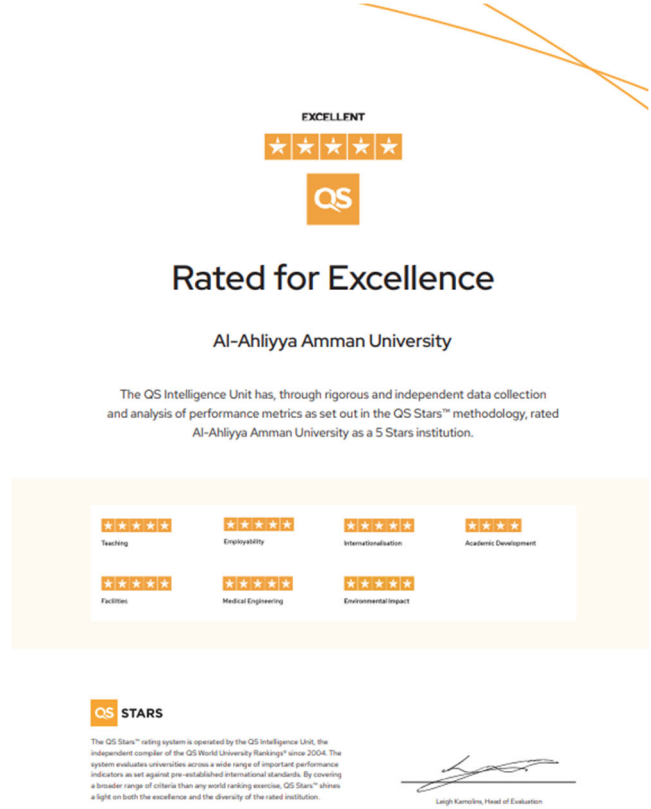
Overall, from the initial 280 kW capacity to the impending completion of 1,835 kW capacity in total capacity, Al-Ahliyya Amman University's commitment to a sustainable and energy-independent future is clear. The university's journey towards 100% renewable energy is a testament to its dedication to environmental stewardship and its proactive approach to addressing the challenges of energy consumption and sustainability.

Year	*Installed Capacity (kW)*	*Description*
2014	280	**Phase 1:** Initial setup completion
2017	1235.6	**Phase 2:** Major expansion completion
2023	1835	**Phase 3:** Further expansion completion
2025	2835	**Phase 4:** Completion to 100%

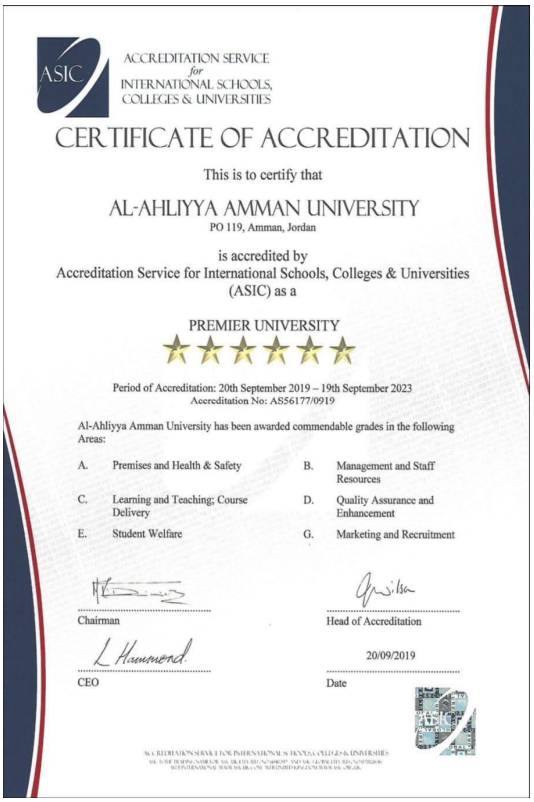


This chart will visually represent the growth in installed capacity of renewable energy sources at Al-Ahliyya Amman University from 2014 to the planned full capacity in 2025, aiding in illustrating the university's commitment to achieving a sustainable future. Moreover, this progress will effectively and positively contribute to the reduction of total CO2 emissions in Scope 2, as the university moves towards complete reliance on renewable energy sources.

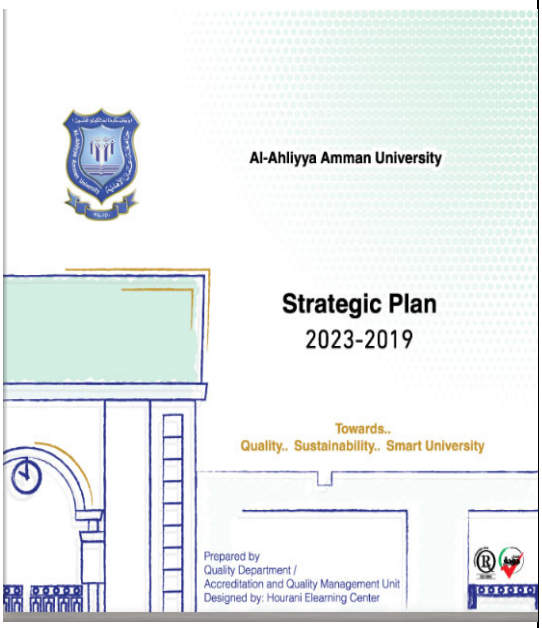
[2.5] ELEMENTS OF GREEN BUILDING IMPLEMENTATION AS REFLECTED IN ALL CONSTRUCTION AND RENOVATION POLICIES



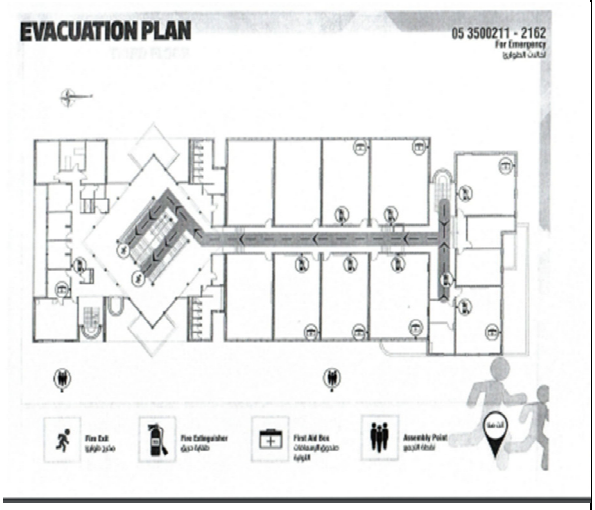
QS accreditation 2023 (5 stars)



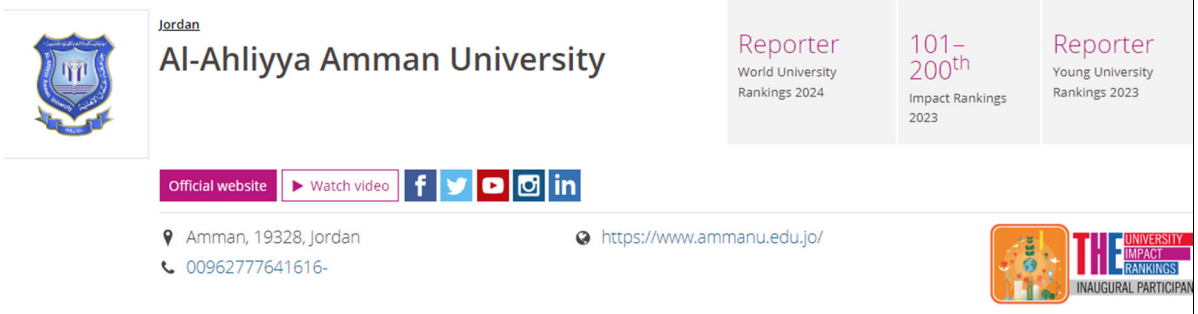
ASIC accreditation (2019-2023)

	
Al-Ahliyya Amman University Strategic Plan (2019-2023) Towards: Quality, Sustainability, Smart University	TQCSI Risk management certificate for AAU

LR certificate for Al-Ahliyya Amman University (2018-2023)



Evacuation plan sample of a faculty building in Al-Ahliyya Amman University



The Times world university rankings (University impact, good health and well-being for people, and quality education)

Description:

Al –Ahliyya Amman University has been certified and accredited by many independent bodies in many aspects such as health and safety, risk management, facilities, and

teaching. Al-Ahliyya Amman University is committed in the efficient management of energy, water and key material resources, and the minimisation of waste and emissions. We also work to integrate sustainability into our teaching and research, and work with our staff, students and our wider community to help raise awareness and drive behavioural change. The University shall undertake a continuous improvement process that seeks to meet the operational performance targets, goals, and objectives designed to achieve sustainability and environmental improvements.

Water Management:

Policy Statement:

To save and recycle water through efficient management.

Achievements:

More than 80% for Rain Water is saved and treated for reuse.

More than 75% of Water is Recycled.

More than 75% of Treated water is consumed.

More than 60% of Water Efficient Appliance Installed.

Solar Energy:

Policy Statement:

To generate the required Energy from the renewable sources.

Achievements:

More than 20,000 Meter Square area has been installed with Solar Panels. More than 1500 KW of Electricity is generated.

Transportation:

To implement the best practice for sustainable travel and transportation on and off campus such as walking, cycling, carpooling., and encouraging the use of hybrid or full electrical cars. Create awareness about green transportation program for the staff and students.

Waste Management:

Developing appropriate recycling infrastructure on campus. Create a Waste Management awareness programs for staff and students to know about the importance of waste management and the positive impacts to the mankind.

