جامعة بيروت العربية
BEIRUT ARAB UNIVERSITY

SUSTAINABLE DEVELOPMENT GOALS

SDG 17: PARTNERSHIPS FOR THE GOALS



Table of Contents

Response to the indicator 4
Principal evidence 4
Comparative research for urban recovery 5
Multinational Urban Acupuncture project from 2023 to 2025 5
Urban Acupuncture: A Strategy of Catalytic Interventions 5
Published comparison informing recovery in Beirut in 2024 6
Urban Insights: A Space Syntax Exploration Workshop 6
Shared analytical methods and public learning resources 7
Beirut Arab University participated in the Closing Conference of the Taziz Partnerships Program 9
International development of Healthy Urban Systems 10
BAU coordinates an international course module 10
Joint design workshop in Lausanne in November 2021 10
MOOC Healthy Urban Systems At BAU 10
Delivered course includes the BAU Urban Lab case 11
HEALTHY URBAN SYSTEMS - PART 1 11
MORALE comparisons for NGO education 15
BAU coordinates a European and Middle Eastern partnership 15
Capacity building for curricula modernization of Syrian and Lebanese HEIs and lifelong learning provision: towards sustainable NGOs management and operation with special focus on refugees 15
Social impact assessment methods tested in May 2021 16
2nd Online MORALE Training on Social Impact Assessment 16
European study visits inform course revisions in 2023 16
MORALE Consortium Meeting and Study Visit University of Alicante Alicante Spain 17
MORALE Consortium Meeting and Study Visit University of Oldenburg Germany 18
Results and recommendations disseminated in July 2023 19
Erasmus+ MORALE At Beirut Arab University 19
MEDID Event 20
International benchmarking and applied energy research 22
DeCAIR jointly reviews international degree programmes 22
DeCAIR: Developing Curricula for Artificial Intelligence and Robotics 22
Developing Curricula for Artificial Intelligence and Robotics Partners 24
Developing Curricula for Artificial Intelligence and Robotics Work packages 25
Documented implementation and exchange of results in 2023 25
Developing Curricula for Artificial Intelligence and Robotics Activities 25
The DeCair Erasmusplus CBHE Project Final Conference 26

Lebanon and Kuwait compare campus energy options in 2023 27
Towards Energy Sustainability in University Campuses: A Case Study of Beirut Arab University 27
Published SDG practice and international dissemination 30
BAU authors document regional SDG best practices 30
International peer exchange through the IAU 30
BAU participated in the Sustainable and Inclusive Internationalization Reimagining Approaches in Higher Education in an Era of Global Uncertainties Virtual Conference 31
"BAU's Journey towards SDG 9: Fostering Industry, Innovation and Infrastructure" 32
Institutional contribution and evidence assessment 34

Beirut Arab University International Collaboration and SDG Best Practice

SDG 17 Partnerships for the Goals

THE Impact Rankings indicator 17.2.4 | Beirut Arab University, Lebanon

Question: Does the university as a body, through international collaboration and research, review comparative approaches and develop international best practice on tackling the SDGs?

Response to the indicator

Yes. Beirut Arab University (BAU) contributes through multinational research projects, joint curriculum development, international teaching resources and published research. The strongest evidence connects a named BAU role with an explicit comparison and a usable output. These outputs include urban recovery proposals, training methods, reviewed curricula and an internationally available course featuring BAU's Urban Lab.

Principal evidence

Collaboration	Comparison and shared output
Urban Acupuncture 2023 to 2025	Four-country research partnership developing a framework to compare urban regeneration approaches. Kassel project record
Healthy Urban Systems 2021 onward	International course development with a BAU module coordinator; the delivered course includes a BAU case. University of Lausanne research record
MORALE 2021 to 2023 activities	European and Middle Eastern partners adapt NGO education through shared methods and curriculum review. University of Alicante project record
DeCAIR 2021 to 2023 activities	BAU contributes to an international degree-programme survey supporting curriculum development. Joint comparative survey
Energy research 2023	Lebanon–Kuwait coauthored study compares campus power-system options and documents implementation. Original journal article
SDG best practice chapter 2023 and 2024 editions	BAU authors publish a regional synthesis of approaches to SDG implementation in higher education. Springer publisher record

This report prioritises activity and publication evidence from 2021 to 2026, checked on 17 October 2026. Older standing agreements and policies may support institutional context without a date cutoff. SDG mappings for technical projects are based on their documented subjects. Published recommendations and project plans are identified separately from demonstrated implementation.

