SDG 7

Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

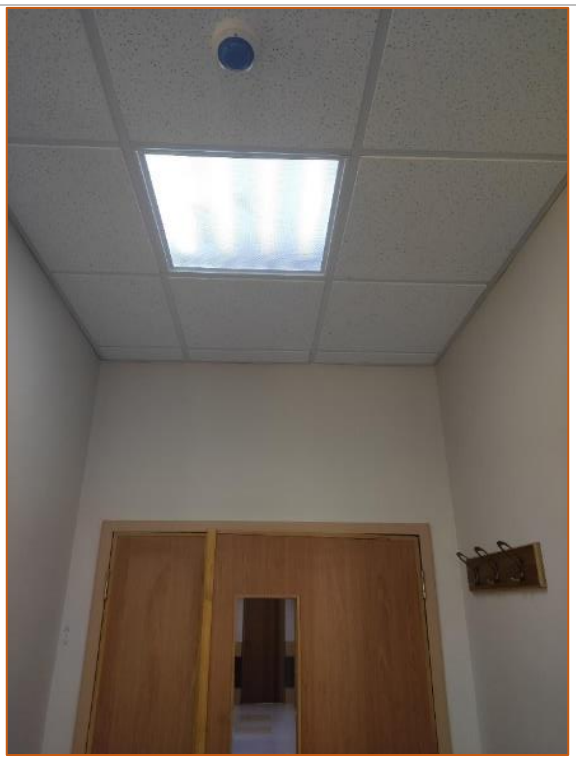
SDG 7.2.1 Energy-efficient renovation and building

ZUJ adopted a thorough set of policies on campus aiming to reduce energy consumption. In this regard, ZUJ has an agreement with Philadelphia Solar to maintain the solar system (Standard level 1, attached the agreement for the year 2022-2023). In addition, Renovation of buildings was carried out taking into account insulation of walls, floors and roofs. Also, high performance windows (low-e) coatings were fixed in the University premises. The buildings were under maintenance to ensure air sealing through sealing the gaps in the walls. Heating systems were shifted toward efficient systems like the implementing high performance (HVAC) units, heat recovery ventilation (HRV) units and programmable thermostats.

In doing so, the use of energy-efficient appliances is increasingly replacing conventional appliances at ZUJ. This shift is part of the university's broader commitment to sustainability and reducing energy consumption. Energy-efficient appliances, such as LED lighting, smart HVAC systems, and eco-friendly office equipment, are being integrated across campus buildings to reduce the overall environmental footprint. These appliances not only help in cutting down energy costs but also contribute to the university's efforts to create a greener and more sustainable campus environment. This transition supports the global movement towards sustainable energy use and reflects the university's dedication to environmental responsibility.

90% of our University's lightning system is energy efficient; LED Lights are used in most of the university's buildings with motion sensor. Energy efficient appliances usage are replacing conventional appliances

LED Light with motion detector



Motion Sensor

اتفـــــاقيـــــــة

جرى الاتفاق في يوم الأربعاء الموافق 29/11/2023 بين الفريقيـــــن :-

الفريق الاول :- شركة فيلادلفيا لتركيب و صيانة مشروعات الطاقة الشمسية و عنوانها : عمان - القسطل - الأردن ، الرقم الوطني للمنشأة : 200164550 ويمثلها لغايات توقيع هذه الاتفاقية السيد عبد الرحمن احمد شحاده شحاده .

الفريق الثاني :- الشركة الاستثمارية لجامعة الزيتونه الأردنيه ، عنوانها : عمان-الأردن 200002099، ويمثلها لغايات توقيع هذه الإتفاقية السيد : عبد اللطيف أمين صالح مرعي.

بما أن الفريق الأول هي شركة تقوم بتركيب وصيانة مشاريع الطاقة الشمسية لغايات متعددة، وبما أن الفريق الثاني يرغب باستخدام هذه التقنية لصيانة مشروع الطاقة الشمسية لمشروع الشركة الاستثمارية لجامعة الزيتونه الأردنيه ، فقد تم الاتفاق ما بين الفريقين على ما يلي :-

أولا : مقدمة هذه الاتفاقية تعتبر جزءاً لا يتجزأ منها .

ثانيا :

إلتزامات الفريق الأول :

1. يقوم الفريق الأول بعمل صيانة تصحيحية بدل فك وتركيب واستبدال 50 لوح شمسي قدرة 330 واط فقط لا غير.

ثالثاً :

إلتزامات الفريق الثاني :

1- التواصل و التنسيق مع صاحب العمل.

رابعاً : يتعهد الفريق الأول بالمباشرة بأعمال صيانة تصحيحية بدل فك وتركيب واستبدال 50 لوح شمسي قدرة 330 واط فقط لا غير.

خامساً : يتعهد الفريق الثاني بدفع مبلغ قدره 4,000 دينار اردني فقط (اربعة الأف دينار فقط لا غير) بعد توقيع الإتفاقية بحيث تكون الدفعات على النحو التالي :-

1- 100% بعد توقيع العقد

سادساً :

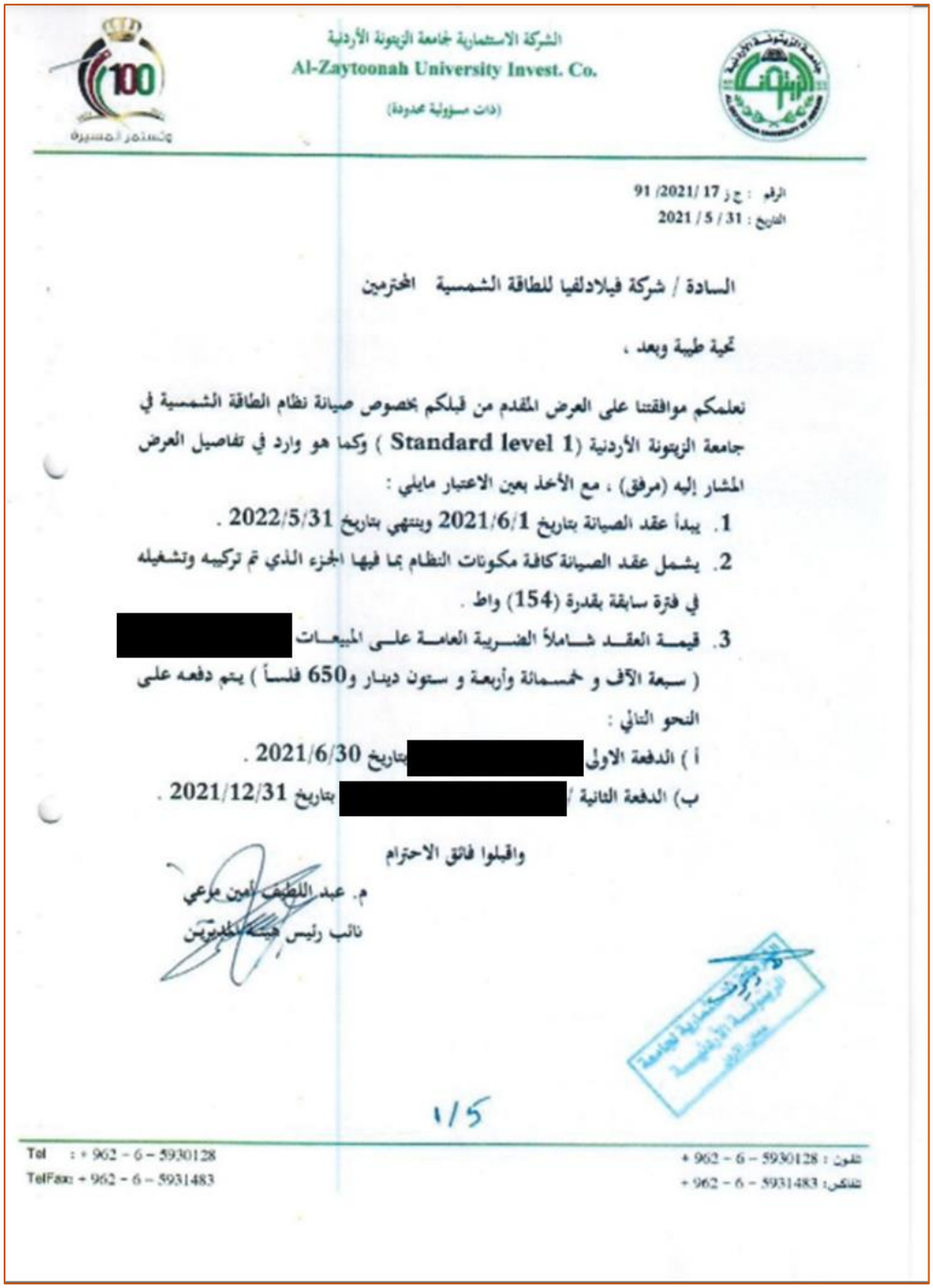
ا- تطبق الشروط العامة في عقد الفيديك للإنشاءات – الأحمر 1999 و تعتبر جزءاً لا يتجزأ من هذه الإتفاقية.

الشركة الاستثمارية لجامعة الزيتونة الأردنية

ب- أي خلاف ينشأ بين الفريقين يتم حله ودياً و في حال عدم التوصل الى اتفاق يتم اللجوء إلى التحكيم و يكون القانون الاردني هو المطبق في المحكمة.

سابعاً : تتكون هذه الاتفاقية من سبعة بنود بما فيها هذا البنـــــد وصفحتين.

الفريق الأول	الفريق الثاني
شركة فيلادلفيا لتركيب و صيانة مشروعات الطاقة الشمسية	الشركة الاستشارية لجامعة الزيتونه الاردنيه
التوقيع :	التوقيع :



الشركة الاستثمارية لجامعة الزيتونة الأردنية
Al-Zaytoonah University Invest. Co.
(ذات مسؤولية محدودة)

الرقم : ح ز 17 /2021/ 91
التاريخ : 31 / 5 / 2021

السادة / شركة فيلادلفيا للطاقة الشمسية المحترمين

تحية طيبة وبعد ،

تعلمكم موافقتنا على العرض المقدم من قبلكم بخصوص صيانة نظام الطاقة الشمسية في جامعة الزيتونة الأردنية (Standard level 1) وكما هو وارد في تفاصيل العرض المشار إليه (مرفق) ، مع الأخذ بعين الاعتبار مايلي :

1. يبدأ عقد الصيانة بتاريخ 2021/6/1 وينتهي بتاريخ 2022/5/31 .
2. يشمل عقد الصيانة كافة مكونات النظام بما فيها الجزء الذي تم تركيبه وتشغيله في فترة سابقة بقدرة (154) واط .
3. قيمة العقد شاملاً الضريبة العامة على المبيعات [redacted] (سبعة آلاف و خمسمائة وأربعة و ستون دينار و650 فلساً) يتم دفعه على النحو التالي :

أ) الدفعة الاولى [redacted] بتاريخ 2021/6/30 .

ب) الدفعة الثانية / [redacted] بتاريخ 2021/12/31 .

واقبلوا فائق الاحترام

م. عبد اللطيف أمين مرعي
نائب رئيس هيئة المديرين

1/5

Tel : + 962 - 6 - 5930128
TelFax: + 962 - 6 - 5931483

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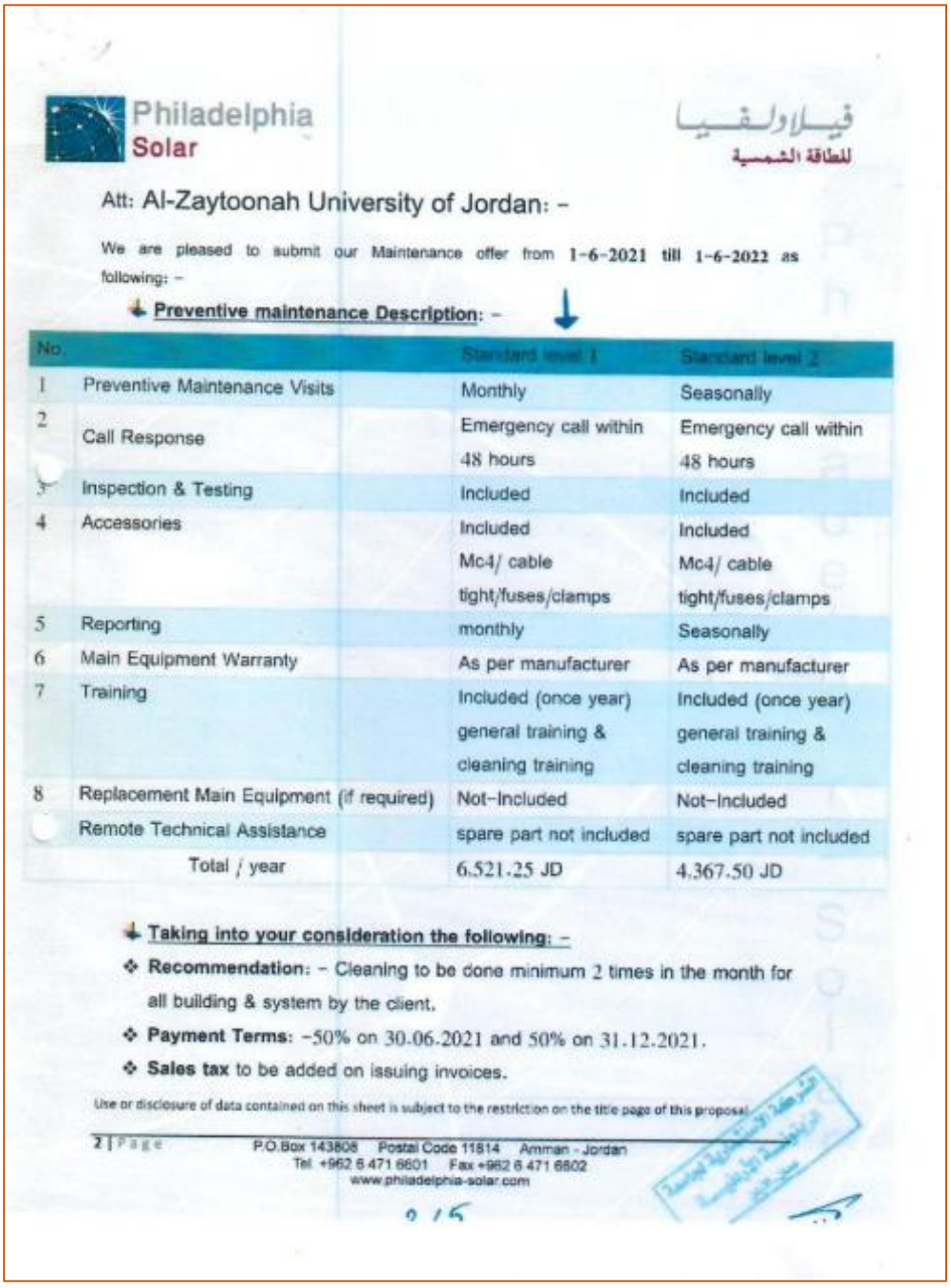
تلفاكس: + 962 - 6 - 5931483