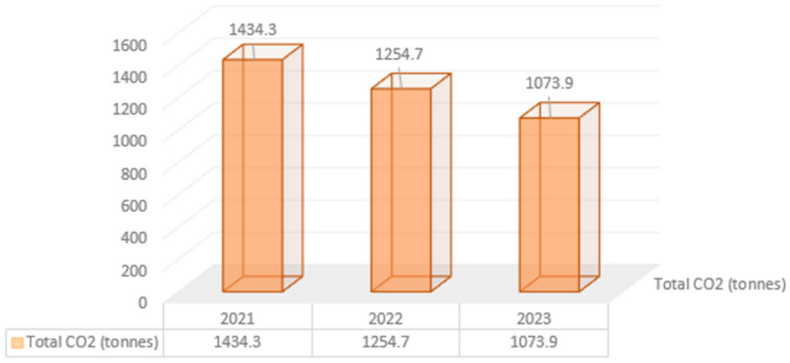
Total CO_2 (tonnes) Summary

The total CO2 emissions have dropped from 1,434.3 tonnes in 2021 to 1,073.9 tonnes in 2023, representing a total reduction of 360.4 tonnes or -25.1%. This significant decrease underscores the university's commitment to sustainability and its proactive approach towards achieving its goal of reducing environmental impact. The consistent year-over-year reduction across all scopes not only aligns with global environmental standards but also showcases the university's dedication to achieving its stated goal of increasing renewable energy usage and decreasing dependency on non-renewable sources. This proactive approach not only helps mitigate the university's operational impact on the environment but also positions it as a leader in sustainability within the academic community.

SN	Scope	2021	2022	2023
1.	Scope 1	27.1	25.2	22.3
2.	Scope 2	241.3	193.1	144.8
3.	Scope 3- *Optional- Transportation*	1,165.9	1,036.4	906.8
	Total CO2 (tonnes)	**1434.3**	**1254.7**	**1073.9**

Total CO2 *reduction* (tonnes) 2021/2023 – **360.4**, **-25.1%**

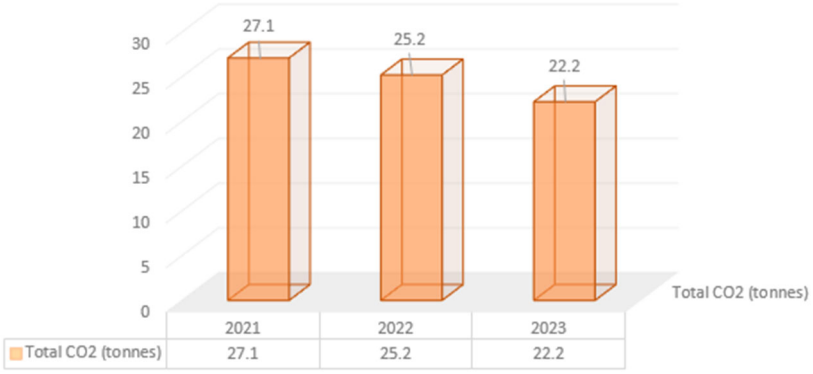
Total CO2 (tonnes) Summary
Total CO2 reduction (tonnes) 2021/2023 – 360.4, -25.1%



4.1 Scope 1 Emissions

SN	Main Activity Type	2021	2022	2023
1.	Stationary combustion	13.6	12.3	11.1
2.	Mobile combustion	11.5	11.1	9.7
3.	Fugitive emissions from air-conditioning	2.0	1.8	1.4
	Scope 1* – Total CO2 (tonnes)	**27.1**	**25.2**	**22.2**

Scope 1 Emissions



Improvement

1. **Installation of Energy-Efficient On-Site Equipment**
   Action Taken: The university has replaced older boilers and on-campus heating systems with high-efficiency models that use less energy and emit fewer pollutants. This update directly lowers the emissions from stationary combustion sources, aligning with the university's goals to minimize its carbon footprint.

2. **Implementation of a Refrigerant Management Program**
   Action Taken: Recognizing the impact of fugitive emissions from refrigerants, Al-Ahliyya Amman University has established a strict refrigerant management program. This program includes regular inspections, maintenance, and upgrades to HVAC systems to prevent leaks and ensure efficient operation. Such measures are crucial for minimizing emissions of potent greenhouse gases associated with air conditioning and refrigeration systems.

3. **Fleet Electrification Initiative**
   Action Taken: Al-Ahliyya Amman University has embarked on a comprehensive fleet electrification initiative, replacing all gasoline and diesel vehicles with electric vehicles (EVs). This transition includes not only light-duty passenger cars but also service and maintenance vehicles used across the campus. As part of this initiative, the university has installed multiple EV charging stations throughout the campus to support the new fleet, ensuring accessibility and convenience for charging.

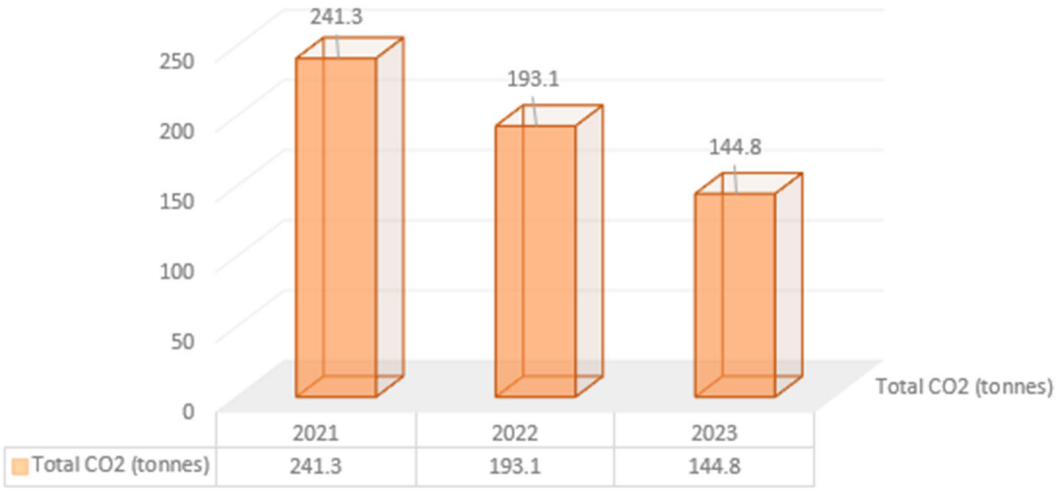
   These targeted actions demonstrate Al-Ahliyya Amman University's commitment to minimizing Scope 1 emissions from mobile combustion sources. By adopting modern technologies, enforcing environmentally friendly policies, and ensuring vehicle maintenance is kept to high standards, the university actively contributes to sustainable practices and moves closer to achieving its net-zero emissions goal.

4.2 Scope 2 Emissions

SN	Main Activity Type	2021	2022	2023
1.	Purchased Electricity	217.2	173.8	130.3
2.	Heat	24.1	19.3	14.5
	Scope 2* – Total CO2 (tonnes)	**241.3**	**193.1**	**144.8**

Achieving 75% utilization of renewable energy by 2023 is a remarkable milestone, especially as the university targets 100% by 2025. This strategy not only reduces dependence on non-renewable sources but also significantly lowers greenhouse gas emissions, as reflected in the Scope 2 figures. The emissions from purchased electricity have decreased significantly from 217.2 tonnes of CO2 in 2021 to 130.3 tonnes in 2023. This substantial reduction by approximately 40% over three years vividly illustrates the effectiveness of the university's strategy to integrate renewable energy into its power consumption matrix. There is also a noticeable decrease in emissions from purchased heat, from 24.1 tonnes in 2021 to 14.5 tonnes in 2023. This reduction, though on a smaller scale compared to electricity, complements the overall strategy of energy efficiency and transitioning to less carbon-intensive energy sources.

Scope 2 Emissions



The significant reduction in Scope 2 emissions at Al-Ahliyya Amman University reflects its successful implementation of renewable energy technologies and commitment to a sustainable future. This journey not only highlights the university's role as a responsible environmental steward but also sets a benchmark for academic institutions globally. The final push towards 100% renewable energy will be pivotal, and continued diligence in this direction will further establish the university's reputation as a leader in sustainability and environmental responsibility.

Improvement

1. **Maximize On-Site Renewable Energy Generation**

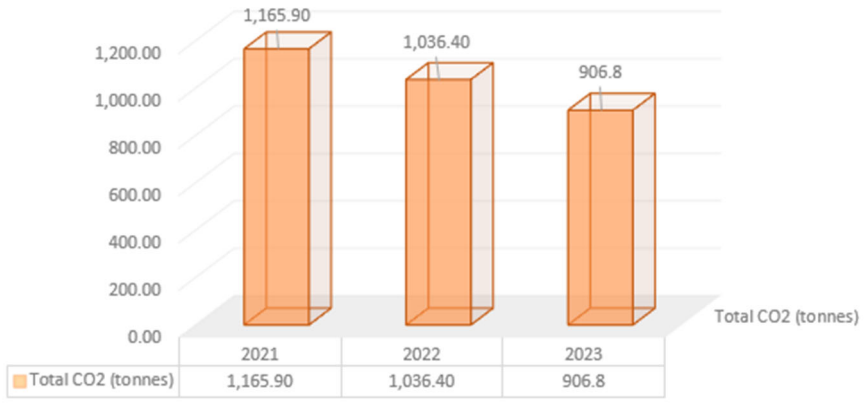
***Action Taken**:* Al-Ahliyya Amman University has expanded its solar energy installations across the campus to cover additional buildings and facilities. This expansion includes the integration of energy storage systems to enhance the utility of generated solar power, ensuring a consistent and reliable supply of renewable energy even during off-peak sunlight hours.

2. **Improve Energy Efficiency**
   Action Taken: The university has deployed a systematic energy management system aimed at monitoring and optimizing energy usage across campus. Recent initiatives include upgrading to LED lighting, installing state-of-the-art HVAC systems, and replacing outdated appliances with models that meet the highest energy-efficiency standards. These measures have effectively lowered the university's total energy consumption and reliance on external energy sources.
3. **Adoption of Green Power and Renewable Energy Certificates (RECs)**
   Action Taken: Recognizing the limitations of on-site generation to meet all its energy needs, Al-Ahliyya Amman University has committed to purchasing green power from renewable energy sources for any additional requirements. Furthermore, the university invests in Renewable Energy Certificates (RECs) to cover 100% of its electricity usage, ensuring that every kilowatt-hour of electricity consumed on campus is offset by renewable energy generated elsewhere. This action supports the renewable energy sector and aligns with the university's goal of achieving net-zero emissions by 2028.