Comparative research for urban recovery

Multinational Urban Acupuncture project from 2023 to 2025

The University of Kassel confirms BAU's institutional participation in the DAAD Ta'ziz research project Urban Acupuncture A Strategy of Catalytic Interventions, running from March 2023 to December 2025. Partners include Kassel in Germany, Alexandria University in Egypt and the University of Babylon in Iraq. The research examines how small interventions and residents' participation can support urban regeneration in different national settings. Its stated outputs include a strategic framework comparing approaches in partner countries and an online learning platform. These are documented project objectives; the completed outputs below provide the stronger evidence of delivery.

Evidence: Kassel original research project description (duration, partners, comparative framework and intended outputs)

Urban Acupuncture: A Strategy of Catalytic Interventions



Within the framework of the DAAD Ta'ziz Partnership – Scientific Cooperations, the Department of Urban Renewal and Planning Theory – University of Kassel – Germany in cooperation with the Department of Fine Arts – Department of Architecture – Egypt, Department of Architecture – Babylon University – Iraq and Department of Architecture - Design and Built Environment – Beirut Arab University – Lebanon have initiated the project "UA – Urban Acupuncture: A Strategy of Catalytic Interventions". The project runs from March 2023 till the end of 2025 and is concerned with deepening cooperation with partner universities through the organization and implementation of various forms of academic and student exchanges.

Urban Acupuncture (UA) was first introduced in 1983 as a data collection, analytical, and design method. With the help of its eight strategies, it offers prompt spatial solutions by pinpointing interventions for quotidian pressure points in small urban spaces that in turn create a positive ripple effect. This project involves several activities that will incorporate all the partner universities which aim to bridge the gap between academic education and practice. This will take place through evaluating to what extent UA theory enhances locals' contributions to solving the problems of urban life in their cities through a comprehensive urban regeneration discussion. Thus, UA aims to have an impact on every potential space in the city. It can be applied through art sometimes; it is called the 'true art of our urban context'. That is why it is different from the large urban renewal strategies that have been previously used. It is a localized, small-scale intervention method. Since this approach should be influenced by the local inhabitants which have a limited budget as well as limited resources, it must be raised from the smallest scale urban city development.

The expected outputs of this project revolve around implementing UA as a strategy of selected catalytic interventions in Lebanon, Iraq, Germany, and Egypt, suggesting a comprehensive proposal for a strategic framework for the UA different approaches in the partner countries, and establishing an online platform to set up Massive Open Online Courses (MOOCs) in the UA field. This will in turn strengthen the boundaries

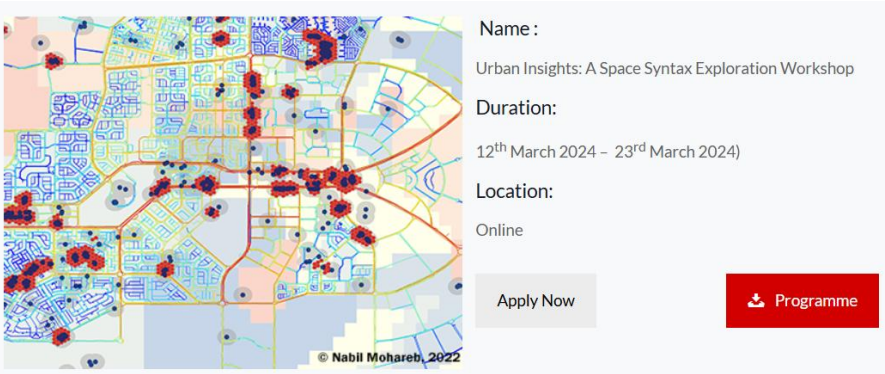
between the three fields of action, namely teaching, research, and practice, which will consolidate and complement each other towards progressive development. Eventually, the physical implementation of the outputs will evaluate the challenges, efficiency, and opportunities of Urban Acupuncture (UA) theory in each partner country as a claimed quick and effective tool that can help in the renewal and recovery of the partners' cities besides achieving maximum results with minimal effort in the most critical places.