Philadelphia Solar

فيلادلفيا للطاقة الشمسية

Att: Al-Zaytoonah University of Jordan: -

We are pleased to submit our Maintenance offer from 1-6-2021 till 1-6-2022 as following: -

Preventive maintenance Description: -

No.		Standard level 1	Standard level 2
1	Preventive Maintenance Visits	Monthly	Seasonally
2	Call Response	Emergency call within 48 hours	Emergency call within 48 hours
3	Inspection & Testing	Included	Included
4	Accessories	Included Mc4/ cable tight/fuses/clamps	Included Mc4/ cable tight/fuses/clamps
5	Reporting	monthly	Seasonally
6	Main Equipment Warranty	As per manufacturer	As per manufacturer
7	Training	Included (once year) general training & cleaning training	Included (once year) general training & cleaning training
8	Replacement Main Equipment (if required)	Not-Included	Not-Included
	Remote Technical Assistance	spare part not included	spare part not included
	Total / year	6.521.25 JD	4.367.50 JD

Taking into your consideration the following: -

- **Recommendation:** - Cleaning to be done minimum 2 times in the month for all building & system by the client.
- **Payment Terms:** -50% on 30.06.2021 and 50% on 31.12.2021.
- **Sales tax** to be added on issuing invoices.

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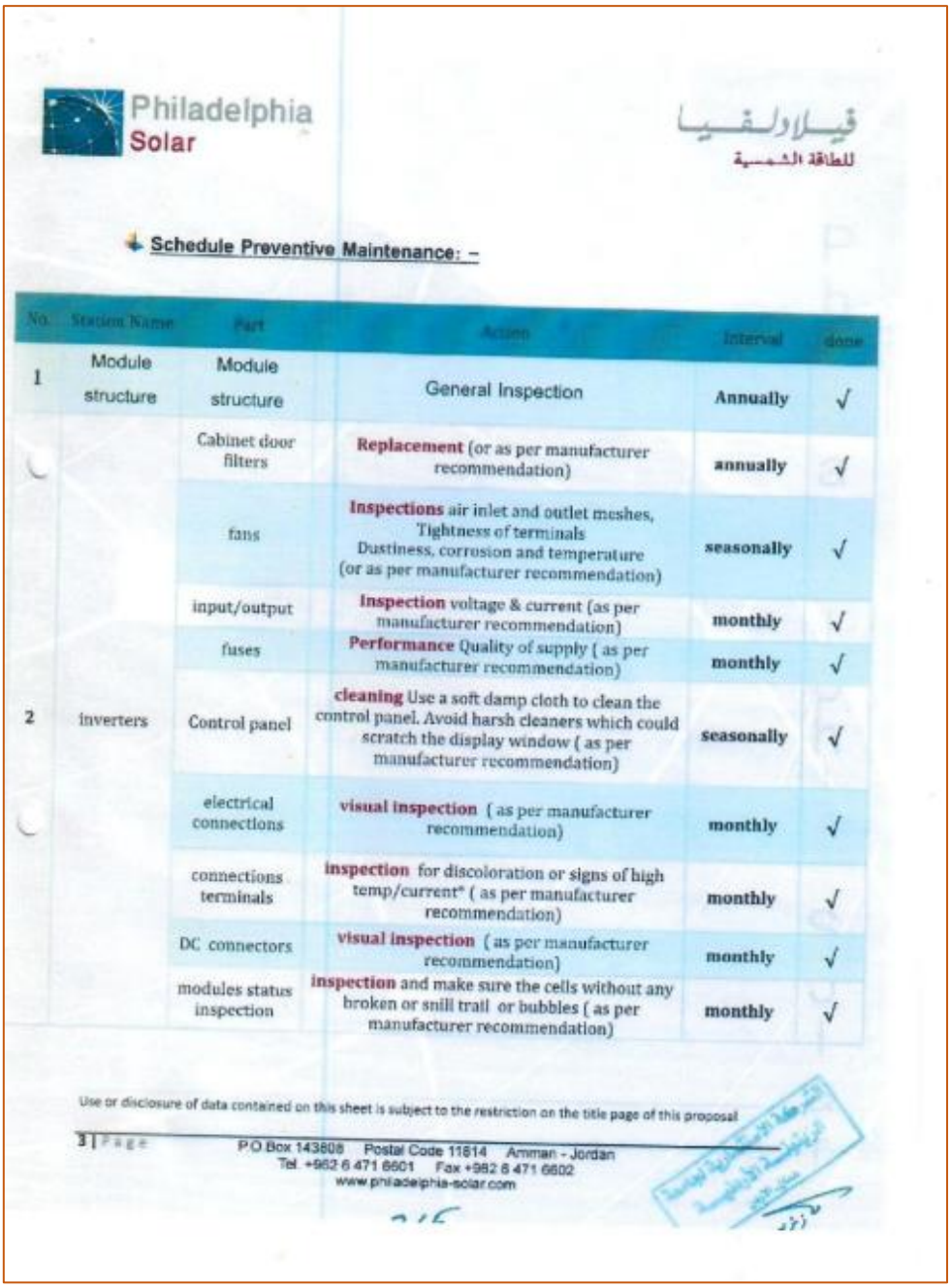
Tel +962 6 471 6601 Fax +962 6 471 6602
www.philadelphia-solar.com



Philadelphia Solar

فيلادلفيا للطاقة الشمسية

Schedule Preventive Maintenance: –

No.	Station Name	Part	Action	Interval	done
1	Module structure	Module structure	General Inspection	**Annually**	√
		Cabinet door filters	**Replacement** (or as per manufacturer recommendation)	**annually**	√
		fans	**Inspections** air inlet and outlet meshes, Tightness of terminals Dustiness, corrosion and temperature (or as per manufacturer recommendation)	**seasonally**	√
		input/output	**Inspection** voltage & current (as per manufacturer recommendation)	**monthly**	√
		fuses	**Performance** Quality of supply (as per manufacturer recommendation)	**monthly**	√
2	inverters	Control panel	**cleaning** Use a soft damp cloth to clean the control panel. Avoid harsh cleaners which could scratch the display window (as per manufacturer recommendation)	**seasonally**	√
		electrical connections	**visual inspection** (as per manufacturer recommendation)	**monthly**	√
		connections terminals	**inspection** for discoloration or signs of high temp/current* (as per manufacturer recommendation)	**monthly**	√
		DC connectors	**visual inspection** (as per manufacturer recommendation)	**monthly**	√
		modules status inspection	**inspection** and make sure the cells without any broken or snill trail or bubbles (as per manufacturer recommendation)	**monthly**	√

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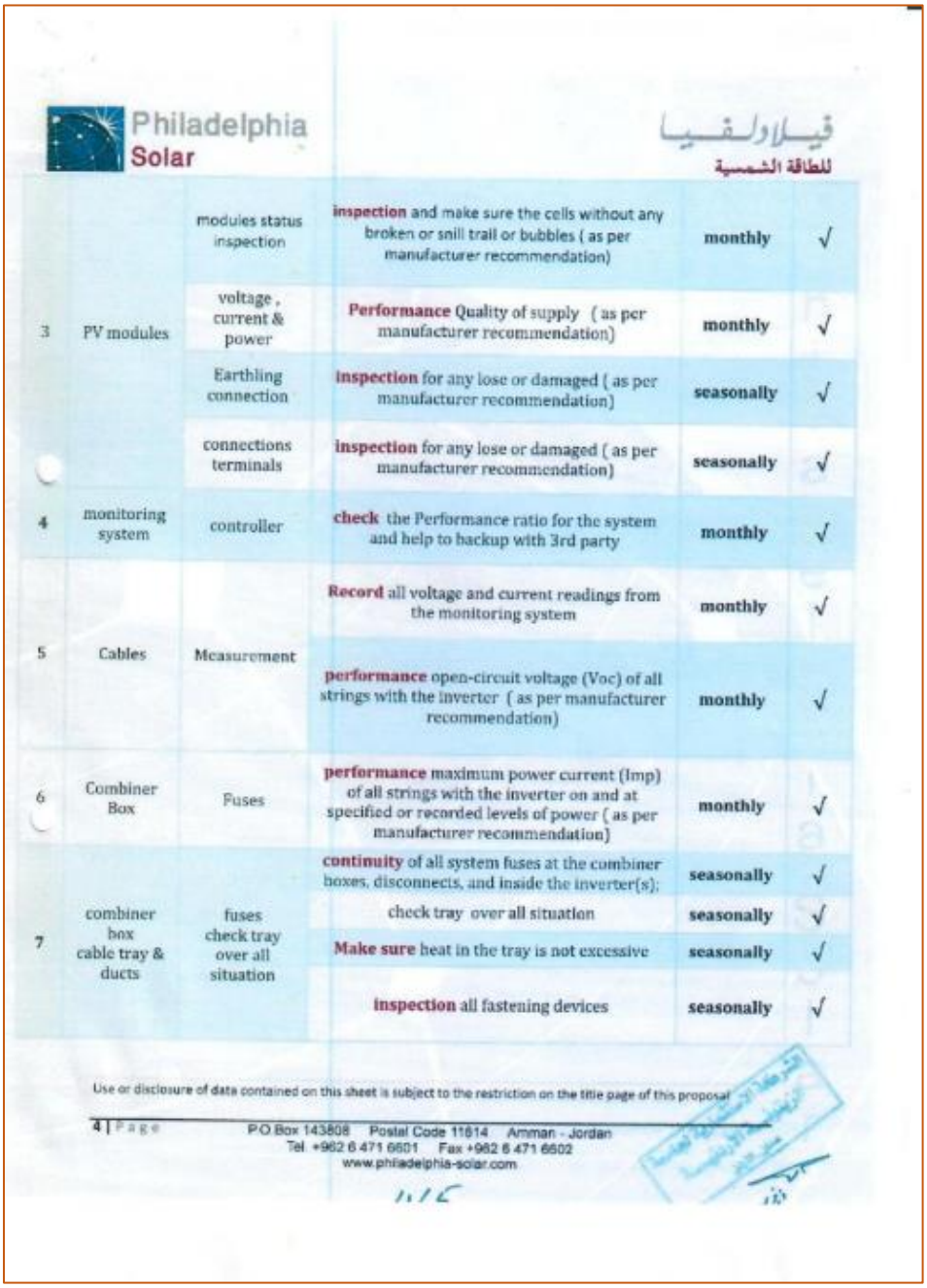

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فيلادلفيا للطاقة الشمسية

3	PV modules	modules status inspection	**inspection** and make sure the cells without any broken or snill trail or bubbles (as per manufacturer recommendation)	**monthly**	√
		voltage , current & power	**Performance** Quality of supply (as per manufacturer recommendation)	**monthly**	√
		Earthling connection	**inspection** for any lose or damaged (as per manufacturer recommendation)	**seasonally**	√
		connections terminals	**inspection** for any lose or damaged (as per manufacturer recommendation)	**seasonally**	√
4	monitoring system	controller	**check** the Performance ratio for the system and help to backup with 3rd party	**monthly**	√
5	Cables	Measurement	**Record** all voltage and current readings from the monitoring system	**monthly**	√
			performance open-circuit voltage (Voc) of all strings with the inverter (as per manufacturer recommendation)	**monthly**	√
6	Combiner Box	Fuses	**performance** maximum power current (Imp) of all strings with the inverter on and at specified or recorded levels of power (as per manufacturer recommendation)	**monthly**	√
7	combiner box cable tray & ducts	fuses check tray over all situation	**continuity** of all system fuses at the combiner boxes, disconnects, and inside the inverter(s);	**seasonally**	√
			check tray over all situation	**seasonally**	√
			Make sure heat in the tray is not excessive	**seasonally**	√
			inspection all fastening devices	**seasonally**	√