4.3 Scope 3 Emissions

SN	Main Activity Type	2021	2022	2023
1.	Transportation	1,165.9	1,036.4	906.8
	Scope 3* – Total CO2 (tonnes)	**1,165.9**	**1,036.4**	**906.8**

Scope 3 Emissions



The emissions from transportation show a consistent decrease from 1,165.9 tonnes of CO2 in 2021 to 906.8 tonnes in 2023. This progressive reduction of nearly 22% over three years underscores the effectiveness of the university's strategies aimed at adopting greener transportation methods. The university is currently conducting several studies aimed at integrating more green vehicles into its

transportation fleet. This involves evaluating the potential for replacing existing vehicles with more energy-efficient and lower-emission options, such as electric or hybrid vehicles. The transition to greener vehicles is a significant factor in the observed reduction of Scope 3 emissions. Al-Ahliyya Amman University has established several agreements with travel agencies that align with sustainability principles. These partnerships ensure that the transportation options provided for university-related travel, including student and staff mobility, are environmentally friendly and support the university's carbon reduction goals.

The university has conducted several workshops for staff and students emphasizing the importance of transitioning to more sustainable transportation solutions. These workshops serve to educate the university community about the environmental impacts of traditional transportation modes and the benefits of adopting greener alternatives. In addition to workshops, there are ongoing initiatives to encourage staff and students to adopt more sustainable travel habits. This includes promoting carpooling, the use of public transportation, and walking. These initiatives not only contribute to reducing emissions but also foster a culture of sustainability across the campus.

The ongoing efforts and gradual shifts in transportation habits indicate a significant cultural shift towards sustainability within the university community. By integrating educational aspects into its sustainability initiatives, the university ensures that the transition to greener transportation is accompanied by a deep understanding of its importance.

Improvement

1. **Enhance Sustainable Procurement Practices**

   Action Taken:

   - Develop and implement a sustainable procurement policy that prioritizes products and services with lower carbon footprints.
   - Engage suppliers through sustainability criteria in procurement contracts, encouraging them to disclose their emissions and commit to reduction targets.

2. **Expand Telecommuting and Remote Operations**

   Action Taken:

   - Promote and facilitate remote learning options and telecommuting policies for staff and students to reduce the need for daily commuting.
   - Invest in robust IT infrastructure to support effective online learning and virtual meetings, reducing the necessity for physical travel.
   - Implement incentives for students and staff to use sustainable modes of transportation, such as biking, public transit, or carpooling, for necessary on-site activities.

3. **Offset Remaining Emissions Through Credible Projects**

   Action Taken:

   - Identify and invest in high-quality carbon offset projects, such as reforestation, renewable energy projects, or community-based sustainability initiatives.

- Develop on-campus projects that can generate carbon credits, such as solar energy installations or sustainable land management practices.
- Establish partnerships with other organizations or networks to invest in large-scale environmental projects that offer verifiable carbon offsets.

These specific actions are designed to address the direct factors contributing to Scope 3 emissions at Al-Ahliyya Amman University and can be adapted as more data becomes available or as technology and opportunities evolve. The success of these initiatives would hinge on strong policy enforcement, continuous monitoring, and active engagement of the university community to embed sustainability deeply into the culture and operations of the institution.

[3] WASTE (WS)

[3.1] RECYCLING PROGRAM FOR UNIVERSITY WASTE

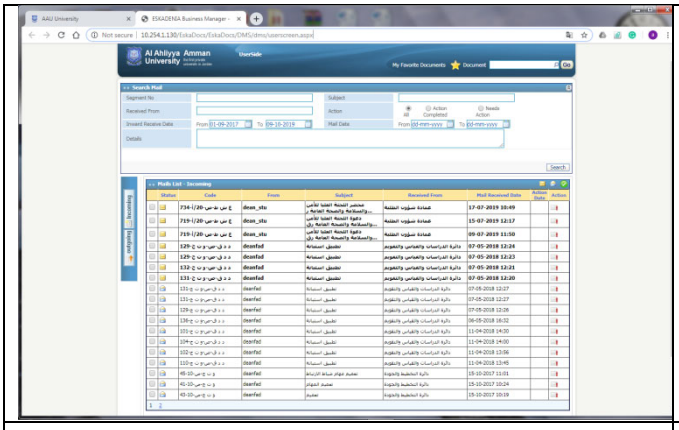
Recycling containers vision for University Waste

Description:

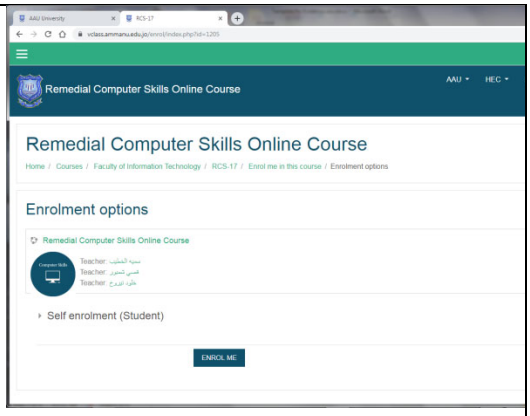
Since 2014 until today, Al-Ahliyya Amman University has supported real initiatives to awareness both of staff and students about the importance of recycling various materials, especially those produced on campus. This culture was disseminated through students

systematic and non-systematic activities, in addition to the dissemination of all elements contributing to this awareness, such as sorting materials containers.

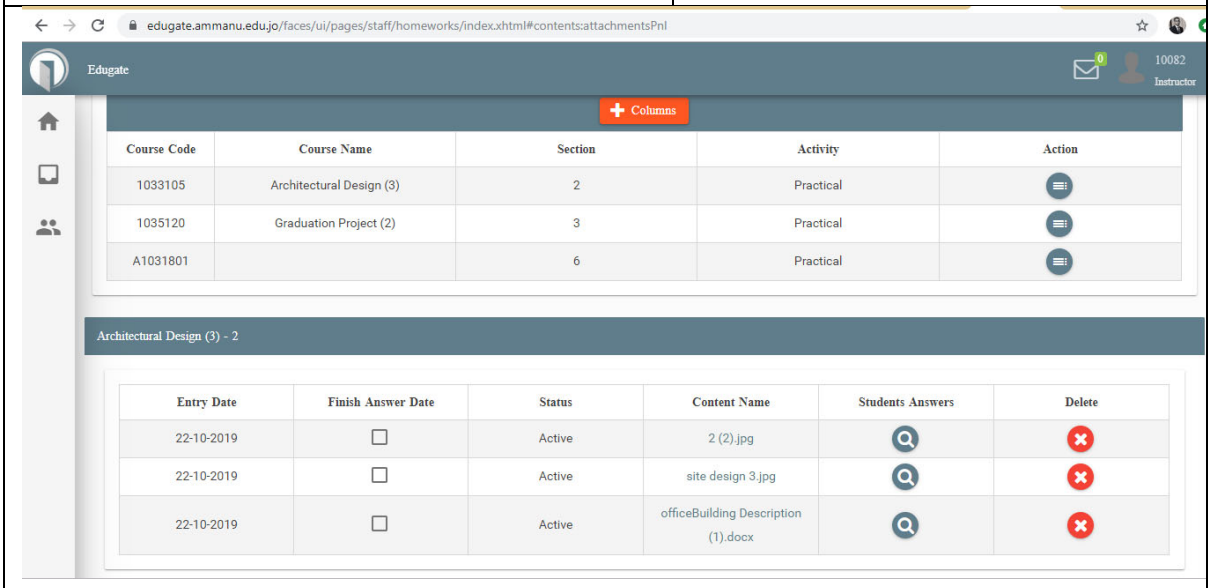
[3.2] PROGRAM TO REDUCE THE USE OF PAPER AND PLASTIC ON CAMPUS



1



2



3

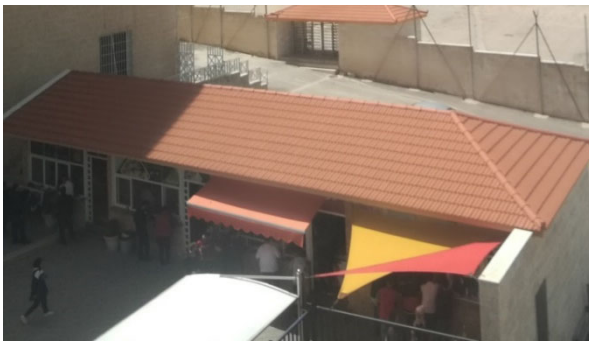
Example of Program to Reduce the Use of Paper and Plastic in Campus Program for University Waste

Description:

1- One of the biggest steps taken by the University in reducing paper usage is the development of an electronic correspondence system in agreement with **ESKADENIA**

for document management, which is used for internal correspondence between university facilities.
2- Another example to reduce the use of paper is the introduction of electronic teaching courses through the Internet and the student to take the exam held electronically in specialized laboratories, especially examinations level of English language and computer skills courses.
3- Instructors and students can upload assignments on their portal, reducing paper required for this purpose (edugate system).

[3.3] ORGANIC WASTE TREATMENT

	
Example of Organic Waste Treatment	Example of cafeterias located on campus

Description:
At Al-Ahliyya Amman University, one of the most diverse sources of organic waste is from restaurants and cafeterias located on campus. The University has contracted with the **Zawati Company** specialized in the transport of organic waste after being collected in dedicated containers and distributed on campus to be treated outside the university by sound environmental methods. The university also offers awareness initiatives on the importance of treating organic waste due to the positive environmental benefits.

[3.4] INORGANIC WASTE TREATMENT

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>1</td><td>2</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3</td><td>4</td></tr>
<tr><td colspan="2">Example of Inorganic Waste Treatment</td></tr>
</table>

Description:

1- The Department of Supplies of the AAU stores and sorting inorganic wastes in private warehouses to be auctioned to private institutions for the treatment and recycling of these wastes

2- As part of the University's policies for the treatment of inorganic wastes, procedures have been put in place for the treatment mechanism through the conclusion of agreements for the supply of these materials with specialized companies for recycling paper sold to them by weight or replaced by paper again from the same company. An example of this is the agreement with the **Mahmoud Al Khalili Paper Recycling Foundation**.

3- Another example is the supply of used furniture and appliances to charities.

4- Another agreement is to sell inorganic wastes to specialized companies that process them in a sound environmental manner.

[3.5] TOXIC WASTE TREATMENT

Toxic Waste Treatment

Description:
At the AAU campus there is a maintenance station for buses periodically. These buses will result in toxic substances such as waste oils, damaged batteries and others. The University collects these toxic wastes in special barrels and transports them properly to oil treatment plants outside the university.