Published comparison informing recovery in Beirut in 2024

Aya Dikmak, Baher Farahat and Hiba Mohsen published Urban Acupuncture as Recovery Approach to Improving the Liveability of Neighbourhoods Affected by Beirut Port Explosion in 2024. The study compares Jan's Garden in Amsterdam with Kodak Passage in Cairo, using tables to examine their principles and implementation. It combines these lessons with site analysis, residents' discussions and a survey in Rmeil, Beirut, proposing six interventions and ten actions. Author biographies connect Dikmak and Mohsen with the DAAD partnership. The paper therefore links international collaboration with comparative research and a locally adapted recovery approach. The interventions are proposals, and the authors identify a need to investigate longer-term outcomes. This supports SDG 11 through inclusive neighbourhood recovery and community participation.

Evidence: Original open access urban recovery paper (PDF pages 6 and 7, comparison; page 16, research affiliations)

Urban Insights: A Space Syntax Exploration Workshop



Dive into the world of urban analysis and design innovation with our Space Syntax Workshop, tailored specifically for beginners. Over six engaging days, this workshop demystifies the principles of Space Syntax—a powerful tool for analyzing spatial configurations and their impact on social interactions. Designed for architects, urban planners, designers, and researchers with a working knowledge of GIS software, this workshop combines lectures, hands-on applications, and vibrant discussions centered around practical group projects.

Workshop Overview

- Day 1: Kickstart your journey with an in-depth look at Space Syntax's foundational principles and methodologies. You'll learn about its significance as a human-focused design approach, delve into key terminologies, and explore the mathematical foundations that underpin Space Syntax theory. The day concludes with an introduction to various Space Syntax tools, setting the stage for their application in professional practice.
- Day 2: Roll up your sleeves for a hands-on day where you'll be introduced to the Space Syntax Toolkit and process spatial models in QGIS. This session is about applying what you've learned to real-world contexts, from preparing Space Syntax maps to web scraping for additional data.
- Day 3: Apply your skills to a specific case study, visualizing data, combining and analyzing different datasets, and adhering to Space Syntax standards. This session emphasizes practical application, from data visualization to mapping urban data inputs like frontages and land use.
- Day 4: Test your design alternatives based on the previous days' analyses. You'll learn how to select and test alternatives, culminating in selecting the most suitable outcome based on established criteria.
- Day 5 & Day 6: Compile your analyses into a coherent report and prepare for the group jury. These final sessions focus on critical discussion, questioning results, and sharing insights, concluding with a jury presentation where each group showcases their project, followed by a discussion.



What You Will Gain

- Foundational Knowledge: Understand the core principles of Space Syntax and its application in urban planning and design.
- Practical Skills: Gain hands-on experience with GIS and Space Syntax tools, enhancing your analytical capabilities.
- Project-Based Learning: Engage in a comprehensive group project, from data collection to presenting your findings, fostering teamwork and critical thinking.

Shared analytical methods and public learning resources

The partnership's March 2024 Space Syntax workshop programme describes a reproducible workflow: prepare spatial models in QGIS, analyse a case, test design alternatives against criteria and present findings for discussion. The project published workshop recordings on 3 April 2025, making the analytical teaching resource available beyond the original sessions. This provides a concrete route for transferring methods between partner institutions and other learners.