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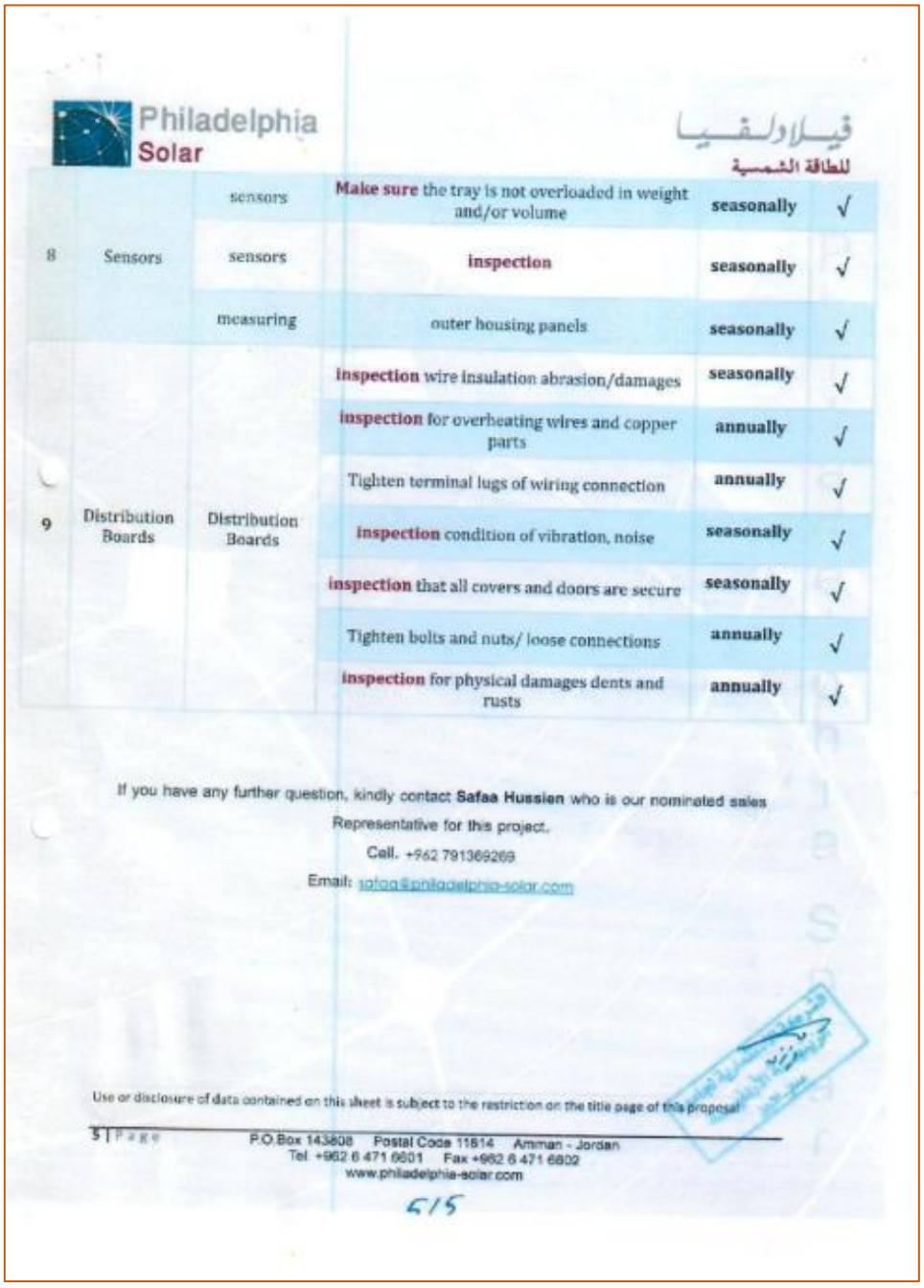

Philadelphia Solar
فيلادلفيا للطاقة الشمسية

		sensors	**Make sure** the tray is not overloaded in weight and/or volume	**seasonally**	√
8	Sensors	sensors	**inspection**	**seasonally**	√
		measuring	outer housing panels	**seasonally**	√
			inspection wire insulation abrasion/damages	**seasonally**	√
			inspection for overheating wires and copper parts	**annually**	√
			Tighten terminal lugs of wiring connection	**annually**	√
9	Distribution Boards	Distribution Boards	**inspection** condition of vibration, noise	**seasonally**	√
			inspection that all covers and doors are secure	**seasonally**	√
			Tighten bolts and nuts/ loose connections	**annually**	√
			inspection for physical damages dents and rusts	**annually**	√

If you have any further question, kindly contact **Safaa Hussien** who is our nominated sales Representative for this project.
Cell. +962 791369269
Email: safaa@philadelphia-solar.com

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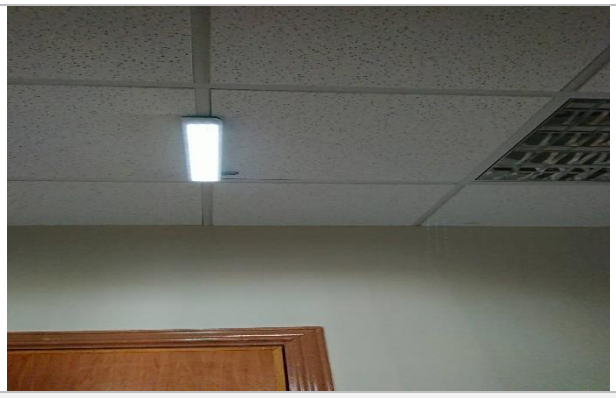
SDG 7

Affordable and Clean Energy

Adopting Smart Building technologies at ZUJ is continuous and aims to improve energy efficiency and building management. Smart building systems integrate advanced technologies such as IoT (Internet of Things), automation, and data analytics to monitor and control various aspects of campus operations.

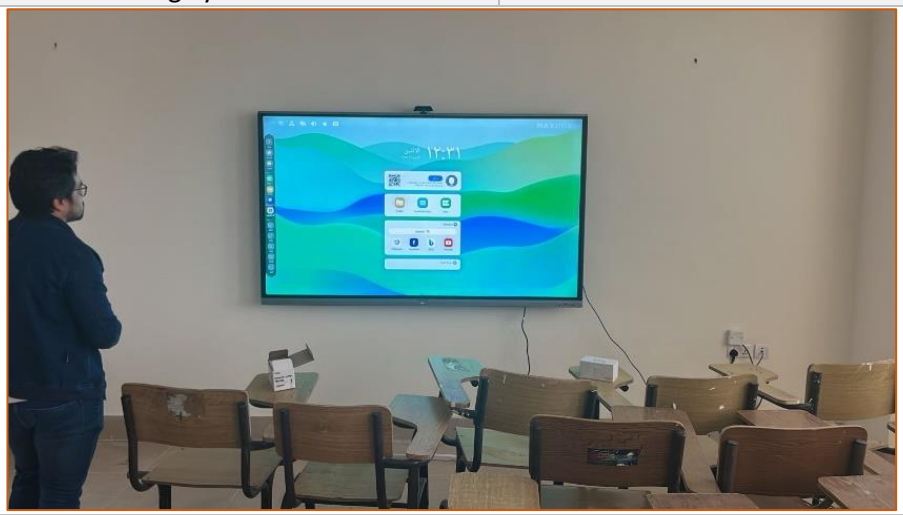
- Automated Lighting and Climate Control
- Energy Monitoring
- Security Systems
- Water Conservation
- Integration with Renewable Energy
- Data-Driven Decisions

By implementing smart building technologies, Al-Zaytoonah University enhances operational efficiency, promotes sustainability, and improves the overall experience for students and staff. This initiative supports the university's goal of creating a future-ready, sustainable campus.

	
Emergency lights	The Automatic Fire Alarm Sensor System

The Automatic heating System

SMART DOOR



SDG 7

Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

SDG 7.2.2 Upgrade buildings to higher energy efficiency

ZUJ adopted approaches and regulations to ensure the new builds and renovations are following energy efficiency standards, energy-saving and carbon-reduction practices. The users of the buildings, facilities, and equipment on campus follow the given instruction to maximize the efficiency of energy. Examples of measures taken by ZUJ are listed below: Moreover, buildings renovation and maintenance studied the approches which would upgrade the energy effieciency based on inulation in walls, roofs, and floors to lower heat loss and gain, also windows and doors sealing to reduce air leaks in windows and doors

When renovating existing buildings or creating new ones on campus, strict adherence to government rules regarding environmental protection, energy efficiency, and water conservation must be maintained. These include, but are not limited to, the following points:

It is estimated that 75% less energy lightning system is energy efficient; LED Lights are used in most of the university's buildings with motion sensor.

1.1. LED Energy

LED Light with motion detector

1.2 Split-type air-conditioners are purchased in accordance with the latest environmental regulations and are inverter air-conditioners.

CONTROL CENTER FOR PHOTOVOLTAIC CELLS SYSTEM

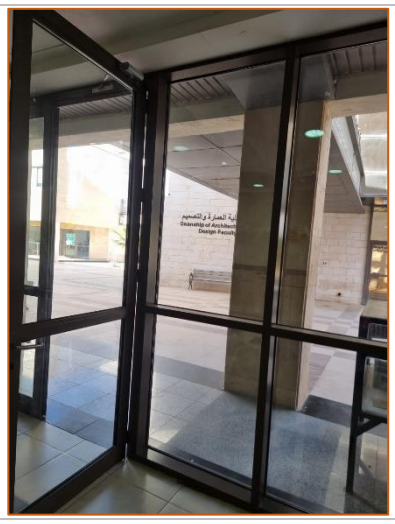
SDG 7

Affordable and Clean Energy

In order to increase the energy efficacy, a control center for photovoltaic cells is established. Where the 6000 solar panels are monitored 24/7 and once a defect is detected a maintenance team would fix the panel directly and thus maximize the estimated energy usage.

1.3 The passive lighting strategy: ZUJ adopted implementation of large windows and glass doors that allow natural lighting to pass through the buildings: Inserted below samples of the designated natural lighting:

The electricity box that is shown above, is a controller box which can control the timing of when the electricity is turned off or on to have more electricity efficiency.

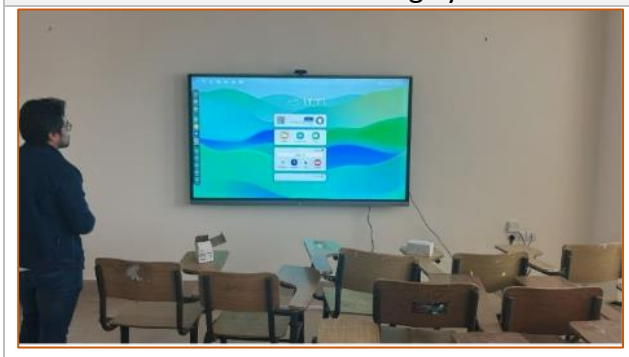


1.4 Al-Zaytoonah University of Jordan has the automatic fire alarms sensor, emergency lights system where both are turned on automatically if a fire occurred or the electricity went down.

As well as the heating system that is provided in all the buildings in the university

Emergency lights

The Automatic Fire Alarm Sensor System

	
The Automatic Heating System	SMART DOOR
	
Smart Board Screen Saver	Photovoltaic Cells

Moreover, ZUJ guid their students towars practices contribute in energy saving

A practical course on the solar panel efficiency in energy saving/ ZUJ

Wind Energy

SDG 7
Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

SDG 7.2.3 Carbon reduction and emission reduction process

ZUJ has implemented a comprehensive Greenhouse Gas Emission Reduction Program aimed at minimizing its carbon footprint and promoting sustainability on campus. The program includes several initiatives:

Charge Parking: The university has introduced charging stations for electric vehicles, encouraging the use of cleaner transportation options among faculty, staff, and students.

Renewable Energy: The university utilizes renewable energy sources, primarily solar energy, to power its buildings and facilities. This shift towards green energy significantly reduces dependence on traditional electricity sources.

First Jordanian Solar Park: The university features an innovative solar park that incorporates a "solar tree" with photovoltaic (PV) panels, a hybrid PV/wind system, and solar umbrellas equipped with electricity outlets for student use. This park represents a major step in the university's commitment to renewable energy.

Ride Share Program: The university has also launched a ridesharing initiative to promote carpooling among students and staff, reducing the number of vehicles on campus and lowering overall greenhouse gas emissions.

These initiatives reflect the university's dedication to reducing greenhouse gas emissions and fostering a more sustainable, eco-friendly campus environment.

To that extent ZUJ has taken the following steps:

1. ZUJ is adopting a fully electronic portal that include sectors in both academic and administrative sections. A trial version is applied and ZUJ is hoping to train the administrative staff on its use to lower paper waste.

2. Al-Zaytoonah University of Jordan has constructed a charging parking for the private electric vehicle.

3. Al-Zaytoonah University of Jordan used a renewable energy for electricity.

4. Al-Zaytoonah University of Jordan has established the first Jordanian solar park, which consists of different components; a solar tree where the leaves are basically PV panels (M36s-100Wp), a hybrid system (PV/wind), and solar umbrellas fitted with electricity outlets for students.

5. Al-Zaytoonah University of Jordan has encouraged rideshare to adopt healthy and sustainable transportation options, (Carpool). Furthermore, Al-Zaytoonah University of Jordan promotes eco-friendly commuting options such as cycling, walking, and public transportation by providing bike-sharing programs, pedestrian-friendly infrastructure, and discounted public transit passes.

6. Al-Zaytoonah University of Jordan Develop a clear plan to become a carbon-neutral institution by a specified target year, taking into account energy efficiency, renewable energy adoption, and carbon offsetting strategies.

7. Al-Zaytoonah University of Jordan Invest in on-campus renewable energy projects, such as solar panels and wind turbines, to reduce dependence on fossil fuels and lower greenhouse gas emissions.