[3.6] SEWAGE DISPOSAL

Special tank to transport treated water for agricultural purposes	
Sewage Disposal in AAU	

Description:
On campus of AAU there is a wastewater treatment and sewage treatment plant. The volume of this water is estimated at 60 to 100 cubic meters per day at the general rate. Where this water is collected in a tank and then transferred mechanically to three large containers after going through special filters and the capacity of each container 35000 litres treated every 12 hours. A careful laboratory examination of the purification results ensures its safety to the environment, and then is transported by special tankers used for vegetation on campus and surrounding agricultural land.

[3.7] CHEMICAL WASTE TREATMENT

All potential waste streams that arise from laboratory operations needs to be assessed and an appropriate disposal route selected prior to waste being generated. Waste should be collected in a suitable container and labelled. For hazardous waste chemicals, a Chemical Waste Disposal Form must be completed and submitted via e-mail at least 2 days in advance of the collection date. The concerned Office will inform you if your submission cannot be included in the university's hazardous waste disposal program. In general, the following items will be accepted:

- Waste aqueous solutions (e.g. corrosive, oxidizing, and toxic liquids)
- Waste solvents, oils, and scintillation fluids
- Contaminated lab ware and absorbents

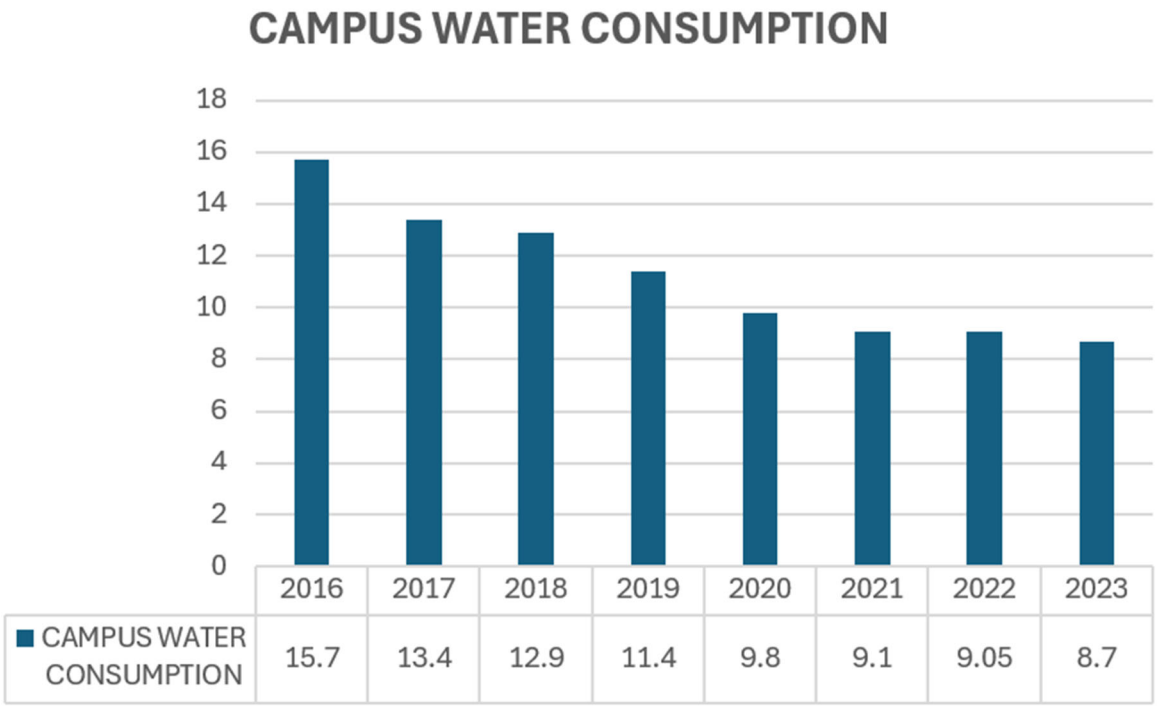
Large quantities of expired and/or unwanted materials are not acceptable and recovery fees may be applied. Limited quantities of these materials will be accepted at the direction of staff. In most cases, staff will be able to dramatically reduce costs by coordinating multiple requests. We trust you appreciate the complexity (and associated risks) of the hazardous waste disposal program and will work with us to make it successful.

Please post or circulate this notice to those persons responsible for preparing wastes for collection - noting:

- Pick Up arrives as close as possible to the times indicated.
- Occasionally there are delays from pick-up destinations prior to your stop, please be patient.
- Do not leave your waste unattended.

[4] WATER (WR)

Jordan is one of the poorest countries of water in the world. Due to lack of water resources, Jordan suffers from absolute water scarcity. Water availability is about 145 m^3 per person per year, and this is projected to drop to about 91 m^3 by 2025 (UN DESA, 2005. *Changing Unsustainable Patterns of Consumption and Production: Human Settlements and Water*). Therefore, Al-Ahliyya Amman University (AAU) considers water management as a major priority in its strategic plan.



Water Management:

Policy Statement:

To save and recycle water through efficient management.

Achievements:

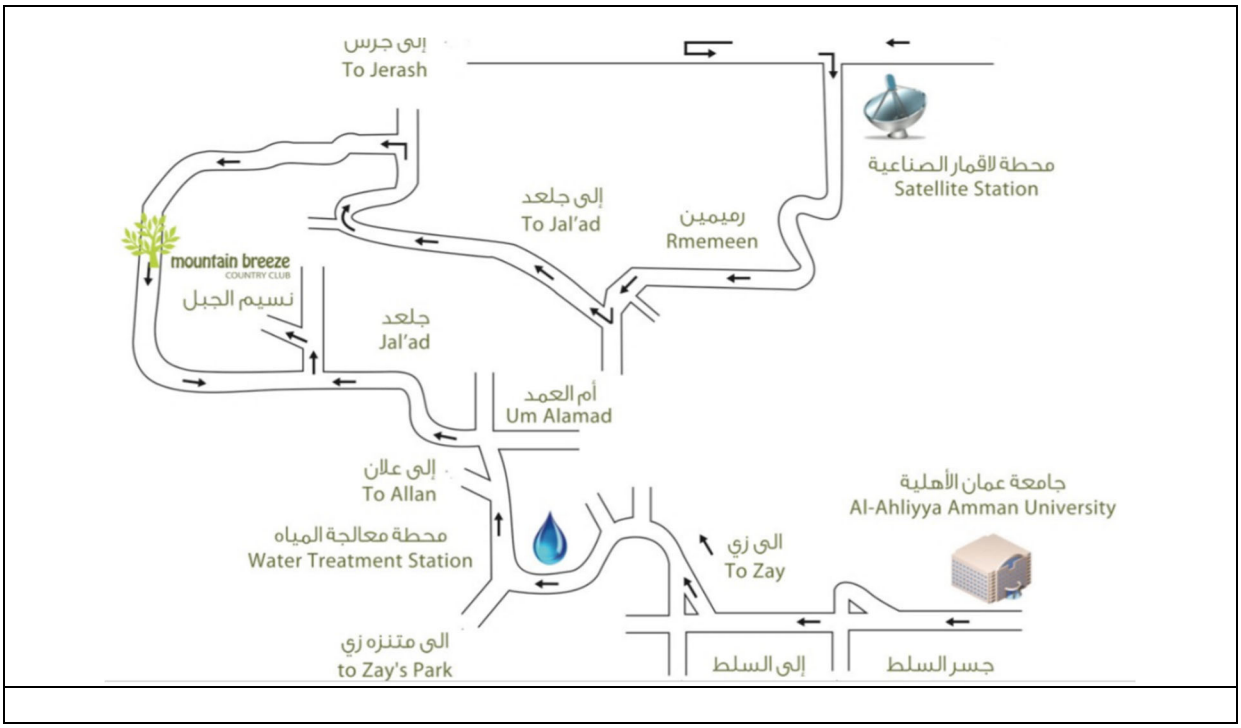
More than 88% for Rain Water is saved and treated for reuse.

More than 85% of Water is Recycled.

More than 92% of Water Efficient Appliance Installed.

More than 76% of Treated water is consumed.

[4.1] WATER CONSERVATION PROGRAM IMPLEMENTATION



Water Saving Well (This room includes the water compressors)

Water Harvesting Copmressors

Water pipes

Water gutter

Water Collector

Water canals

Water processing unit

Description:

AAU implements a water conservation program that focuses on three main issues; firstly, rain water harvesting, secondly, reducing the use of water, and thirdly, water recycling. Rain water surface gutters (water canals) on the ground level surround every building, in addition to several water pipes and gutters from the roofs of AAU buildings are used to collect rain water. Furthermore, curvature of roads were designed to redirect the water flow toward the valley; the lowest area in the AAU campus. Then the rain flow is collected as a ground water in artesian wells with a depth of 10m.

Achievements:

More than 80% of rain water is collected, saved and then treated for reuse.

[4.2] WASTE WATER RECYCLING/REUSING PROGRAM IMPLEMENTATION

Description:

Al-Ahliyya Amman University established a Purification Unit /Water Treatment Plant; where all used water is recycled and reused in the campus and surrounding planted lands.

Location of the Purification Unit is clean, smells so good and its green area contains so many organic plants. In addition; there is no insects in this area. This is due to the highly controlled process of the water treatment stages.