Evidence: Space Syntax workshop analytical programme (12 to 23 March 2024)

Evidence: Published Space Syntax workshop recordings (3 April 2025)

Date	Time Slot	Topic	Type
Day 1 Introduction to Space Syntax principles & methodologies.			
Tue. 12.03.2024	09:00 - 13:00 CET	Understanding the significance of Space Syntax as a human-focused approach to design.	Lecture
		Understanding key Space Syntax terminology.	
		Introduction to the mathematics behind the Space Syntax approach.	
		Implementation of Space Syntax principles in professional practice.	
		Introduction to different space syntax tools	Lecture and Application
Preparation for Day 2 - Select a case study, gather relevant information, prepare for what needs to be analyzed, sketch alternatives, and download the plugins.			
Day 2 Preparations and Application			
wed. 13.03.2024	09:00 - 13:00 CET	Introduction to the Space Syntax Toolkit and the processing of spatial models in QGIS	Lecture and Application
		Preparing Space Syntax Maps for analysis (drawing axial lines)	
		Web scraping to obtain further data for the case study action area	
		Running Space Syntax Analysis in QGIS	Application
Preparation for Day 3 - Prepare PowerPoint slides to include preliminary outcomes, finalize the axial line map, and include any relevant information on the map.			
Sat. 16.03.2024	09:00 - 13:00 CET	Visualise data in different styles	Application
		Combine and analyse different datasets	Lecture and Application
		Visualising the analysis results per the Space Syntax standards (current situation)	
		Using the Urban Data Input tool to map frontages, entrances, and land use	
Preparation for Day 4 - Write a statement of intervention that you will use to define different design alternatives (future interventions)			
Day 4 - Testing the Alternatives			
Tue. 19.03.2024	09:00 - 13:00 CET	Selecting alternatives (criteria of selection)	Application
		Testing alternatives (comparisons)	
		Selecting the suitable result (criteria of selection)	
Preparation for Day 5 - Structure the spatial configuration report (develop an outline)			
Day 5 - Compiling the Analysis			
Wed. 20.03.2024	09:00- 11:00 CET	Writing the report and results	Discussion
		Questioning the results	
		General comments and discussion	
		Preparing for the group jury	
Sat. 23.03.2024	11:00 - 13:00 CET	Jury	Discussion
		Exit Questionnaire	





A Space Syntax Exploration Workshop - Recordings

Dive into the world of urban analysis and design innovation with our Space Syntax Workshop, tailored specifically for beginners. Over six engaging days, this workshop demystifies the principles of Space Syntax—a powerful tool for analyzing spatial configurations and their impact on social interactions. Designed for architects, urban planners, designers, and researchers with a working knowledge of GIS software, this workshop combines lectures, hands-on applications, and vibrant discussions centered around practical group projects.

BAU also reports that its president and architecture representatives participated in the DAAD closing conference in Tunis on 6 to 8 October 2025, discussing the joint research with contributors from Germany and the region. The report additionally identifies the University of Duhok among the contributing institutions.

Evidence: BAU DAAD conference and research partnership record (6 to 8 October 2025)

Beirut Arab University participated in the Closing Conference of the Taziz Partnerships Program







Beirut Arab University participated in the Closing Conference of the “Taziz Partnerships” Program, titled “Achievements, Lessons Learned, and Future Perspectives” organized by the German Academic Exchange Service (DAAD), that was held in Tunis, Tunisia, from 6 to 8 October 2025, bringing together academics and university professors from Germany, Tunisia, Morocco, Egypt, Jordan, Lebanon, and Iraq.

Prof. Wael Nabil Abdelsalam, BAU President, Prof. Hassan Abdel-Salam, Dean of the Faculty of Architecture – Design and Built Environment, and Dr. Hiba Mohsen participated Assistant Dean took part in the event which highlighted the strong international collaboration, innovative ideas, community development and knowledge exchange, all promoted through the program.

This participation took place following the completion of the joint research project “UA – Urban Acupuncture: A Strategy of Catalytic Interventions”, conducted under the DAAD Taziz Partnerships, bringing together contributions from Kassel University, Beirut Arab University, Alexandria University, Babylon University, and Duhok University.