8. Al-Zaytoonah University of Jordan commits to sustainable building practices by adhering to green building standards like LEED (Leadership in Energy and Environmental Design) for all new construction and renovations.

9. Al-Zaytoonah University of Jordan integrates sustainability and climate change-focused courses and programs across various disciplines, encouraging students to explore solutions to environmental challenges.

10. Al-Zaytoonah University of Jordan funds and support research initiatives focused on climate change, renewable energy, and sustainability, facilitating innovation in these areas.

11. Al-Zaytoonah University of Jordan implements comprehensive waste reduction and recycling programs on campus, with a goal to minimize landfill waste and maximize recycling rates.

12. Al-Zaytoonah University of Jordan sources goods and services locally and sustainably, prioritizing eco-friendly products and supporting fair trade practices.

13. Al-Zaytoonah University of Jordan engages with the local community and collaborate on sustainability initiatives, knowledge-sharing, and outreach programs to extend sustainability efforts beyond campus boundaries.

14. Al-Zaytoonah University of Jordan allocates resources and grants to support student-led sustainability projects and initiatives, empowering students to drive change and apply their knowledge in practical ways.

  	   
Charge Parking	Renewable Energy using Solar System

These steps have produced a total carbon footprint (CO_2 emission in the last 12 months, in metric tons) of:

CO_2 (electricity) = (945000/1000) x 0.84 =793.8 metric ton (according to explanation provided in evidence 2.6)

CO_2 (bus) = (Zero) metric ton (no Buses within the campus)

CO_2 (cars) = (Zero) metric ton (just the electrical cars are allowed)

CO_2 (motorcycle) = (Zero) metric ton (no motorcycle within the campus)

CO_2 (total) = 793.8 metric ton

Charge Parking

First Jordanian Solar Park | Ride Share

Renewable Energy Using Solar System

SDG 7

Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

SDG 7.2.4 Plan to reduce energy consumption

ZUJ has implemented four key renewable energy systems on its campus to reduce electricity usage: wind energy, solar systems, clean biomass, and bio-diesel systems. These renewable sources are used collectively to generate power, ensuring that the university buildings rely 100% on these sustainable energy sources. This initiative demonstrates the university's commitment to sustainability and energy efficiency by fully integrating renewable energy solutions into its campus operations. Moreover, ZUJ has energy monitor center called Control Center for PV systems where 6000 solar panels are being monitored 24/7 with ability to detect defects that may occur and ensure they are being fixed.

ZUJ plan to conduct energy audit by professional assessment and identification of high energy areas.

Moreover, a trained cleaning team is hired to clean the 6000 solar panels on daily basis for 4h per day. Typically, each panel is cleaned twice a month. In this way, ZUJ ensure reduction in wasted energy.

ZUJ is adamant to adopt plan regarding the reduction of energy consumption through continuous renovation of its premises and design smart buildings for the new one.

ZUJ plans to implement higher number of smart lighting controls and led bulbs.

Wind Energy

Solar Systems

Bio Diesel

Clean Biomas

SDG 7

Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

SDG 7.2.5 Energy wastage identification

Al-Zaytoonah University of Jordan try to identify energy wastage and implement policies to diminish these wastage, as described below:

1. Installation of paper shredding machines in the school administrative and academic sectors.

2. Papers and cardboard are put in a special can to be collected and recycled.

3. The weekly deans 'council meetings are paper free and electronic and procedures are sent via email. to reduce the usage of papers.

4. ZUJ is adopting a fully electronic system in their management affairs to lower energy wastage.

5. The university has three classes of waste bins: where glass, metallic and paper waste are classified and dealt with as required. This approach would have allowed staff and enrolled students to be part of saving the environment.

6. The old falling trees and woods are shipped to a local chopper or shredder and turn it to wood veneer and reuse.

7. The university operate its own sanitary treated plants resulting sewerage (sludge) being recirculated within the treated plants due to the small amounts resulted.

8. Al-Zaytoonah university of Jordan uses recycled water for irrigation, and to reduce water usage; the university uses the dripping methodology.

9. Faculty of Pharmacy, Faculty of Nursing and the University's clinic use containers with international specifications to get rid of toxic content, to be disposed of in the most proper ways.

	
Paper shridder	Paper and hard paper recycling can
	
Paper free meetings	Three different typrd of cans to resort trash

Example of Organic Waste Treatment

Treated water consumed

Example of Toxic Waste Handled (Mahidol University, Thailand)

ZUJ emphasizes on modernization of its campus and improving energy efficiency, security, and overall building management. Smart building systems integrate advanced technologies such as IoT (Internet of Things), automation, and data analytics to monitor and control various aspects of campus operations. In order to lower energy wastage, the following measures are taken:

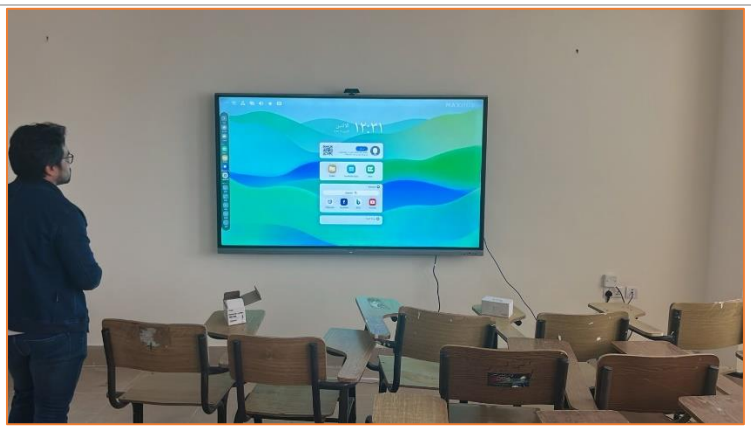
- Automated Lighting and Climate Control
- Energy Monitoring
- Security Systems
- Water Conservation
- Integration with Renewable Energy
- Data-Driven Decisions

SDG 7

Affordable and Clean Energy

By implementing smart building technologies, Al-Zaytoonah University enhances operational efficiency, promotes sustainability, and improves the overall experience for students and staff. This initiative supports the university's goal of creating a future-ready, sustainable campus.

	
Emergency lights	The Automatic Fire Alarm Sensor System
	
The Automatic heating System	SMART DOOR



SDG 7

Affordable and Clean Energy

SDG 7.2 University measures towards affordable and clean energy

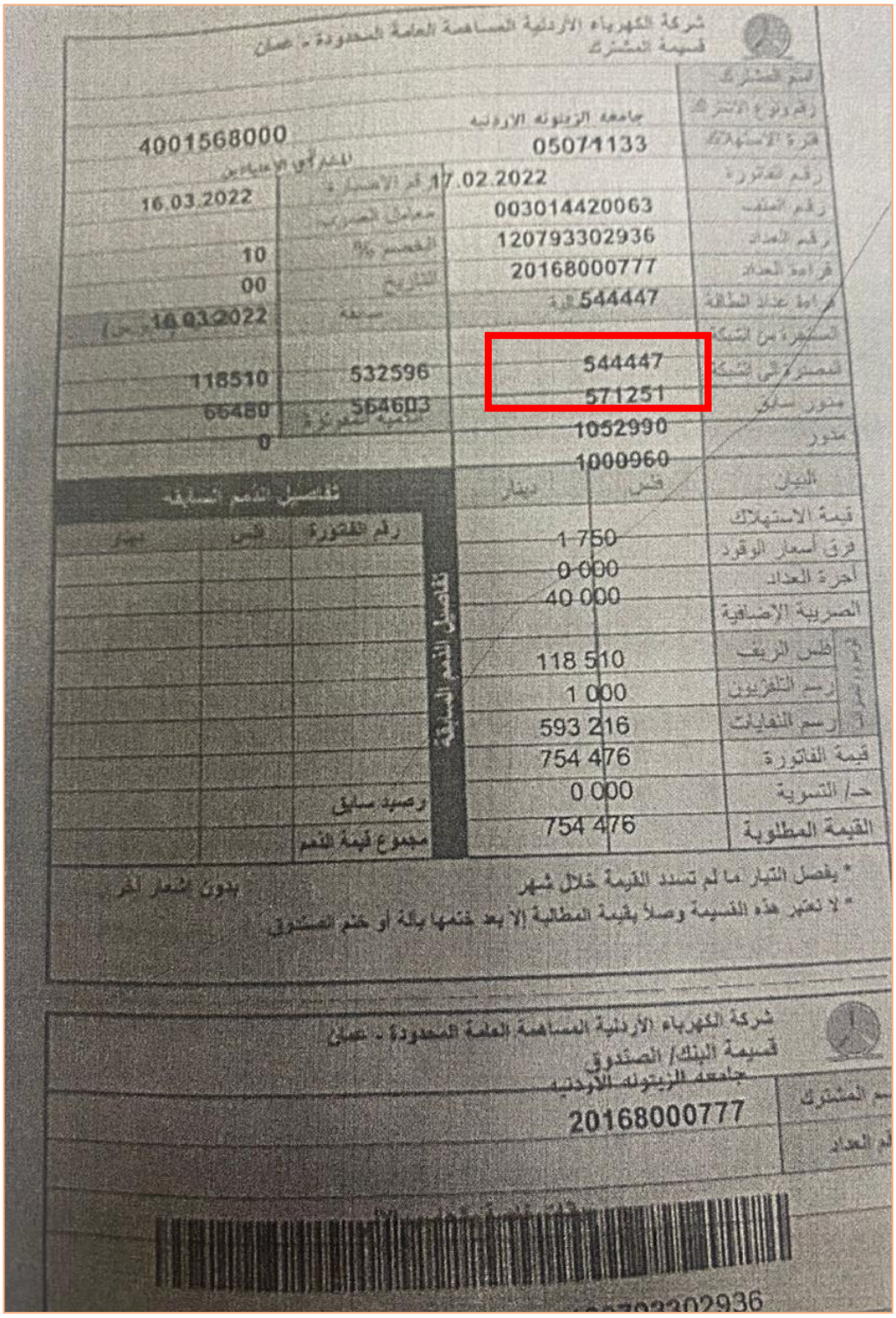
SDG 7.2.6 Divestment Policy

ZUJ is fully committed to carefully investigates the projects which it considers to sponsor. Thereby, ZUJ is not sponsoring any projects that may be harmful to the environment or projects that requires resourcing 100% biofuel energy.

ZUJ does not sponsor any financial projects currently, but it supports scientific projects that is related to sustainability where the deanship of scientific research has financially sponsored over 31 researches with a budget nearly 750 thousand dollars in the year 2022-2023. Moreover, ZUJ recognizes the significance of divestment, in order to promote green energy and help spread the benefit of green energy as well as provide green energy to the community and not just the campus. To that purpose, Al-Zaytoonah University of Jordan has an agreement with Jordan Electricity Company in which the University provides the excess amount of its solar energy.

SDG 7

Affordable and Clean Energy



SDG 7

Affordable and Clean Energy

SDG 7.3 Energy use density

SDG 7.3.1 Energy use per sqm

Energy usage per sqm	12.95
Total energy used per year	945,000 kwh
University floor space	72,993 m^2

SDG 7

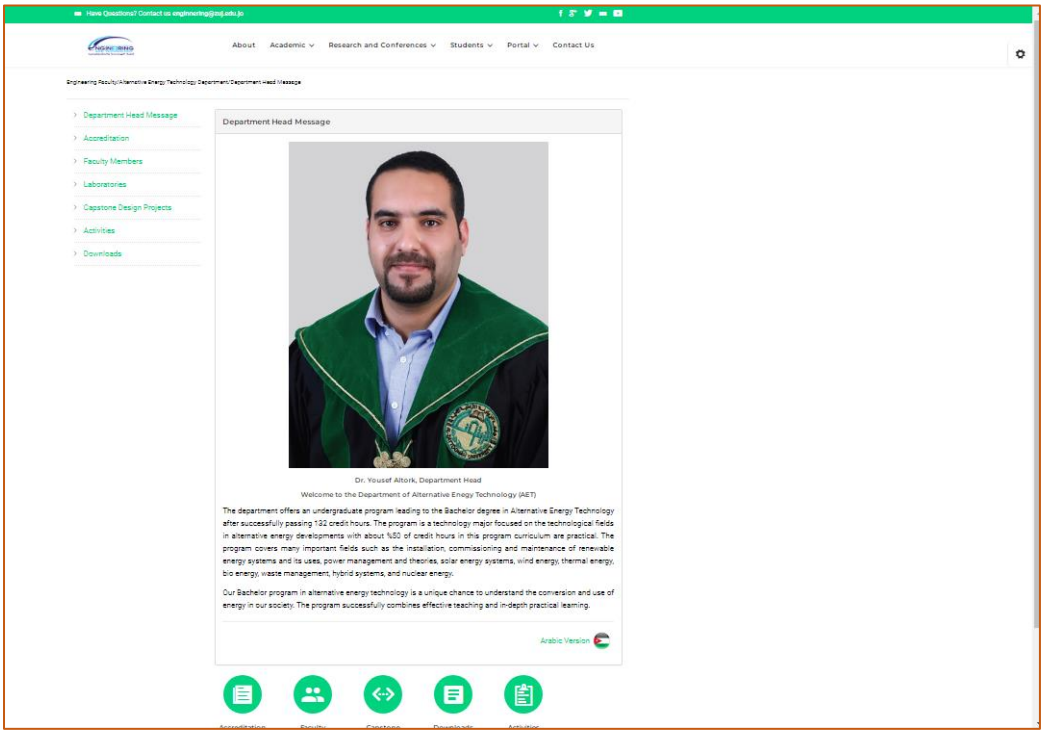
Affordable and Clean Energy

SDG 7.4 Energy and community

SDG 7.4.1 Local community outreach for energy efficiency

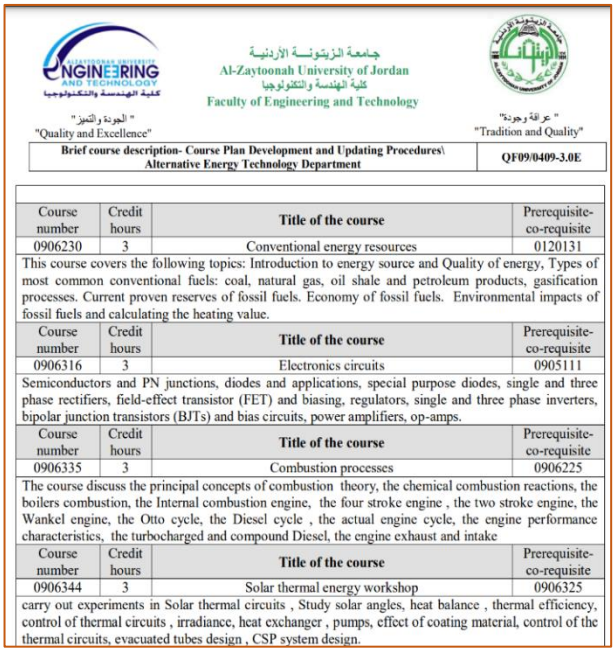
Al-Zaytoonah University of Jordan acknowledge the importance of spreading knowledge to the community. In order to achieve that goal ZUJ provides programs for local community to learn about importance of energy efficiency and clean energy, as follows:

1. Al-Zaytoonah University of Jordan developed an Alternate Energy Department, which offers an undergraduate program leading to the Bachelor degree in Alternative Energy Technology after successfully passing 132 credit hours. Click Here (Link)



SDG 7

Affordable and Clean Energy



جامعة الزيتونة الأردنية
Al-Zaytoonah University of Jordan
كلية الهندسة والتكنولوجيا
Faculty of Engineering and Technology

"الجودة والتميز" "Quality and Excellence" | "عراقة وجودة" "Tradition and Quality"

Brief course description- Course Plan Development and Updating Procedures\ Alternative Energy Technology Department — QF09/0409-3.0E

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906230	3	Conventional energy resources	0120131

This course covers the following topics: Introduction to energy source and Quality of energy, Types of most common conventional fuels: coal, natural gas, oil shale and petroleum products, gasification processes. Current proven reserves of fossil fuels. Economy of fossil fuels. Environmental impacts of fossil fuels and calculating the heating value.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906316	3	Electronics circuits	0905111

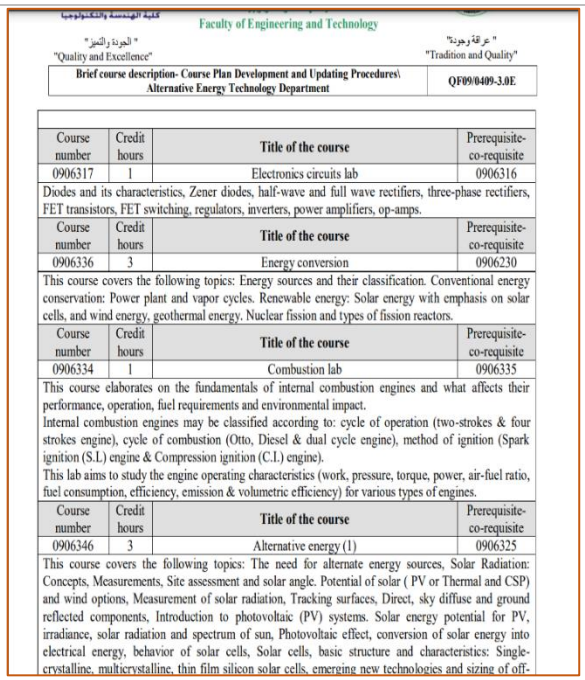
Semiconductors and PN junctions, diodes and applications, special purpose diodes, single and three phase rectifiers, field-effect transistor (FET) and biasing, regulators, single and three phase inverters, bipolar junction transistors (BJTs) and bias circuits, power amplifiers, op-amps.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906335	3	Combustion processes	0906225

The course discuss the principal concepts of combustion theory, the chemical combustion reactions, the boilers combustion, the Internal combustion engine, the four stroke engine , the two stroke engine, the Wankel engine, the Otto cycle, the Diesel cycle , the actual engine cycle, the engine performance characteristics, the turbocharged and compound Diesel, the engine exhaust and intake

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906344	3	Solar thermal energy workshop	0906325

carry out experiments in Solar thermal circuits , Study solar angles, heat balance , thermal efficiency, control of thermal circuits , irradiance, heat exchanger , pumps, effect of coating material, control of the thermal circuits, evacuated tubes design , CSP system design.



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Brief course description- Course Plan Development and Updating Procedures\ Alternative Energy Technology Department — QF09/0409-3.0E

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906317	1	Electronics circuits lab	0906316

Diodes and its characteristics, Zener diodes, half-wave and full wave rectifiers, three-phase rectifiers, FET transistors, FET switching, regulators, inverters, power amplifiers, op-amps.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906336	3	Energy conversion	0906230

This course covers the following topics: Energy sources and their classification. Conventional energy conservation: Power plant and vapor cycles. Renewable energy: Solar energy with emphasis on solar cells, and wind energy, geothermal energy. Nuclear fission and types of fission reactors.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906334	1	Combustion lab	0906335

This course elaborates on the fundamentals of internal combustion engines and what affects their performance, operation, fuel requirements and environmental impact.
Internal combustion engines may be classified according to: cycle of operation (two-strokes & four strokes engine), cycle of combustion (Otto, Diesel & dual cycle engine), method of ignition (Spark ignition (S.L) engine & Compression ignition (C.I.) engine).
This lab aims to study the engine operating characteristics (work, pressure, torque, power, air-fuel ratio, fuel consumption, efficiency, emission & volumetric efficiency) for various types of engines.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906346	3	Alternative energy (1)	0906325

This course covers the following topics: The need for alternate energy sources, Solar Radiation: Concepts, Measurements, Site assessment and solar angle. Potential of solar (PV or Thermal and CSP) and wind options, Measurement of solar radiation, Tracking surfaces, Direct, sky diffuse and ground reflected components, Introduction to photovoltaic (PV) systems. Solar energy potential for PV, irradiance, solar radiation and spectrum of sun, Photovoltaic effect, conversion of solar energy into electrical energy, behavior of solar cells, Solar cells, basic structure and characteristics: Single-crystalline, multicrystalline, thin film silicon solar cells, emerging new technologies and sizing of off-

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Brief course description- Course Plan Development and Updating Procedures\ Alternative Energy Technology Department — QF09/0409-3.0E

Faculty	Engineering and Technology	Academic Department	Alternative Energy Technology	Number of the course plan ( )
Number of Major requirement courses	31	Date of plan approval		

This form is just for the major requirement courses

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906100	3	Principles of energy sciences	-

This course aims to teach the students the traditional energy sources: coal, oil shale, oil and its derivatives. Renewable energy sources: solar energy, wind energy, hydrogen production, groundwater energy, biomass energy, and nuclear energy. Energy conservation in buildings appliances and other different sectors.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906201	3	Workshop and occupational safety	-

This course concentrates on safety management as it relates to hazard identification, accident investigation and training, enabling the safety manager to reduce costs to business, industry, and government. This course also covers labor laws in general and the Jordanian labor law in specific.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906210	3	Electrical machines and power systems	0905111

Newton's law of rotation, magnetic fields and circuits, Faraday's law, real reactive and apparent power, three-phase circuits, delta wye connections, one-line diagrams, power triangle, ideal transformers, per-unit system, three-phase transformers, magnetomotive force, stator, rotor, synchronous generators and

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Brief course description- Course Plan Development and Updating Procedures\ Alternative Energy Technology Department — QF09/0409-3.0E

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906225	2	Thermodynamics	0120131

This course covers the following topics: Defining and describing systems and their behavior, Energy and the first law of thermodynamics. Ideal gas law & ideal gas properties. First law Analysis for a control volume: Development of equations for conservation of mass and energy. Introduction to second law of thermodynamics. Gas power cycles and Refrigeration Cycle.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906211	1	Electrical machines and power systems lab	0906210

Delta-star connections, measurement of voltage-current-power, single phase transformers, autotransformers, three phase transformers, synchronous transformers, three phase induction motors, shunt DC motors, series DC motors, transmission lines.

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906223	2	Fluid mechanics	0120131

This course covers the following topics: General Introduction – Introduction – Fluid Properties – Fluid Statics - Flowing Fluids and Pressure Variation - Control Volume Approach and Continuity Equation – Momentum Equation – Energy Equation - Dimensional Analysis and Similitude - Flow in conduits: Laminar and Turbulent pipe flow -Turbomachinery

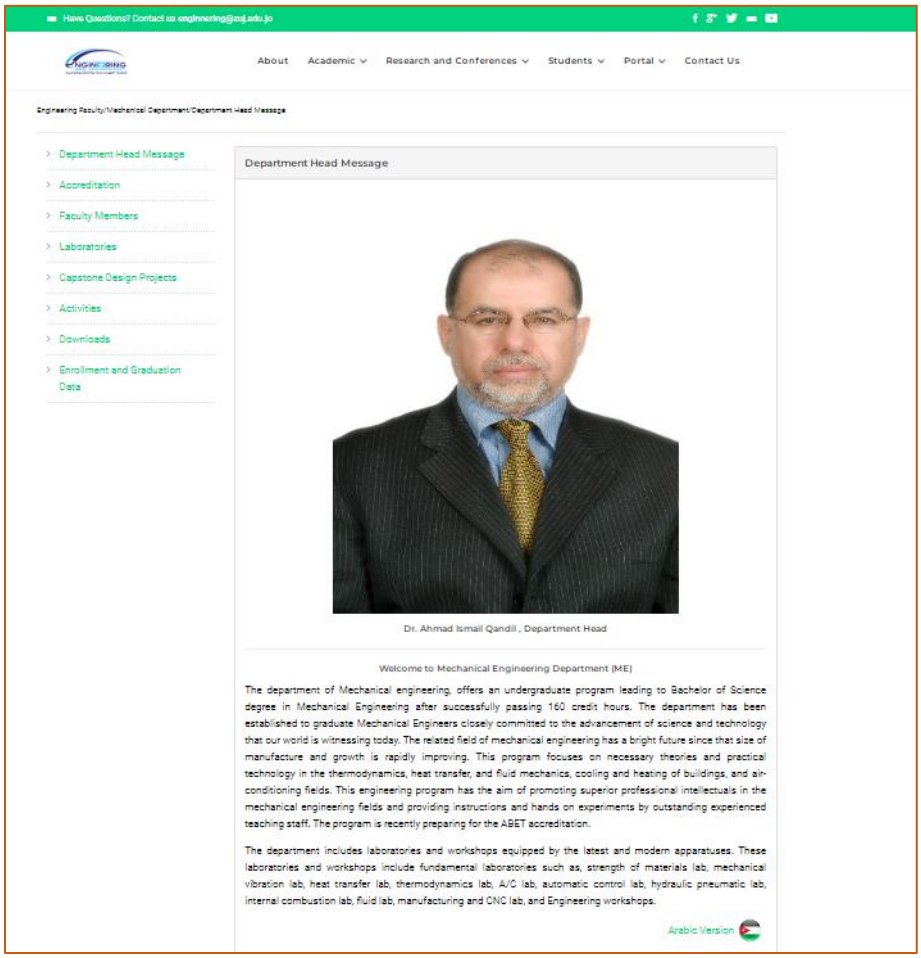
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0906314	3	Instrumentations and measurements	0906223 0905111

Units, dimensions and standards, uncertainty analysis, error measurements, statistical analysis, sensor calibration, noise sources, signal conditioning, amplifiers, op-amps, low pass and high pass filters,

Course Plan of Alternative Energy Technology

Total number of specialty courses on Alternate Energy are 52 courses including labs and workshops, as seen in this link, Click Here (Link)