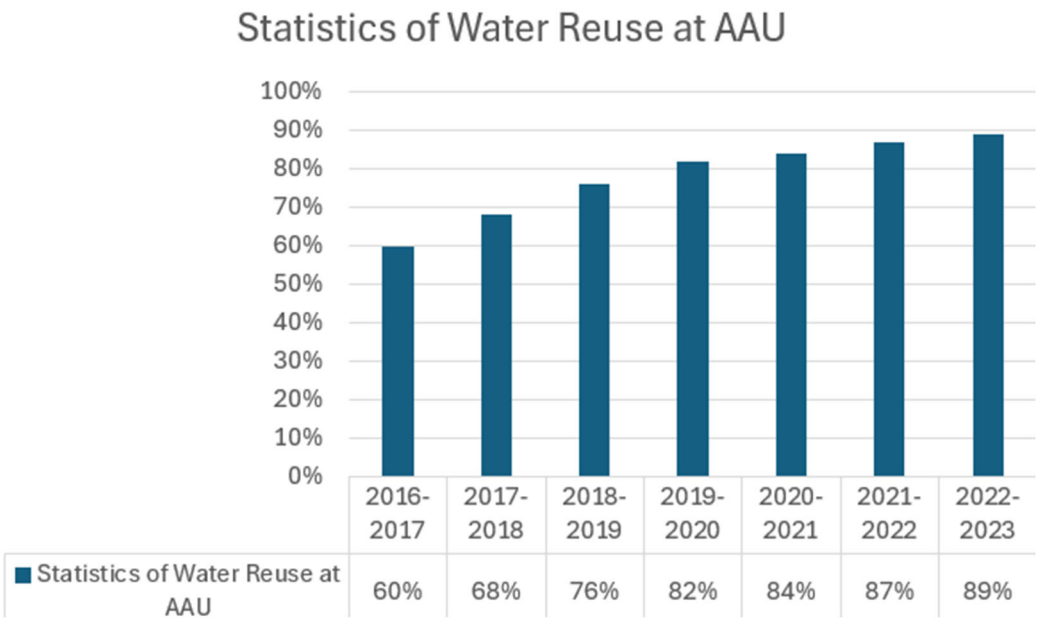
Process of treatment includes four main stages. Firstly, used water from sewage is collected by long pipes inside a large tank called receiving tank. This tank contains a filter to separate solid and liquid waste. After the separation, the solid waste is taken to purification plants to be converted to compost by means of perfusion mechanisms. While, the liquid waste is then transferred to another tank to be purified. In this tank, water is purified and treated by bacteria and air for 12 hours. At the last hour and half, treated water is transferred to clean water tank. After that, this water is sterilized by chlorine and transferred by 6 inch pipes.

It is also transported using containers that distributes a well-formed resin for irrigation and planting.

The University also conducts a water examination at the faculty of pharmacy (parasite examination, and acidity).

The reservoir capacity is 70000 m^3. This water is very close to the purity of drinking water comes from governmental water authority.

The recycled water is reused for watering plants (drip irrigation systems) in the university campus. In addition, it is used to irrigate planted fields surrounding the university campus.



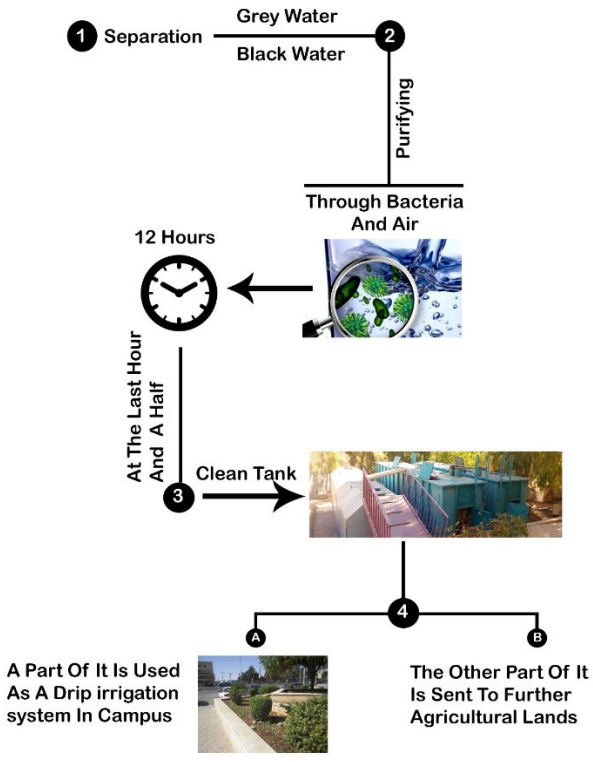


Diagram showing the water recycling program in Al-Ahliyya Amman University (AAU)

Water Treatment Plant

Vegetations in the site of the treatment plant

Filter pipes

Filter

Transmission pipe

Liquid waste tank

Receiving pipes

Receiving tank

Containers

Drip irrigation system

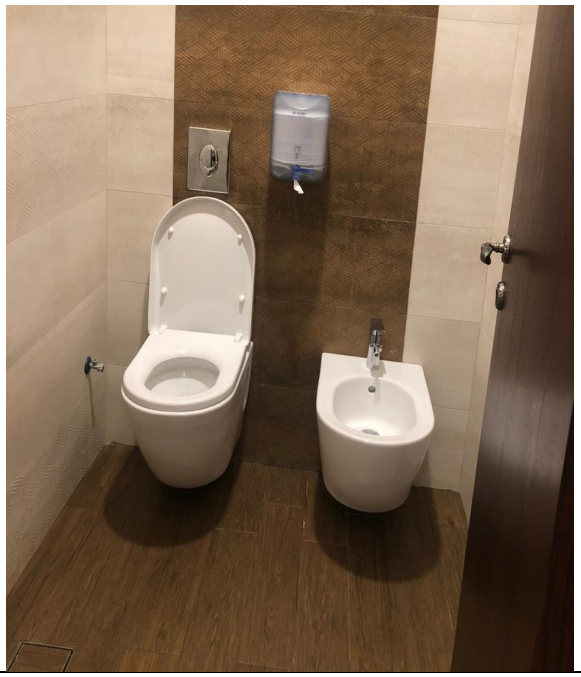
Drip irrigation system

Part of the recyled water in Al-Ahliyya Amman University (AAU) is used to water agricultural land outside the campus

Achievements:

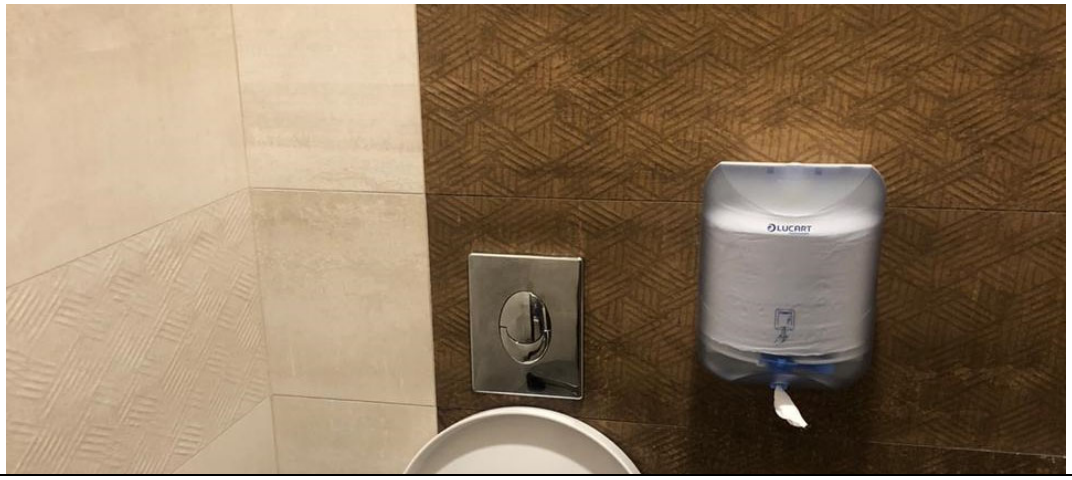
More than 89% of Water is Recycled.

[4.3] WATER EFFICIENT APPLIANCES USAGE (E.G. HAND WASHING TAPS, TOILET FLUSH, ETC.)

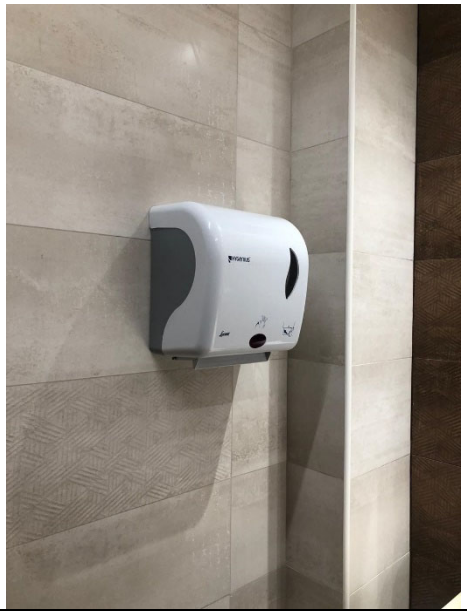


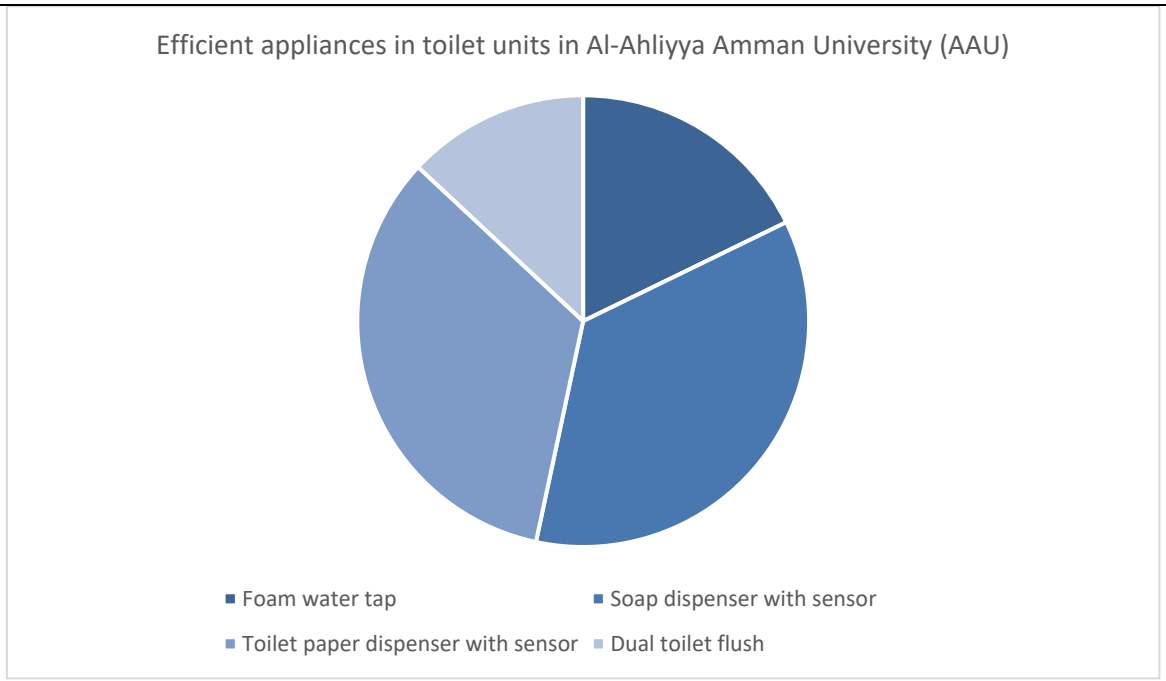
Example of men toilet unit in AAU

Example of women toilet unit in AAU



Dual toilet flush

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">Toilet paper with sensor</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Soap dispenser with sensor</td><td>Foam water tap</td></tr>
</table>



Breakdown of efficient appliances in toilet units in Al-Ahliyya Amman University (AAU)

Description:

Al-Ahliyya Amman University campus consists of 21 permanent buildings (including academic activities facilities, student residence, and services) and 9 temporary structures (including caravans, kiosks, and shelters). These include about 350 toilet units, water efficient appliances are applied in these units. Examples of such appliances are foam water taps, soap dispenser with sensor, toilet paper dispenser with sensor and dual toilet flushes. The table below illustrates the total number of appliances, number and percentage of efficient appliances in toilet units.