The conference was honored by the presence of Mr. Kai Sicks, Secretary General of DAAD, H.E. Elisabeth Wolbers, German Ambassador to Tunisia, H.E. Mondher Belaid, Tunisian Minister of Higher Education and Scientific Research, and Ms. Anke Reiffenstuel, Representative of the German Federal Foreign Office.

International development of Healthy Urban Systems

BAU coordinates an international course module

The University of Lausanne's Institute of Geography and Sustainability lists BAU's Ibtihal El-Bastawissi as a researcher in its Healthy Urban Systems MOOC project and identifies her as Module 1 coordinator in the 2021 development structure. The project brings together researchers and practitioners associated with the International Science Council's urban health programme, the International Society for Urban Health and WHO, among others. Lausanne coordinates production. Its research record describes a systems approach connecting urban conditions, health, environmental factors and participation across scales. Intended learners include urban planners, health professionals, government officials and postgraduate learners.

Evidence: Lausanne original research project and coordinator record (researchers, 2021 module structure and intended audiences)

Joint design workshop in Lausanne in November 2021

BAU's original report confirms that the Faculty of Architecture participated in course preparation and that its dean attended the Lausanne workshop from 16 to 20 November 2021 as a module coordinator. Participants coordinated contributions, discussed video scripts and undertook trial filming. This establishes an active university contribution to developing the teaching material with international partners. The activity began before the 2022 date used in some later summaries.

Evidence: BAU original course development workshop record (reported 29 November 2021)

MOOC Healthy Urban Systems At BAU







"The Faculty of Architecture - Design and Built Environment at BAU is participating in preparing a Massive Open Online Course (MOOC) entitled "Healthy Urban Systems" with the International Science Council (ISC), International Society for Urban Health (ISUH), World Health Organization (WHO) and about 25 other people and organizations. Supported by University of Lausanne (UNIL) on "Coursera", this MOOC project seeks to develop a system approach for urban health for a long live training (or Master & PhDs) for medical and urbanism professions.

Being the coordinator of one of the MOOC Modules, Prof. Ibtihal Youssef El- Bastawissi, the Dean of the Faculty, was invited to participate in a workshop in Lausanne, Switzerland hosted by University of Lausanne (UNIL), and organized by Prof. Celine Rozenblat, Professor of Urban Geography at UNIL and President of the urban commission of the International geographical Union (IGU), from 16th to 20th of November 2021. The workshop focused on developing the progress of the MOOC project through coordinating ideas and interventions, elaborating and discussing scripts of the videos, as well as shooting trials.