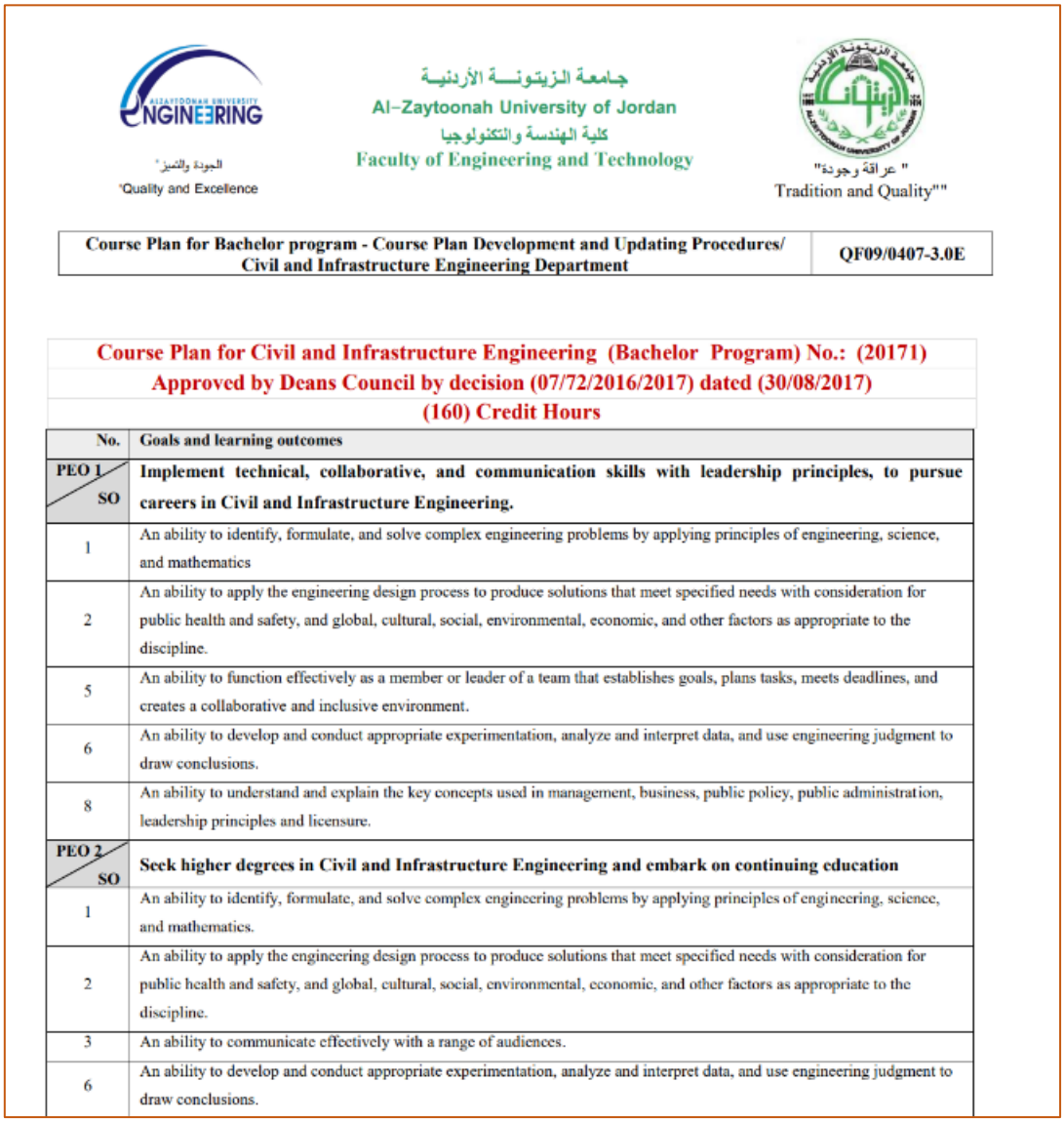
2.A new program under the mechanical engineering's department entitled sustainable energy engineering was established. Click Here (Link)



Total number of specialty courses on sustainable energy engineering is about 30% of the total courses which is equivalent to about 48 hours.

3. Al-Zaytoonah University also offers different courses that address energy efficiency and clean energy in different programs, as follows

    a. Civil and Infrastructure Engineering, there are 25 courses Click Here (Link).



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Tradition and Quality""

Course Plan for Bachelor program - Course Plan Development and Updating Procedures/ Civil and Infrastructure Engineering Department	QF09/0407-3.0E

Course Plan for Civil and Infrastructure Engineering (Bachelor Program) No.: (20171)
Approved by Deans Council by decision (07/72/2016/2017) dated (30/08/2017)
(160) Credit Hours

No.	Goals and learning outcomes
PEO 1 / SO	**Implement technical, collaborative, and communication skills with leadership principles, to pursue careers in Civil and Infrastructure Engineering.**
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
5	An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
8	An ability to understand and explain the key concepts used in management, business, public policy, public administration, leadership principles and licensure.
PEO 2 / SO	**Seek higher degrees in Civil and Infrastructure Engineering and embark on continuing education**
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
3	An ability to communicate effectively with a range of audiences.
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Couse Plan of Civil and Infrastructure Engineering

b.Mechanical Engineering offers one course on Mechanical Systems in green buildings, Click Here (Link).

SDG 7

Affordable and Clean Energy

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كلية الهندسة والتكنولوجيا
Faculty of Engineering and Technology

" عراقة وجودة"
"Tradition and Quality"

Brief course description- Course Plan Development and Updating Procedures\ Mechanical Engineering Department	QF09/0409-3.0E

0911322	3	Thermodynamics (2)	Thermodynamics (1)
This course covers the following topics: Review of thermodynamic basic laws and principles. Thermodynamic cycles analysis, energy analysis of both closed and open systems, irreversibly, exergy analysis for both control mass and volume systems, vapor cycles, gas power cycles, refrigeration and air thermodynamic cycles			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0911324	3	Fluid Mechanics (1)	Dynamics
Introduction, Fluid properties, Basic units, Fluid statics, Pressure and its measurements, Forces on plane and curved submerged surfaces, buoyancy & floatation, Fluids in motion, Flow kinematics and visualization, Basic control volume approach, Differential and integral continuity equation. Pressure variation in flowing fluids, Euler's and Bernoulli's equations, Applications of Bernoulli equation, Momentum principle and its applications, Navier-Stokes equations. Energy equation, Hydraulic and energy grade lines. Dimensional analysis and similitude. Surface resistance and introduction to boundary layer theory. Flow in conduits, laminar and turbulent flows, Frictional and minor losses, Piping systems.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0911361	3	Engineering Numerical Methods	Calculus (2) For Engineering students

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Brief course description- Course Plan Development and Updating Procedures\ Mechanical Engineering Department	QF09/0409-3.0E

Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0911323	1	Thermodynamics Lab.	Co.Thermodynamics (1)
Experimental methods in the following : Mechanical equivalent of heat; The adiabatic exponent; Marcet boiler; Bomb calorimeter; Flow through nozzle; Refrigeration system; Air conditioning system; Heat pump and air cooler; single stage air compressor; cooling tower; Thermic unit (steam turbine power plant).			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0911325	1	Fluid Mechanics Lab.	Co. Fluid Mechanics (1)
Experimental methods in the following systems: center of pressure; impulse momentum principle; pumps, friction losses in pipes, stream lines and flow fields, buoyancy and boundary layer theory. Radial flow fan, Water turbine, Flow measurement.			
Course number	Credit hours	Title of the course	Prerequisite-co-requisite
0911331	3	Heating and Air Conditioning	Thermodynamics (1)
Review of psychrometry; thermal comfort; air conditioning processes; inside and outside design conditions;			

Course Plan of Mechanical Engineering

SDG 7

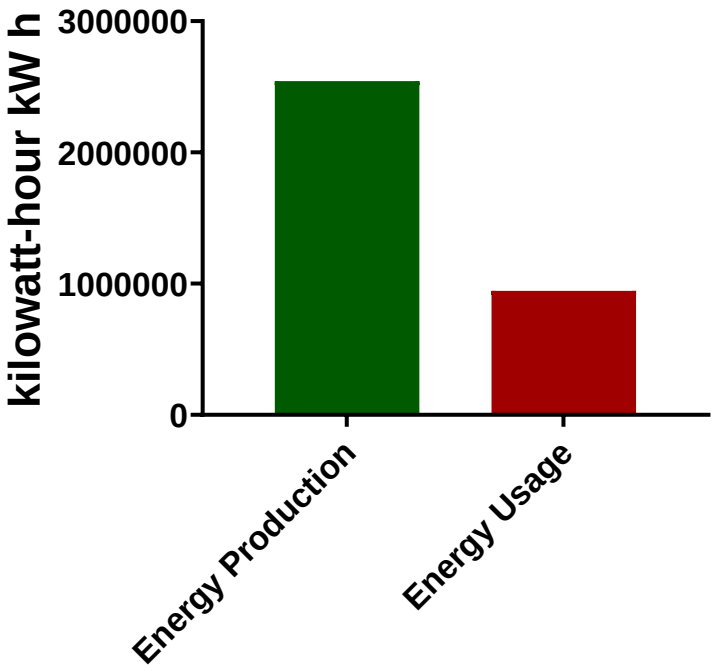
Affordable and Clean Energy

SDG 7.4 Energy and community

SDG 7.4.2 100% renewable energy pledge

ZUJ is fully committed to 100% renewable pledge. ZUJ relies on implementing solar panels (6000 panels) for production of energy and do not rely on biofuel sources. Click Here

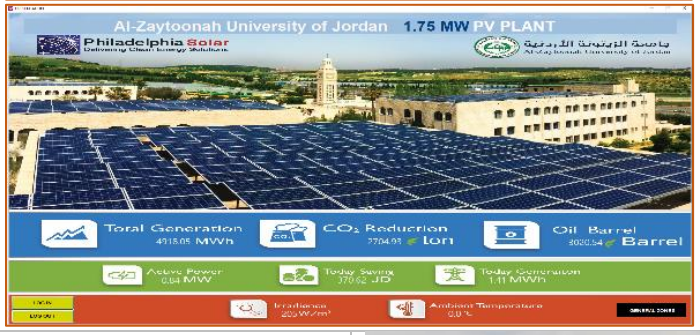
ZUJ has implemented four key renewable energy systems on its campus to reduce electricity usage: wind energy, solar systems, clean biomass, and bio-diesel systems. These renewable sources are used collectively to generate power, ensuring that the university buildings rely 100% on these sustainable energy sources. This initiative demonstrates the university's commitment to sustainability and energy efficiency by fully integrating renewable energy solutions into its campus operations. ZUJ produces 2,544,000 kwh per annum with a total Energy Usage of 945,000kwh. Also, Al-Zaytoonah University of Jordan took different measurement to ensure 100% renewable pledge, as follows:



1. Using electrical charging parking for the private electric vehicle.
2. Using renewable energy for electricity.
3. The first Jordanian solar park consists of different components; a solar tree where the leaves are PV panels (M36s-100Wp), a hybrid system (PV/wind), and solar umbrellas fitted with electricity outlets for students.
4. Rideshare is designed to encourage commuters to adopt healthy and sustainable transportation options, (Carpool). Furthermore, Al-Zaytoonah University of Jordan promotes eco-friendly commuting options such as cycling, walking, and public transportation by providing bike-sharing programs, pedestrian-friendly infrastructure, and discounted public transit passes.
5. Encouraged rideshare to adopt healthy and sustainable transportation options, (Carpool).

6. Developed a clear plan to become a carbon-neutral institution by a specified target year, taking into account energy efficiency, renewable energy adoption, and carbon offsetting strategies.
7. Invested in on-campus renewable energy projects, such as solar panels and wind turbines, to reduce dependence on fossil fuels and lower greenhouse gas emissions.
8. Committed to sustainable building practices by adhering to green building standards like LEED (Leadership in Energy and Environmental Design) for all new construction and renovations.
9. Integrated sustainability and climate change-focused courses and programs across various disciplines, encouraging students to explore solutions to environmental challenges.
10. funded and support research initiatives focused on climate change, renewable energy, and sustainability, facilitating innovation in these areas.
11. Implemented comprehensive waste reduction and recycling programs on campus, with a goal to minimize landfill waste and maximize recycling rates.
12. Sourced goods and services locally and sustainably, prioritizing eco-friendly products and supporting fair trade practices.
13. Engaged with the local community and collaborate on sustainability initiatives, knowledge-sharing, and outreach programs to extend sustainability efforts beyond campus boundaries.
14. Allocated resources and grants to support student-led sustainability projects and initiatives, empowering students to drive change and apply their knowledge in practical ways.


مركز المراقبة للنظام الكهروضوئي
CONTROL CENTER FOR
PV SYSTEM


Al-Zaytoonah University of Jordan 1.75 MW PV PLANT
Philadelphia Solar
Toral Generation
CO2 Reducrion
Oil Barrel

SDG 7

Affordable and Clean Energy

Wind Energy	Solar Systems
	
Bio Diesel	Clean Biomas

  	   
Charge Parking	Renewable Energy using Solar System

SDG 7

Affordable and Clean Energy

SDG 7.4 Energy and community

SDG 7.4.3 Energy efficacy service for industry

ZUJ take a pride in providing free direct services to local industry aimed at improving energy efficiency and clean energy (energy efficiency assessments, workshops, consultations and research renewable energy options).