Achievements:

More than 90% of water appliances are efficient.

Appliance	Total Number	Total number Efficient appliances	Percentage
Toilet	410	410	**100%**
Water tap	525	Foam water tap = 480	91%
Soap dispenser	365	Soap dispenser with sensor = 325	89%
Toilet paper dispenser	375	Toilet paper dispenser with sensor = 345	82%
Toilet flush	525	Dual toilet flush = 415	79%
		Total Percentage	**90%**

[4.4] PREVENTING POLLUTED WATER ENTERING THE WATER SYSTEM

EQUIPMENT LABELLING AND IDENTIFICATION

BELOW GROUND SERVICES

All underground services have marking tape of correct distances above pipework complying with relevant Jordanian Standards for that service. Where the service is non-metallic, provide a tape incorporating locating wire.

ABOVE GROUND SERVICES

All pipe works are labelled with adhesive pipe markers indicating pipe contents or system type and directional arrows indicating flow. Markers are installed at a minimum of every five metres. Labelling are not being restricted only to close proximity of access panel openings.

ASSET LABELLING AND BAR CODING

Equipment's are provided with asset labels and bar codes as per CIS Asset Identification and Labelling Standard.

BELOW GROUND PIPEWORK

All pipework and services installed below ground are fully surveyed and documented in accordance with the details required for Quality Level– Classification of Subsurface Utility Information (SUI). The CIS Standard – Permit to Dig Form are submitted and approved by the department prior to installing or repairing any pipework located below ground. For further details and requirements of all pipe installations below ground, please refer to the CIS Excavation Standard.

CCTV recordings of below ground sewer, storm water and sub-soil drainage pipework and structures, including pits, reflux valves, detention tanks, gross pollutant traps, jellyfish, etc, are provided prior to practical completion.

ABOVE GROUND PIPEWORK

All pipe work chased into masonry walls are not crossed any movement joint and are provided with sufficient insulation so that expansion and contraction can take place without damage to pipe work or to the surrounding element and its surface finish.

PIPE SUPPORTS AND FASTENING

Spacing of pipework supports are installed to suit:

a. Spacing of Brackets and Clips

b. Maximum Spacing of Brackets, Clips and Hangers.

c. Heated Water Services

d. every 2 metres for pipework greater than or equal to 100mm in diameter

e. located to separately support valves within pipework of 200mm or greater.

f. pipe manufacturers requirements
Inlet and outlet pipework serving pumps and other hydraulic equipment are not used to support the equipment. All equipment are adequately supported independently of the to the inlet and outlet pipework supports. Materials for pipework supports are as follows.

CORE HOLES AND SLEEVES

Details of all proposed core holes in floors, walls, beams and columns are checked and approved by a structural engineer prior to coring the hole. All pipework passing through a core hole or masonry/concrete wall or floor are provided with a 0.6 mm thickness sheet copper sleeve having a grooved and seamed joint. Sleeves are cylindrical having a diameter to provide a 25mm gap all around the pipe passing through the sleeve. Alternatively, copper tubing are used as the sleeve if a 25mm gap around the pipe can be achieved. Each pipe passing through the sleeve are positioned centrally in the sleeve to ensure the annular space between the pipe sleeve is equal and round. Fire rating of all pipework penetration are installed to comply with all statutory requirements. For further information regarding fire rating of pipe penetrations, refer to the CIS Essential Fire Safety Measures Standard.

CORROSION PROTECTION AND FINISHES

All surfaces exposed or susceptible to corrosion will be suitably painted, including external surfaces of all machinery, apparatus, equipment, fittings, tanks, vessels and services including supports, hangers and brackets. CAMPUS INFRASTRUCTURE & SERVICES CIS Hydraulic Services Standard - Final CIS-PLA-STD-Hydraulic Services 002 Date of Issue: 18 September 2015 47 Ferrous metal exposed to the atmosphere or in humid conditions is to be hot dip galvanised having a minimum coating thickness 0.1mm. Hot dip galvanising are carried out after all welding, cutting, drilling and swarf removal has been completed. The university will not accept cold galvanising process.

ACOUSTIC PERFORMANCE OF HYDRAULIC PIPEWORK

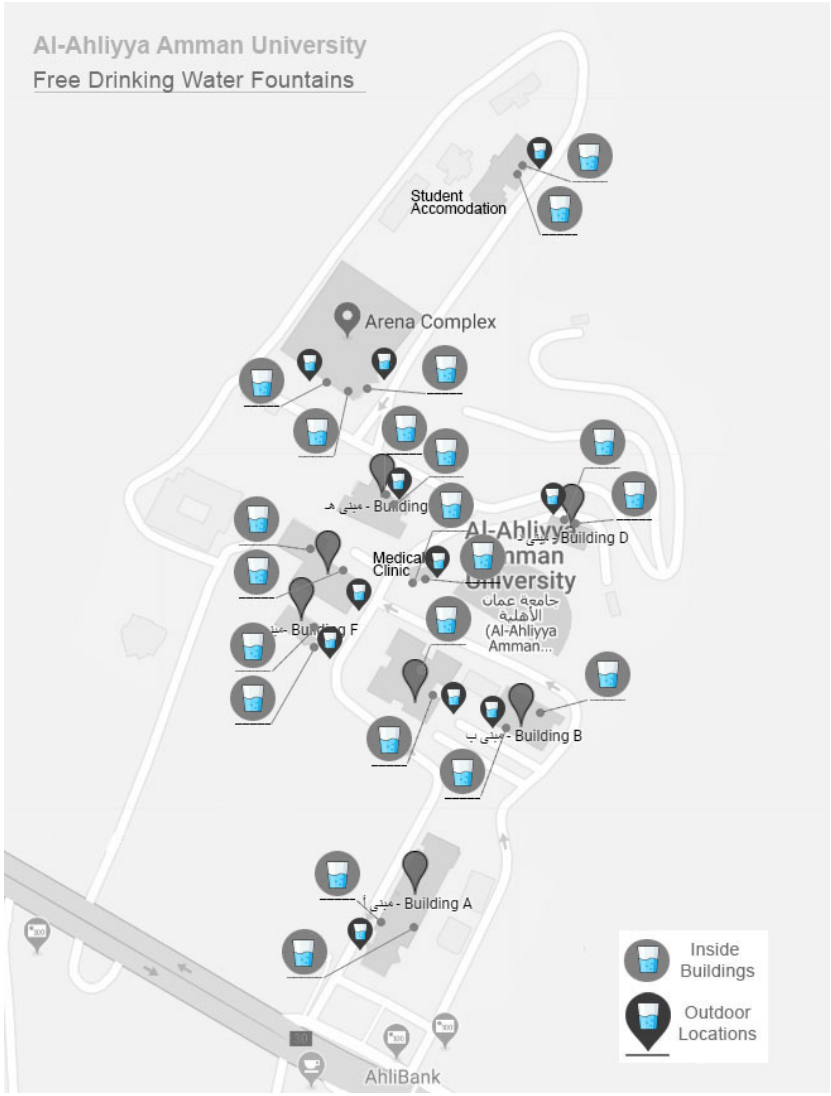
All hydraulic services must comply with the acoustic requirements of NCC through a combination of treatment to building elements and system pipework. Acoustic treatment of all hydraulic services requires assessment and certification from a qualified Acoustic Engineer

[4.5] FREE DRINKING WATER

Al- Ahliyya Amman University has over 60 water dispenser/fountains located around its buildings, play grounds, parking, cafeterias etc giving you access to free fresh hot/cold

drinking water whenever you need it. Al- Ahliyya Amman University is committed to providing free drinking water and it is safe to drink and provides a great opportunity for all students, staff and visitors to use a reusable cup.