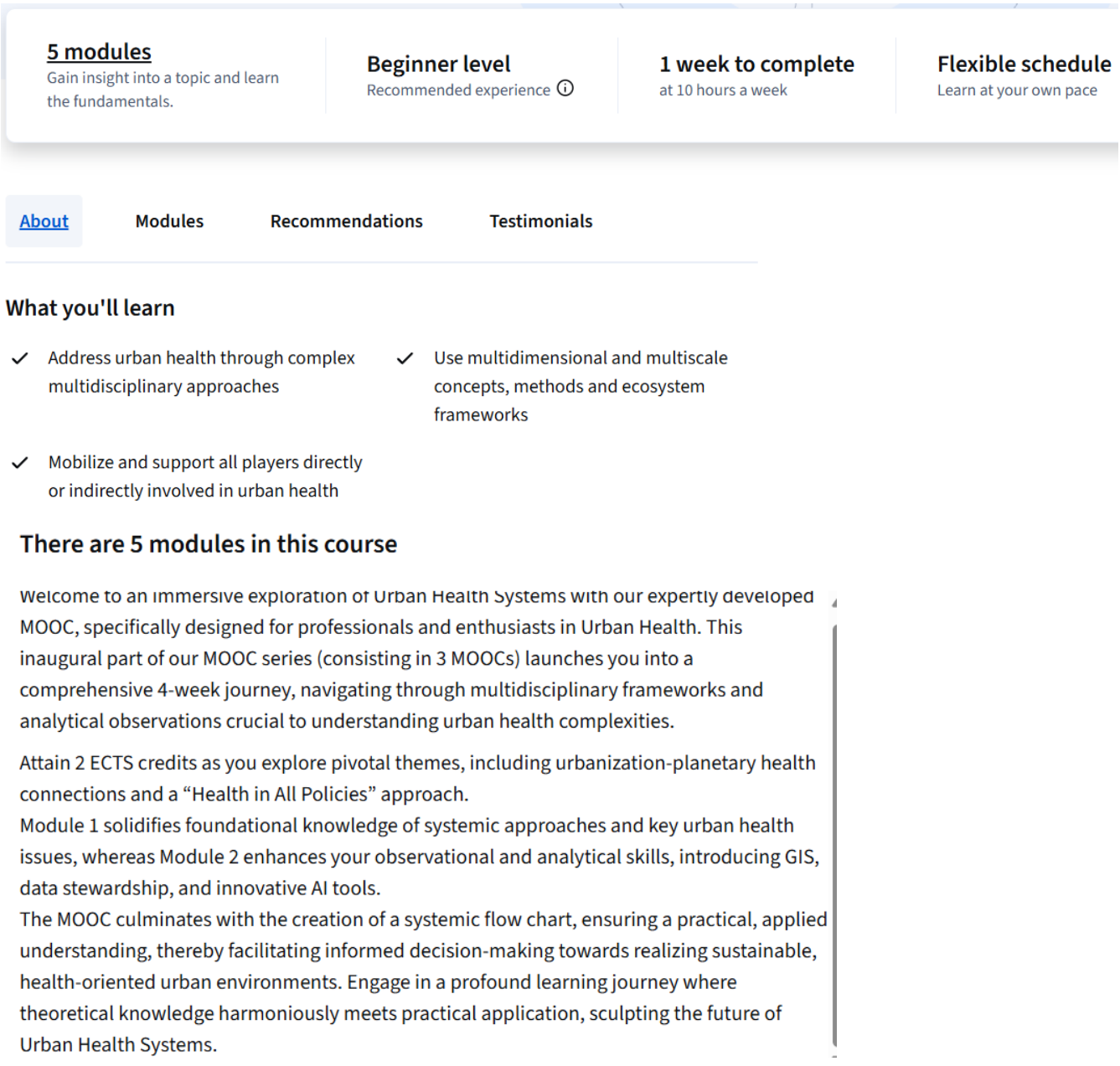
Additional information about the MOOC project and the workshop are posted on the following webpage: https://wp.unil.ch/citadyne-news/mooc-healthy-urban-systems-hus/