Examples of Events Related to Environment (Al-Zaytoonah University of Jordan, Amman)

SDG 7

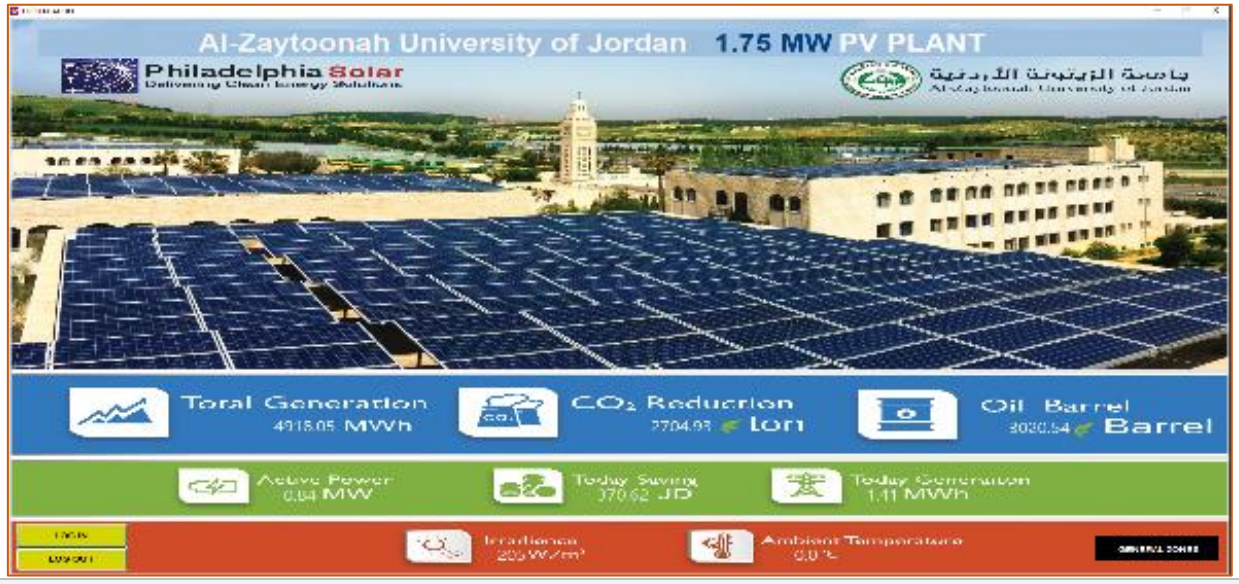
Affordable and Clean Energy

SDG 7.4 Energy and community

SDG 7.4.4 Policy development for clean energy technology

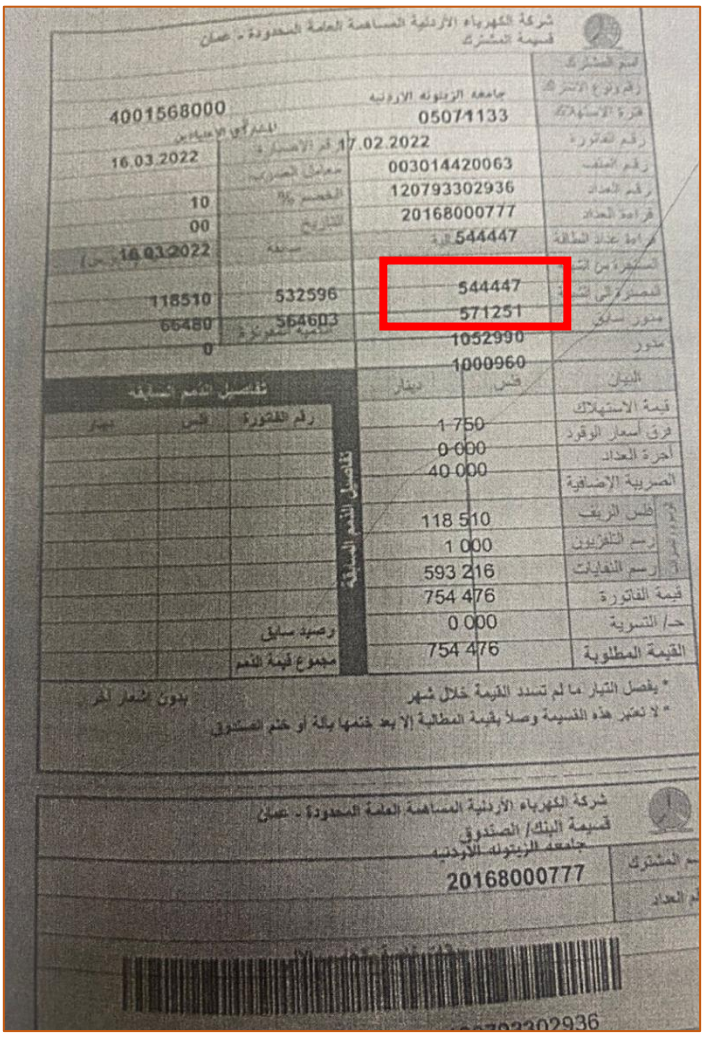
ZUJ has been assessing the potential for installing renewable energy systems using GIS mapping and renewable energy simulation software since 2016. The university conducted feasibility studies to identify the optimal locations for solar panels and wind turbines. Upon completing the planning phase, the implementation process began immediately, with the installation of the energy systems closely monitored through project management tools. ZUJ continues to track energy production and performance using renewable energy monitoring systems, ensuring efficient and sustainable energy use across the campus. Planning, implementation, monitoring and/or evaluation of all programs related to Energy and Climate Change through the utilization of Information and Communication Technology (ICT):

Stage	Activities/Programs	ICT Utilization	Evidence	Timeline	Responsible Team/Department
Planning	Assess potential for renewable energy installations	Use of GIS mapping and renewable energy simulation software	Feasibility studies, site assessment reports	2016	Engineering Department, ICT committee, Deans council
Implementation	Install renewable energy systems (solar panels, wind turbines)	Project management tools, installation scheduling software	Installation logs, energy generation data	2016	Engineering Department
Monitoring	Track renewable energy production	Renewable energy monitoring systems	Energy production reports, performance analytics	Ongoing	Engineering Department, ICT committee



Renewable energy simulation software and installation of renewable energy

ZUJ recognizes the importance of establishing clean energy technology as well as developing policies for clean energy technology. For that purpose, Al-Zaytoonah University of Jordan has an agreement with Jordan Electricity Company in which the University provides the excess amount of its solar energy.



4. Al-Zaytoonah University of Jordan encourages its academics to be a part of different originations both nationally and internationally to shape and participate in policy development for clean energy

4.1 Prof. Safwan Al-Qawabah from Mechanical Engineering Dept./ Faculty of Engineering worked as:

4.1.1 A member in the board directors of Cigre – Jordan

4.1.2 A member in Cigre – Paris

4.1.3 the Head of steel committee in Jordan Standards of Metrology Organization

4.1.4 a member of International Advisory Board of Jordan Journal of Mechanical and Industrial Engineering Click Here (Link)

THE HASHEMITE UNIVERSITY

JORDAN JOURNAL OF MECHANICAL AND INDUSTRIAL ENGINEERING (JJMIE)

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in recognition of your valuable contributions to

JORDAN JOURNAL OF MECHANICAL AND INDUSTRIAL ENGINEERING (JJMIE)

as member of 2022 international advisory board

Professor Ali Jawarneh
Editor In Chief

The Hashemite University, Zarqa 13115, Jordan Website: www.jjmie. hu. edu.jo Email: jjmie@hu.edu.jo Tel: +96253903333 Fax: +96253903338

2.1.5 a Member of board of directors of EPPM Association EPPM-Association: Officers 2018 - 2020 (ppml.url.tw)

2.1.6 a Member of the technical committee of the 4th International Conference on Mechanical Design and Engineering (ICMDE 2018)-EI Compendex, Scopus, ICMDE--EI, Scopus 2018 : 2018 the 4th International Conference on Mechanical Design and Engineering (ICMDE 2018)--EI Compendex, Scopus (wikicfp.com)

2.1.7 a Member of the technical committee of the First Conference in Mechanical Engineering Science and Applications Click Here (Link)

2.1.8 a Member of the technical committee of The 7th International Conference on Advanced Materials Research Click Here (Link)


Jan.22, 2016, Visit to Politecnico di Torino | ICAMR 2016


Session 2- Alloy Material

2.1.9 a Member in the steering committee of the IEEE Middle East & North Africa Communications Conference Advancing the Communication Vision Click Here (Link)

2.1.10 an Industrial Consultant for Jordan Engineer Association

SDG 7

Affordable and Clean Energy

SDG 7.4 Energy and community

SDG 7.4.5 Assistant to low-carbon innovation

Al-Zaytoonah University of Jordan has innovative programs-based solar energy namely:

1. Sustainable Students Park (SSP) program**:** in this program, a solar photovoltaic system has been installed outdoors (in the university park), benefiting more than 10000 students and visitors who can enjoy charging their devices, connecting to the internet, lighted park at night, and free-smoke area.

2. Electronic Cars Charging Stations (ECCS) program: this program was launched by Al-Zaytoonah University of Jordan in 2019 to provide convenient and affordable charging for electronic cars.

3. University Solar Photovoltaic (USVP) Program: This program aims to provide the university with 2,544,000 kwh of solar-powered electricity for buildings lighting, heating, operating all electrical devices in the university such as operating air-conditioners and operating computers in labs.

4. Green Area Program aims to limit and decrease the parking area on campus (increasing the green area)

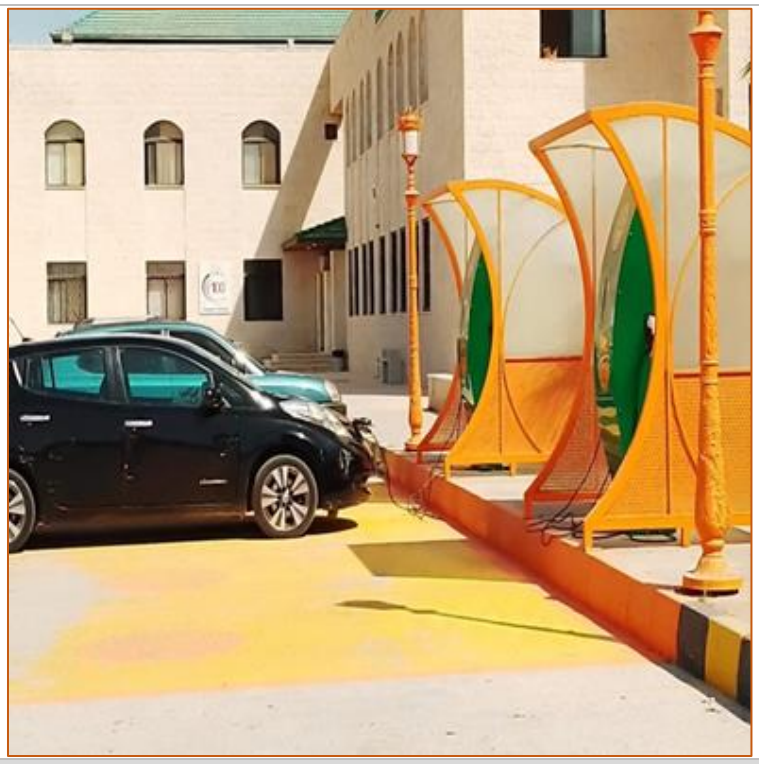
5. Sustainable Ecological System: This program has been funded by the Al-Zaytoonah University of Jordan to overcome the complex chronic problem of water scarcity for freshwater drinking and agriculture. This program has developed an innovative, sustainable and Ecological system as a solution to the water scarcity problem by

designing a Renewable Energy Driven Vapor Absorption System (RE-VAS) for water harvesting from atmospheric air.

6. Forest Fire System: This program has been funded by Al-Zaytoonah University of Jordan to develop a reliable system that can detect wildfire before it is too late; Provide a fire behavior analysis and some important parameters using machine learning (such as the fire spreading rate, the spreading direction, the slop…etc.) for the firefighter department to reduce the faulty alarm and help the firefighter to plan the right teamwork for fire extinguishing. 3- Fire prediction using multiple inputs, such as WSN input, from sensor readings, sensor behavior, weather condition …etc.

Sustainable Students Park (SSP)

University Solar Photovoltaic (USVP)



Electronic Cars Charging Stations (ECCS)


Green Area Program aims to limit and decrease the parking area on campus (increasing the green area)



Sustainable Ecological System

HOME PAGE > NATIONAL > FEATURES

Initial fire-detection experiment held in Barqash forests

Roaa Rayyan, Jordan News •
last updated: Sep 08,2022

(Photos: Handou Al-Khatib)

A+ A-

AMMAN – An init t on early fire-detection was conducted in the plantations of Barqash in Ajloun, a project

nniversary

Jordan, Hungary tackle cooperation

kely Competencies in civil service

Initial fire-detection experiment held in Barqash forests

Stavros Niarchos Foundation to support | Flat6Labs holds demo

TRY OUR NEW E-PAPER

tor res financial duals' future

Forest Fire System

	
Dedicating E-learning Center to Help and Support Students for E-Learning	Virtual Workshops
	
A Chatbot Had Been Built to Help and Support the University's Students in the e-learning System and Process	E-learning Mobile Application to Help and Guide the Students in the E-Learning
	
E-learning Youtube Channel	E-learning Portal Connected to Facebook, Youtube, Virual Labs , and Whatsup Channels

	
http://icit.zuj.edu.jo/icit2021/Index.html	http://sicb.zuj.edu.jo/sicb/sicb2021/

Like many countries, Jordan has resorted to lockdown in an attempt to contain the outbreak of coronavirus (Covid-19). A set of precautions such as quarantines, isolations, and social distancing were taken in order to tackle the rapid spread of it. However, the authorities were facing a serious issue with how to enforce quarantine instructions and social distancing among its people. In this work, a social distancing mentoring system has been designed to help Al-Zaytoonah University of Jordan to implement the precautionary measures that prevent the spread of infection among students and staff in order to return to work from the campus, making it one of the leading and pioneering institutions in Jordan that use an automated "Social Distancing" system as part of its risk management plan. This real-time object tracking system utilizes the widespread of surveillance cameras that already located within the university campus. The results showed the efficiency of this system in tracking people and determining the distances between them in accordance with public safety instructions. This work is the first approach to handle the classification challenges for moving objects using multi-core techniques.

E-Learning Center

The e-Learning Center at Al Zaytoonah University has been operating as the core of distance learning, online courses, online training, educational support, and open educational resources. The center is one of the main operating units in the university.

The Center Main Goals are as following:

- Support and help the student in the learning era.
- Solve all problems of the students related to the e-learning process.
- Create a basis of multiple eLearning platforms and services to students, professors, and staff.

- Promote and improve the methods of eLearning among youth and adult learners.
- Enable the opportunities for research and innovation in the eLearning field.
- Provide professional training in e-Learning to strengthen the overall learning outcomes and teaching techniques.