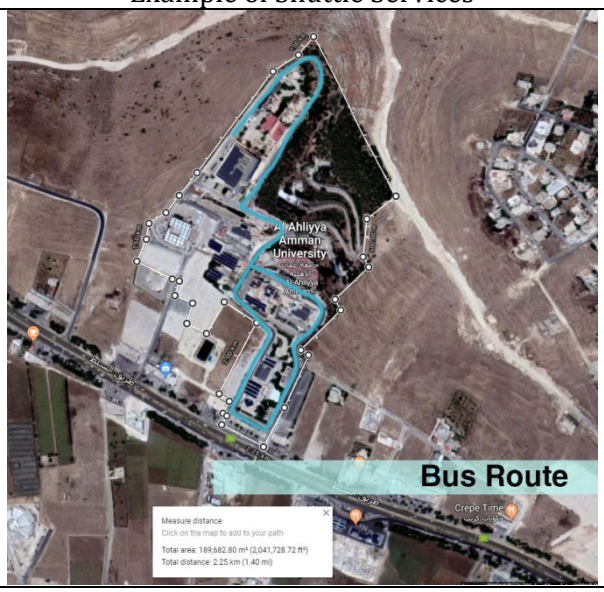
See the information below for key locations of water fountains at AAU:



[5] TRANSPORTATION (TR)

[5.1] SHUTTLE SERVICES

Example of Shuttle Services



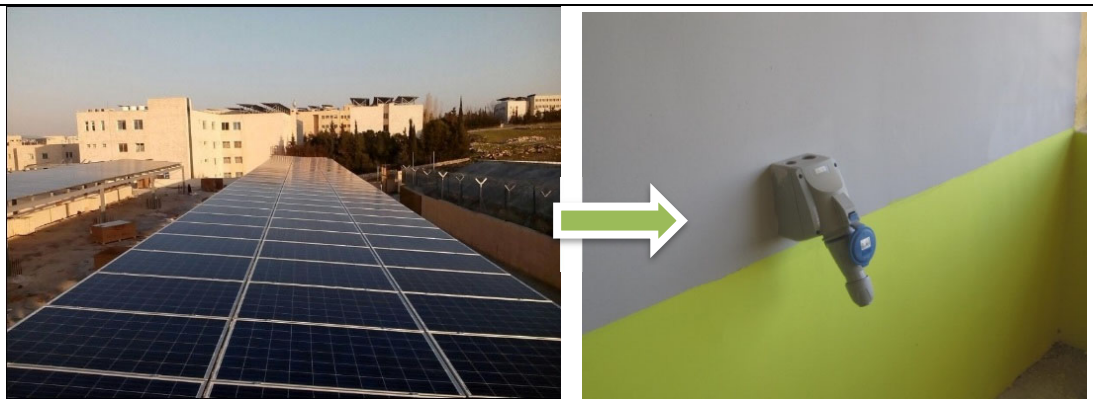
Bus – Route

Description:

Despite the availability of public transport from all cities to the AAU of public buses and taxis. However, the university provides free transportation services using two buses only for both students and staff. These buses are modern, equipped and safe. . The capacity of these buses is 25 passengers for each one of them. The two buses travel within a route inside the campus every 30 minutes from 8:30 am to 2:30 pm all week days.

Total number of shuttle buses: 2
Total number of journeys for each shuttle bus: 12 journeys

[5.2] ZERO EMISSION VEHICLES (ZEV) POLICY ON CAMPUS



Example of free charging points for EV from photovoltaic panels on parking rooftop

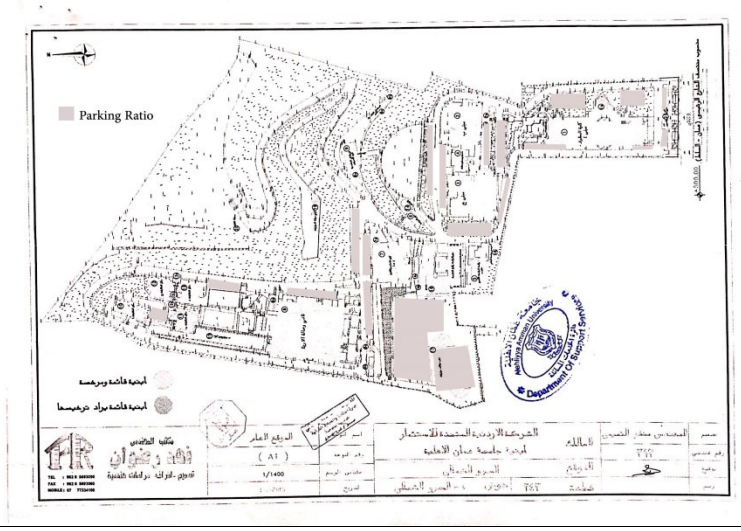
Example of Electric / Hybrid vehicles used by students

Description:

In order to minimize the impact of carbon dioxide emissions in the atmosphere, PV Cells supply electricity to electric car chargers for student and staff vehicles in designated parking areas. This encourages environmentally friendly and energy-saving transportation. Electricity charging for vehicles is free of charge.

[5.3] RATIO OF PARKING AREA TO TOTAL CAMPUS AREA

Ratio of Parking Area to Total Campus Area



Ratio of Parking Area to Total Campus Area

Description:
Total main campus area: 100,004 m^2
Total parking area = 8750 m^2 (700 spaces*12.5m^2 per space).
Ratio = 0.087

[5.4] NUMBER OF TRANSPORTATION INITIATIVES TO DECREASE PRIVATE VEHICLES ON CAMPUS

	
Campus Bus	Multi-story parking building.
	
Smart gates that allow only cars with smart stickers (staff only) to access the campus	Smart car sticker (for staff)

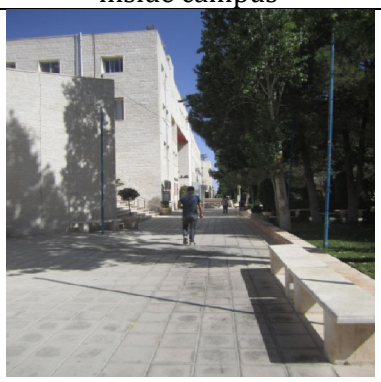
Description:

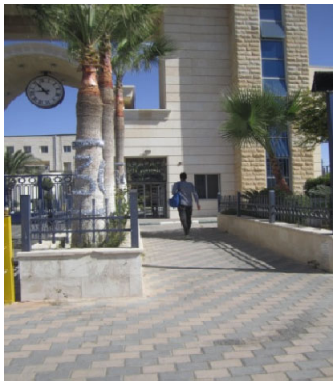
1. Bus service for students transportation
2. Multi-story parking building to minimize parking space footprint.
3. Staff vehicles are provided with smart stickers that the university's car barrier reads. This prohibits students' cars from entering the campus. Instead students with cars should park their vehicles in the designated areas for student parking which are located around campus.

[5.5] PEDESTRIAN PATH POLICY ON CAMPUS

Map for disabled pedestrian circulation inside campus

Safe pedestrian paths inside campus





Safe pedestrian paths inside campus

Special parking the disabled	Ramps for the disabled

Description:
Separator is located between vehicle and pedestrian paths.
Design elements for the physical disabled students and staff.

[6] EDUCATION AND RESEARCH (ED)

[6.1] NUMBER OF COURSES/SUBJECTS RELATED TO SUSTAINABILITY OFFERED - Example

University selective courses

No	Course title	Description
1	Environmental and Public Safety	The concept of the environment, its laws and relation to other sciences, primary and secondary components, cycle of elements in the natural environment, environmental problems, pollution of the environment, the problem of the depletion of environmental resources, principles of public health and diseases: the concept of public health, pathogens, viruses, bacteria, parasites, fungi, insects. The environment and pathology: organic, genetic, reproductive and psychological pathology. Nutrition and public health: types of food, malnutrition diseases, undesirable eating habits. The environment and public health from an Islamic perspective: Quranic verses and sayings of the Prophet.

Faculty of engineering

No	Course title	Description
		Civil Engineering
2	Transportation Engineering	Introduction to transport and transportation engineering; types passenger and freight transportation; transportation systems and elements) highway, railway, airport and harbours); design criteria for transportation systems; traffic flow theory and queuing theory; introduction to capacity analysis and quality of service; logistic in transportation; transportation environmental impact; introduction to transportation planning.
3	Environmental and Sanitary Engineering	Definitions of the environmental engineering concepts; Pollution sources and types; Pollution prevention; Air pollution, sources and causes; Principles of water chemistry and Microbiology; Design of water distribution systems; Drinking water treatment; Wastewater characteristics and treatment. Contemporary issues.
4	Treatment of Liquid and Solid Wastes	Wastewater conveyance systems; Design of sewers; Wastewater management; Advanced wastewater treatment and reuse; Sources, types, and composition of solid wastes; sanitary landfills; landfill techniques for domestic, industrial, and hazardous wastes; landfill rehabilitation. Contemporary issues.
5	Public Transportation Engineering	Role of public transportation; urban public passenger modes; transport network types; methods of estimating public transportation demand; public transport facility capacity and quality of service; network and route planning and design; terminal design.
6	Pavement Maintenance and Rehabilitation	Introduction to pavement maintenance management process; pavement networks definitions and classifications; pavement distress evaluation and rating procedure; Pavement testing types (destructive and non-destructive tests); pavement condition forecasting; overview of maintenance and rehabilitation techniques; network level management; project level management; computer applications in pavement maintenance and rehabilitation.

7	Water Resources	Hydrologic and hydraulic design concepts for water resources systems; Functions and design of hydraulic structures; Storm water systems design; Groundwater occurrences and Darcy's law; Equations of groundwater flow; Well hydraulics; Flow in confined and unconfined aquifers; Engineering economy concepts in planning and management of water resources systems; Computer applications in water resources; Contemporary issues.
8	Irrigation, Drainage, and Dam Engineering	Sources of irrigation water; Long term storage; Design of dams and reservoirs; Design of irrigation structures and drainage canals; Design of culverts and measurement structures; Contemporary issues
Electronics & Communications Engineering		
9	Power & Power Electronics Lab.	This course teaches how to work with high voltage power elements and power electronics components.
Electrical Engineering		
10	Design of Lighting and Electrical Installations	Residential and Commercial building wiring: blueprint reading, branch circuit and feeder installations, service entrance installations; Lighting: Illumination basic concepts, parameters and units, types and characteristics of lamps and luminaries, Indoor lighting design and public road lighting design; Low-voltage installations with TT earthling system of panels and boards; Single line diagram electrical safety; Special electrical installations: Fire alarm systems, Closed-Circuit Television.
11	Design of Lighting and Electrical Installations Lab.	Identify structural equipment; Training on domestic and industrial installations; Fault detection; safety systems and electrical protection installations; phone system for the entrances of buildings combinations; Fire alarm systems; Closed-Circuit Television; Lighting design and evaluation of lighting devices combinations.
12	Renewable Energy Systems	Conventional and renewable energy sources; Possible approaches for conversion of sunlight into electricity; Statistics on world installations of renewable energy systems and costs; Environmental considerations; Wind turbines (WTs) and Wind characteristics: Types of WTs, Power in the wind, Impact of tower height, Maximum rotor efficiency, Average power in the wind; WT generators: Review of induction generators, Fixed- and Variable-speed WTs, Types of Control systems, Typical wind generation configurations, Estimates of produced electrical energy, WT power curve, WT economics, Environmental impacts of WTs; Solar radiation: Properties of light, Solar Radiation in Space and the Earth's Surface, Solar angles, solar radiation measurements, calculation of average monthly insolation on a tilted surface, Peak Sun Hours; Physics and electrical characteristics of solar PV Cells: Basic semiconductor physics, Equivalent circuit for a solar cell, The I–V curve under STC,