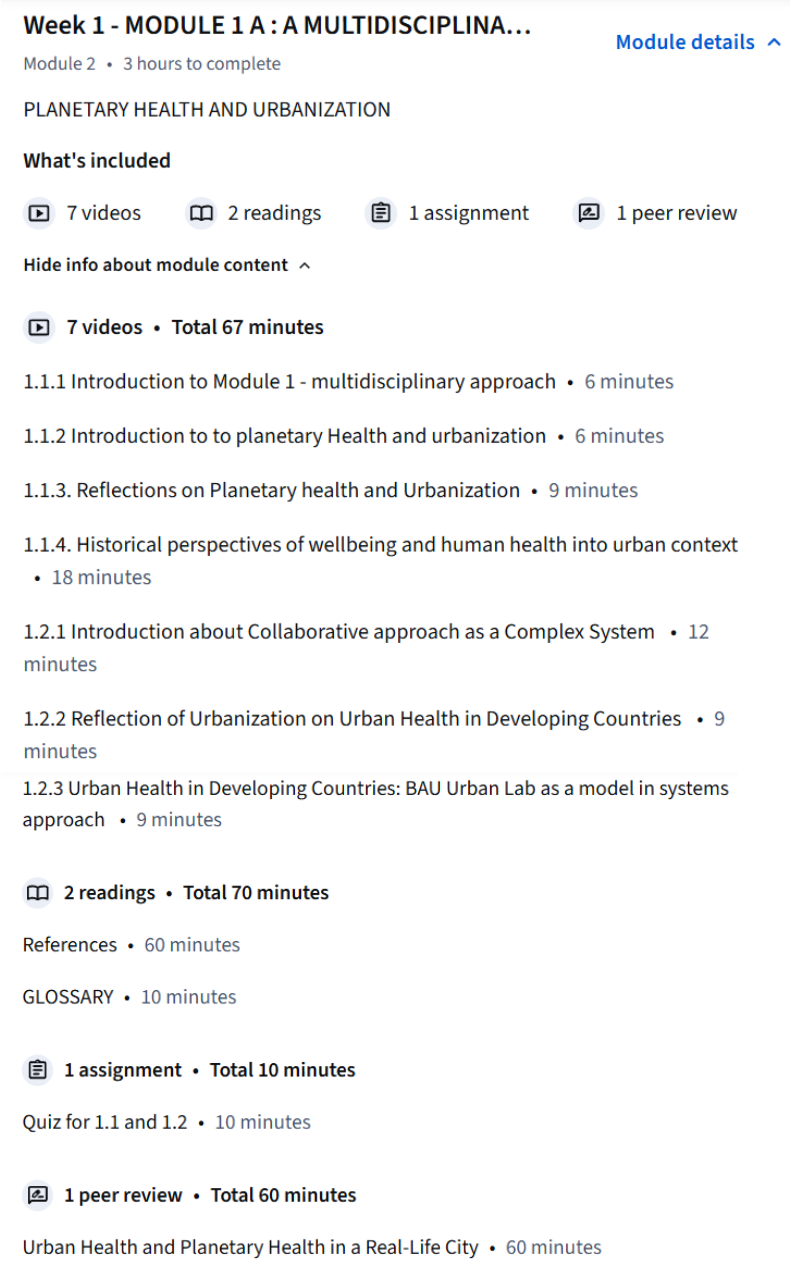
Delivered course includes the BAU Urban Lab case

The currently published University of Lausanne course on Coursera includes a lesson using BAU's Urban Lab to illustrate a systems approach to urban health in developing countries. The syllabus places this case alongside multidisciplinary frameworks, urban health observations, risk governance and housing and climate change. Learners apply ideas to a real city through assessed exercises, including a systems flow chart. This is direct evidence that BAU's experience has become an internationally accessible learning resource. The original sources verify development in 2021 and present course availability; they do not establish a precise launch date, learner total or universal free certification.

Evidence: Live course syllabus with the BAU Urban Lab lesson (Week 1 Module 1 A, lesson 1.2.3; course assignments)

HEALTHY URBAN SYSTEMS - PART 1





The wider three-course series extends the approach to modelling tools, design and policy. Its value for this indicator is the conversion of international expertise and a BAU case into structured methods that other professionals can study and apply. The subjects connect SDG 3 with sustainable urban planning under SDG 11, supported by SDG 4 through continuing education.

Evidence: University of Lausanne three course series (concepts and observations, models and tools, design and policies)

HEALTHY URBAN SYSTEMS Specialization

For HEALTH in all urban sustainable POLICIES.
The MOOC offers transdisciplinary knowledge (medicine, biology, geography, remote sensing, architecture, planning, urban design, policies with participatory engagement) about what urban systems are, how they can be modeled, and how citizens and policymakers can apply this knowledge to better cope with urban complexity to improve health and well-being.

3 course series
Get in-depth knowledge of a subject

Beginner level
Recommended experience

12 weeks to complete
at 3 hours a week

Flexible schedule
Learn at your own pace

About | Outcomes | Courses | Testimonials

What you'll learn

- ✓ Understand and assess social, ecological, and psychological factors affecting urban health.
- ✓ Engage stakeholders to design resilient, sustainable cities.
- ✓ Strengthen skills to model urban health as a complex system.

Skills you'll gain

Public Health | Health Policy | Systems Thinking | Health Assessment | Health Systems | Mathematical Modeling | Systems Analysis | Policy Development | Governance

Advance your subject-matter expertise

- Learn in-demand skills from university and industry experts
- Master a subject or tool with hands-on projects
- Develop a deep understanding of key concepts
- Earn a career certificate from University of Lausanne

Specialization - 3 course series

The MOOC Healthy Urban Systems stresses numerous urban health issues and solutions in a comprehensive introduction on Multidisciplinary Frameworks, Observations & Measures, Concepts & Theories, Modeling Tools, Scenarios Design, and Policies and governance.