E-Learning Portal and Different Social Media Pages, Helpdesk Groups, and Software's.

E-Learning portal, Facebook Page, WhatsApp, and Chabot's tools' main mission is to keep in contact with locked students at home and comfort them and their families about the destiny of the courses. However, teachers were not ready to move to full remote learning, and others did not know eLearning platforms and tools. To detect demands extremely fast and offer distance courses for Professors for e-learning discovery, the University established a dedicated e-learning center. A Facebook group, WhatsApp Help Group, Hotline, Chabot and YouTube Channel facilitated fast communication to support students and professors. All the software needed for Professors (Moodle, Microsoft Team, social media, Zoom, Simulators, Virtual Labs, VR labs etc.) to reduce technological constraints and cope with Covide-19 Pandemic.

Virtual Workshop

In the course of the health crisis of COVID-19 that is speeding the digital transition from higher education, the world of higher education is profoundly altering. In higher education institutions globally, this quiet revolution is happening. Not just what should be taught but how best to teach it, these basic tendencies are shifting. In the dynamic worldwide environment of higher education, we consider it necessary to reflect on and discuss experiences and problems. This seminar and workshop seek to determine strategies to ensure that our students enjoy the best learning experiences possible. Al Zaytoonah University focuses on its core strengths. It challenges the long-standing assumptions of teaching and learning based on a wide spectrum of change, such as active study, philosophy and hybrid courses, and green skills. It also

challenges addressing the urgent need for students to gain new and highly specialized skills to achieve the Sustainable Development Goals in more broad terms. Industry and university experts from throughout the globe will share their experiences and explore new developments in disruptive learning.

In addition, ZUJ through the Deanship of Scientific Research and Innovation emphasis on the role of Universities in innovation and sponsoring cutting-edge research on renewable energy technologies and energy efficiency. Thus, ZUJ had sponsored over 31 projects under the category of sustainability-related projects in a total budget of 715,112.15 US dollars. ZUJ addressed the urge of digital transition in education, adopting smart buildings and the use of virtual reality on the expense of conventional paper-based learning. The designated projects addressed the need of using non-conventional approaches in practical life fields that include banking, education, nursing. It is envisaged that the sponsored projects will hopefully facilitate innovation in carbon reduction. A list of the sustainability related projects that were sponsored by ZUJ are inserted below:

SDG 7

Affordable and Clean Energy

قائمة مشاريع البحث العلمي المدعومة من الجامعة (التي تم التنسيب بالموافقة عليها) 2022 - 2023 م

Projects List 2022-2023

Sustainability - related projects

#	عنوان المشروع	الباحث / الباحثون	الكلية / القسم	تاريخ بداية التنفيذ	قيمة الدعم (د.أ)
.1	تطبيقات انترنت الأشياء في الغرف الصفية الذكية باستخدام تقنيات هندسة متطلبات البرمجيات	**د. اكرم عبدالكريم عبدالقادر**, د. خليل عوض محمد صالح	العلوم وتكنولوجيا المعلومات / هندسة البرمجيات	2022/12/6	11500
.2	تطوير نظام ذكي لإدارة المستندات الإلكترونية يعتمد على أساليب التعلم الآلي(دراسة حالة - نظام أرشفة ملفات الطلاب بجامعة الزيتونة)	**د. محمد ابراهيم عبد الكريم المهيرات**, د. وائل جمعة عبد اللطيف الزيادات	العلوم وتكنولوجيا المعلومات / هندسة البرمجيات	2023/4/6	10400
.3	نظام تتبع الطلاب والتعرف عليهم لتنبؤ المخالفات داخل كلية العلوم وتكنولوجيا المعلومات	**د. عدنان احمد عبد الفتاح حنيف**, د. ثامر أحمد موسى الرواشدة	العلوم وتكنولوجيا المعلومات / الأمن السيبراني	2023/4/6	9750

.4	الأمثليه الرياضيه في تحكم نظري جديد وتطبيقاتها على تصميم وتطوير نظام زراعي ذكي مرتبط بتقنيات الذكاء الاصطناعي وتعلم الآلة	**د. طارق محمد ذياب حمادنه**, د. هيثم علي مصطفى القواقنة	العلوم وتكنولوجيا المعلومات / الرياضيات	2023/4/6	7000
.5	دراسة مدى اهتمام مستخدمي الجولة الافتراضية لجامعة الزيتونة الأردنية من الطلبة وأعضاء الهيئة التدريسية والمجتمع المحلي	**د. محمد محمود عارف عبد الله**, د. موسى ابراهيم محمد صلاح	العلوم وتكنولوجيا المعلومات / هندسة البرمجيات	2023/4/6	7590
.6	تحليل الأداء والتحديات الأمنية لتطبيق SiS / SaS على السحابة: دراسة حالة جامعة الزيتونة الأردنية	**د. محمد احمد عبد الحفيظ عالية**, د. يوسف محمد عبد الرحمن جرادات	العلوم وتكنولوجيا المعلومات / الأمن السيبراني	2023/8/8	89700
.7	فاعلية المستخلصات والنواتج الطبيعية لبعض النباتات الطبية في الأردن لعلاج السرطان	**د. نور حسن محمد أبو الهيجاء**, د. ايفين فوزي سعيد الشلبي, د. شدى جاسر احمد العبد, د. الهام منصور ابراهيم أبوشريعة	الصيدلة / الصيدلة	2022/12/6	16900

.8	العوائد الصحية والاقتصادية الوطنية المتوقعة من برامج الاقلاع عن التدخين في الأردن	**د. نمر الخطيب**, د. آلاء سعيد محمد الخطيب, د. حمزة محمد علي ابومنصور	الصيدلة / الصيدلة	2022/12/6	6500
.9	تصميم وتصنيع رباعي أمايد جديد من ثلاثة مركبات غير جديدة	**د. لورانس محمد شفيق مرشد البرغلي**, د. حنين محمد خليل كلوش	الصيدلة / الصيدلة	2023/4/6	7950
10	دراسة مقارنة لتأثيرات التعرض لمنتجات التبغ المختلفة على الأعضاء المختلفة في الجرذان	**د. آلاء محمود احمد حماد**, د. سهير زياد عبد الحميد سنقرط, د. سوسن ابراهيم محمد خضير	الصيدلة / الصيدلة	2023/4/6	15000
11	استخدام الواقع الافتراضي الغامر لتحسين اتخاذ القرارات السريرية والتقييم السريري بين طلاب التمريض	**د. مروه البرماوي**, د. خالد حسن حسين سليمان, د. مجدي محمد بشير طه الحديدي	التمريض / تمريض	2022/12/6	34500
12	مدى تطبيق مسار الدراسة المزدوجة وانعكاساته الاكاديمية والمهنية على الطلاب والجامعة والمجتمع: دراسة حالة في جامعة الزيتونة الأردنية.	**د. محمد حسن الطراونه**, د. وائل جمعة عبد اللطيف الزيادات, د. بلال محمود حسين الوادي	الآداب / معلم صف	2022/12/6	8850

13	" أثر استخدام تكنولوجيا الواقع الافتراضي في تدريس عينه من طلبة مادة الحضارة الإنسانية: دراسة حالة/ جامعة الزيتونة الأردنية"	**د. خلدون خليل سليم الحباشنه**, د. عدنان احمد عبد الفتاح حنيف, د. احمد عبد الله اشتيان الذنيبات	الآداب / العلوم الاساسية (الإنسانية والعلمية)	2023/4/6	6050
14	أثر تطبيق التسويق الالكتروني في تعزيز اداء مشاريع الاعمال الصغيرة في الارياف والمناطق النائية في الاردن.	**د. محمد لطفي محمد عاشور**, د. رائد مصباح محمد القرم	الأعمال / التسويق	2022/12/6	4985
15	الاستدامة البشرية وتنافسية الشركات الصناعية الأردنية: الأثر الوسيط لمشاركة العاملين	**د. نجم نجم عبود نجم**, د. نافز نمر حسن علي	الأعمال / ادارة الاعمال	2022/12/6	4350
16	نموذج محاكاة وتقنيات ذكاء اصطناعي لضبط حركة المرور في عمان	**د. قيثارة كاظم عبد الرحمن الشايع**, د. حذيفه الجوازنه	الأعمال / نظم المعلومات الادارية	2023/4/6	5570
17	أثر فعالية التدفقات النقدية في مستوى الاستثمار في تكنولوجيا المعلومات وأثرها في استمرارية الأرباح: أدلة من البنوك المدرجة في بورصة عمان	**د. أحمد عادل جميل عبد الله**, د. عبد الرزاق قاسم محمود الشحادة	الأعمال / المحاسبة	2023/4/6	5100

18	مناهج مبتكرة لتعليم المحاسبة: دمج أدوات ذكاء الأعمال (مقارنة بين آراء الأكاديميين والمهنيين)	**د. محمد محمود مصطفى ياسين**, د. أحمد عدنان حسين طعمه	الأعمال / المحاسبة	2023/4/6	4550
19	أثر الرافعة المالية على الأداء المالي للشركة - الدور الوسيط للذكاء الاصطناعي	**د. أسامة سميح عبدالرحمن شعبان**, د. زيد محمد مسلم الحواتمه	الأعمال / المحاسبة	2023/4/6	4308
20	تصميم وتنفيذ روبوت متحرك ناعم ذو ناقل متحرك الشكل لاستخدامات السلامة العامه	**د. مي محمود عبد الرحيم ارشيدات** , د. احمد عدلي احمد مناصرة, د. محمد زكريا محمد مسعود	الهندسة والتكنولوجيا / الهندسة الكهربائية / الهندسة الكهربائية القوى والتحكم	2022/12/6	5730
21	نظام الصحة والسلامة العامة منخفض الميزانية باستخدام التعلم الآلي ومستشعر Kinect 3D	**د. محمد زكريا مسعود**, د. راشد عبدالرحيم ابراهيم السكارنه	الهندسة والتكنولوجيا / الهندسة الكهربائية / الاتصالات والحاسوب	2022/12/6	5050
22	تأثير عملية الدرفلة المتعددة على الخصائص الميكانيكية وخصائص السطوح للسبائك ذاكرة الشكل	**د. صفوان محمد أحمد القوابعة**, د. نبيل عبد الفتاح عبد الرحمن ابو شعبان	الهندسة والتكنولوجيا / الهندسة الميكانيكية	2022/12/6	6900

23	تحلية المياه متوسطة الملوحة بالطاقة الشمسية النشطة : حل مستدام لأزمة المياه في الأردن	**د. فراس محمود مكاحله**, د. احمد عدلي مناصرة, د. مي شرف الدين بني يونس	الهندسة والتكنولوجيا / الهندسة الميكانيكية	2022/12/6	7000
24	تطوير إطار عمل جديد لتطبيق الاقتصاد الدائري للمشاريع الانشائية في الأردن	**د. رامي محمد ذيب علاونه**, د. اسماعيل احمد اسماعيل جنود	الهندسة والتكنولوجيا / الهندسة المدنية والبنية التحتية	2022/12/6	4650
25	تبريد المكونات الكهربائية والإلكترونية عن طريق نقل الحرارة بالحمل الطبيعي	**د. يوسف أحمد حسن الترك**, د. رفيق منيب رفيق مناع	الهندسة والتكنولوجيا / تكنولوجيا الطاقة البديلة	2022/12/6	6800
26	عوائق ودوافع تبني تطبيق الهندسه القيميه في المشاريع الانشائيه في الاردن	**د. اكرم صبحي حردان سليمان**, د. محمد عبد الرحمن محمد جرادات	الهندسة والتكنولوجيا / الهندسة المدنية والبنية التحتية	2022/12/6	5030
27	استخدام رماد جفت الزيتون والألياف الطبيعية في الخلطات الإسمنتية والخرسانية	**د. محمد عبدالرحمن محمد جرادات**, د. اكرم صبحي حردان سليمان	الهندسة والتكنولوجيا / الهندسة المدنية والبنية التحتية	2023/4/6	10260
28	أثر حوسبة أنظمة إدارة الجودة على مؤشرات الأداء في مؤسسات التعليم العالي – حالة	**د. فراس محمد حسين العزه**, د. فراس حامد فلاح الطراونه	الهندسة والتكنولوجيا / الهندسة الكهربائية / الهندسة	2023/4/6	68000

	دراسية جامعة الزيتونة الأردنية		الكهربائية القوى والتحكم		
29	دراسة أداء التدفق وانتقال الحرارة في قنوات التبريد المعززة بشفرات داخلية	**د. رفيق منيب رفيق مناع**, د. أحمد راتب أحمد العبوشي	الهندسة والتكنولوجيا / الهندسة الميكانيكية	2023/4/6	9270
30	تأثير عملية الصفع الدوراني وعملية الأكسدة الكهربائية على سبائك الالمنيوم المستخدمة في صناعة الطائرات	**د. نبيل عبد الفتاح عبد الرحمن ابو شعبان**, د. صفوان محمد أحمد القوابعة	الهندسة والتكنولوجيا / الهندسة الميكانيكية	2023/4/6	17700
31	حيزات داخلية تدرس تأثير مجموعة متنوعة من مواد البناء على البيئة الداخلية ؛ دراسة حالة جامعة الزيتونة	**د. تالا صفوان سامي مرعي**, د. فداء توفيق شريف عبدالحميد, د. احمد اسماعيل قنديل, د. هشام صالح محمود ربايعة	العمارة و التصميم / هندسة العمارة	2023/4/6	100000