		Bypass diodes and blocking diodes, Types of PV cells; Grid-connected PV systems: Principal components, Configurations of inverters and PV arrays, Interfacing with the Utility, DC and AC rated power, STC efficiency of PV module or array, Estimating PV energy production, PV System sizing (Design), PV System economics; Computer applications to all studied topics using Matlab.
13	Distributed Generation and Smart Grids	Traditional and new concepts of power systems; Possible benefits and drawbacks of Distributed Generation; DG definitions; Types of DG; Interface with the grid; Point of common coupling (PCC); Hosting capacity of DG; Impact of DG on power flow: Steady state voltage rise, Voltage profile for multi-bus radial feeder, Methods for steady state voltage regulation, Estimation of hosting capacity, Evaluation criteria, Power losses; DG impact on hosting grid under fault conditions: DG impact on balanced fault levels, DG impact on unbalanced fault levels, Behaviour of DGs under fault conditions; Power Quality in presence of DG: Long duration voltage variation, Short duration voltage variation, Harmonics, Harmonic producers, Individual and total harmonic Distortion, Effect of harmonics on power system components; DG and Smart Grids: Definitions, Structure, Advantages, Smart grids worldwide, Microgrids, Smart grids and information technology; Computer applications to all studied topics using Matlab. Prerequisite: 0875318 Renewable Energy Systems.
Intelligent Transportation System (ITS) Master Program Course		
14	Fundamentals of ITS	This course will provide the basic knowledge regarding the definition of ITS, function, impacts, benefits and challenges, ITS architecture, the historical development of ITS from policy and market economic perspectives. Also, it will cover the different applications of ITS and Advanced Traffic Management and Traveller Information, vehicle location and route navigation and guidance concepts, traffic and incident management, planning and human factor issues for ITS. The course will also cover ITS and road safety in addition to environmental issues related to ITS.
15	Road Traffic Flow and Control	This course will cover the topics of traffic flow theory, mathematical modelling of traffic, deterministic and probabilistic relations, queuing theory, arrival analysis, traffic delay models, traffic stream shockwaves, gap acceptance models, traffic signals, traffic control measures, traffic signal timing plans.
16	Traffic Modelling and Simulation	This course will provide students with the basics of transportation modelling and simulation. It will cover theory for car-following, lane-changing, speed adaptation, Microscopic, Mesoscopic and Macroscopic traffic simulation approaches, the mathematical simulation framework, Network Supply Models, computer simulation techniques, O-D estimation, cell transmission models. It will also cover on-line simulation and simulation based optimization, calibration and validation of traffic simulation models, and the applications of traffic simulation models.

17	ITS Architecture and Standards	This course will cover the topics of introduction to Intelligent Transportation Systems (ITS), architecture and standards for selected ITS subsystems, such as a connected vehicle, automated driving, and security.
18	Analytical Techniques in Transportation Engineering	This course will cover the topics of introduction to transportation systems analysis, experimental design, analysis of variance, probability models, regression analysis, representation of transportation problems, discrete choice analysis.
19	(Advanced) Transportation Planning	This course will cover the topics of fundamentals of transport systems, introduction to transportation planning, transportation planning and decision making, characteristics of urban travel, data availability and travel surveys, travel demand analysis, introduction to traffic flow theory and simulation approaches, introduction to transportation network models, prediction of origin to destination flows, users' response to ITS and applications for real-time systems. In addition, this course will address the topics of transport policy and multi-modal transport studies, intermodal integration planning, accessibility and mobility planning.
20	Communication Systems in ITS	This course will provide a summary of the components and functions of automotive sensors and mobile communications systems. It will cover an overview of RADAR sensor technology, radio channel modelling, smart antenna, medium access control, routing protocol, data dissemination, handover, security, mesh networking, road traffic estimation, and location-based services.
21	GIS Applications in ITS	This course will provide the required background related to the geographic information technology and the application of geo-informatics in transportation engineering. It will cover the topics of basic concepts of GIS, RS, GPS, and land-use and transportation data, Cartography, Coordinate & Reference systems, map generation and analysis, transportation network development and algorithms, in addition to transportation models and their applications in GIS.
22	Traffic Safety	This course will cover the following topics in detail; accident definition and types, accident cost, factors affecting road accidents, roadway safety appraisal techniques, road safety measures, accident data collection, roadway design standards, traffic education, and law enforcement, before and after studies.

Faculty of Law

No	Course title	Description
23	Environmental law	This course focuses on : fundamental objective which is to study the preservation laws of the environment , as the physical environment in which human live, including water, air and space, soil and living organisms , and various industrial facilities established to satisfy human needs ; And in this course we examine the legal rules established by the legislator to prevent any human behaviour that would endanger public health as a result of pollution of the environment surrounding citizens , such as factory waste and

		trespassing on agricultural land or causing to be less produced in addition to reducing noise pollution or cutting forests and trees ; This course shows the opinion of Islamic law from environmental pollution , and environmental laws in Jordan with the study of regulations and instructions issued there under ; The course presents the liability , aiming to protect all different kinds of environment from pollution.

Faculty of architecture and design

No	Course title	Description
		Architecture
24	Environmental Control	Theoretical: The integral relationship between architecture and its surrounding environment, the considerations that must be taken into account for climate adaptation, thermal performance of buildings, the principles of thermal transitions, the thermal comfort inside architectural spaces and how to control sun radiation and its impact on buildings and their thermal comfort, environmental considerations of sustainability on the macro to micro scale focusing on low energy consumption architecture: zero net, strategies of passive building design, knowing the renewable energy resources, modelling simulation building concepts. Practical: An application project for design principles with low consumption of energy.
25	Landscape Architecture	Theoretical: The study of the elements and principles of coordination of sites; studying the coordinate systems of the sites; studying the plant species and forestation used in Jordan and its suitability and effectiveness for the proposed site, the urban furniture and the gardens. Practical : Research and analysis of different site design projects; selection of sites within the urban environment in Jordan, study of location and climate and its impact on the nature of the selection of elements of the site (trees and plants, site furniture, water bodies), specifying the function and activities of the project, presenting exercises and design projects.
26	Lighting & Acoustics	Theoretical: The main theoretical and applied principles of lighting and acoustics for architectural designed spaces, the technical aspects of natural and industrial lighting, their technical and architectural effects, the requirements of visual comfort, how to calculate the lighting required in interior and exterior architectural design spaces, and the selection of lighting units and their specifications, As well as study the most important design considerations for the vocal aspects, and study sound effects in some spaces of special use such as museums and theatres.

27	Sustainable and Green Architecture	Theoretical: A comprehensive introduction to the history of sustainable architecture, its techniques and applications in the various elements of the built environment; Design strategies, environmental and social methods to be considered for the sustainability of sites and buildings; International and local applications of sustainable design methodology; Expansion of energy modelling and simulation systems for buildings. Practical: An application project for the principles of sustainability at the level of building or urban content, using building modelling and simulation programs.
28	Advanced Building Technology	Theoretical: New building materials; Modern building systems, construction technology for metal structures, wood structures; Advanced concrete structures, precast or prefabricated construction, and the role of the engineering sector and other sectors in developing new building materials.
Interior Design		
29	Technology of Materials	PROPERTIES AND SPECIFICATIONS: Standards & Metrology Organizations, Natural Properties, Mechanical Properties, and Loads.
30	Lighting and Acoustics in Design	The physics of light: The Spectrum of Light, Daylight, Artificial Light, A Brief History of Architectural Lighting, Light Qualities & Features: Quantity of Light, Diffuse Light & Directed Light, Modelling, Brilliance, Glare, Luminous Colour & Colour Rendering, Terms & Units.
31	Behavioural sciences and environmental design	The Nature of Behavioural Sciences, The Nature of Environmental Design, Behavioural Sciences Problems & Concerns, Concepts of Praxis in Environmental Design, The Legacy of Modern Movement.
32	Environmental & Administrative Interior Design	Fundamentals of Interior design in administrative and office spaces, Emphasis on basic design, functional and expressional requirements, Office and/or Administrative Design project from initial client conference through final presentation, Professional presentation techniques, codes, symbols, energy conservation and problem solving are applied with an emphasis on design creativity.
33	Plants and Gardens in Interior Design	THE TYPICAL RESIDENTIAL SITE: Houses & Homes, Architectural Character; Outdoor Rooms, Outdoor Space; GARDENS HISTORY & MAJOR DESIGN STYLE: Formal, Cottage, Mediterranean Gardens, Modernist, Japanese, Foliage, Fusion, Productive, Family Gardens, Sustainable, Urban Gardens, Country Gardens, Concept Gardens.

Description:
A list of the courses title and description with embedded sustainability principles offered by Al-Ahliyaa Amman University is outlined in the previous tables. The Curriculum description is according to national Jordanian accreditation system. The courses include a selective university course in addition to compulsory and selective faculty and department courses.

Total number of courses with sustainability embedded for courses running in (2022/2023)**: 632 course**

[6.2] TOTAL NUMBER OF COURSES/ SUBJECTS OFFERED

The total number of courses offered in Al-Ahliyya Amman University in (2022/2023) = **1382 course**

[6.3] TOTAL RESEARCH FUNDS DEDICATED TO SUSTAINABILITY RESEARCH (IN US DOLLARS)

Total research funds dedicated to sustainability research in 2017/2018=$122,200
Total research funds dedicated to sustainability research in 2018/2019=$120,300
Total research funds dedicated to sustainability research in 2019/2020= $155,400
Total research funds dedicated to sustainability research in 2020/2021= $136,257
Total research funds dedicated to sustainability research in 2021/2022= $186,366
Total research funds dedicated to sustainability research in 2022/2023= $215,635

The averaged annum last 3 years of research fund dedicated to sustainability research = $ 179,419

[6.4] TOTAL RESEARCH FUNDS (IN US DOLLARS)

Total research fund 2017/2018 =$ 1,400,000
Total research fund 2018/2019 =$ 1,400,000
Total research fund 2019/2020 =$ 1,400,000
Total research fund 2020/2021 =$ 1,440,320
Total research fund 2021/2022 =$ 1,640,720
Total research fund 2022/2023 =$ 1,851,280

[6.5] NUMBER OF EVENTS RELATED TO SUSTAINABILITY

A total average of events related to sustainability hosted or organized by Al-Ahliyaa Amman University for the last three academic years: **36 events /year**