The up-to-date knowledge is based on various examples, on their implication for the contemporaneous questions, and on the most recent tools and technics of systemic approaches, machine learning, open and FAIR data, participatory, collaborative and action-research. It encourages place-based policies WITH the people and FOR the people in a multi-scale and long-term perspective beyond SDGs' 2030 and towards the new "Pact for the Future" 2050.

30 international researchers, practitioners and professionals in North and South countries participated to this initiative, that is coordinated and produced by the University of Lausanne – UNIL together with:

- the International Science Council program on Urban Health and Wellbeing (ISC – UHWB)

- the Institute of Urban Environment (IUE), Chinese Academy of Science in Xiamen, China.

- the International Society for Urban Health (ISUH)

- the HUE (Healthy Urban Environments) Collaboratory

- the World Health Organization (WHO), Department of Environment, Climate Change and

MORALE comparisons for NGO education

BAU coordinates a European and Middle Eastern partnership

The University of Alicante identifies BAU as coordinator of MORALE, an Erasmus+ capacity-building project addressing NGO management education and refugee inclusion in Lebanon and Syria. European partners include Alicante, Oldenburg, Bologna and Four Elements in Greece. Its work packages connect needs analysis with staff training, curriculum enhancement and lifelong learning courses. The evidence below documents activity within 2021 to 2023, including the later final conference.

Evidence: Alicante institutional project and work package record (coordinator, international partners and educational development process)

Capacity building for curricula modernization of Syrian and Lebanese HEIs and lifelong learning provision: towards sustainable NGOs management and operation with special focus on refugees

- **Duration:** 01/08/2019 to 31/07/2022
- **Topics:** Curriculum Development; Conflict management
- **Coordinator:** Beirut Arab University
- **Partners:**
  1. Beirut Arab University
  2. Universidad de Alicante
  3. University of Oldenburg
  4. Lebanese University
  5. Alma Mater Studorium - Universita di Bologna
  6. Modern University of Business and Science (MUBS)

MORALE

MORALE (joint project) will be implemented in Region 3 (Syria & Lebanon) and it will address the following E+ Priorities:

*Regional: Category A - CURRICULUM DEVELOPMENT - Social and Behavioural Science + business Administration and - IMPROVING MANAGEMENT AND OPERATION OF HIGHER EDUCATION INSTITUTIONS – Equity, access and democratisation of Higher Education.

General project objective: to build the capacities of Syrian & Lebanese HEIs to train a new generation of high skilled professionals in NGOs management & operation to enhance inclusion of refugees and the rebuilding of the South Mediterranean society.

Specific objectives:

- To provide the NGO labour market sector with high skilled professionals trained by PC HEIs to effectively manage & operate in NGO environments by means of modernising Social & Behavioural Services curricula and by offering LLL courses targeting NGOs professionals at PC HEIs
- Awareness-raising on the key role of HE plays in the provision of high level competences for future NGOs professionals & to strengthen inter-institutional cooperation among HEIs, NGOs and governments through networking actions

3 horizontal WPs have been defined to ensure the proper project implementation (WP1), the achievement of high quality results (WP7) & high project visibility, interaction & contribution by all target groups (WP6).

In addition:

WP2 NEEDS ANALYSIS will carry out a comprehensive analysis as basis for the project development in terms of PC HEIs ToT/replication, curricula modernisation & LLL creation.

WP3 BUILDING CAPACITIES will design, prepare and implement 4 ToT modules + their replications at PC HEIs. Replication is crucial to increase the impact of the action within PC HEIs (more staff trained) but also at national and at regional level.

WP4 CURRICULA ENHANCEMENT & DELIVERY will be focused on the improvement of PC HEIs existing bachelors in the Social & Behav. Science field, by creating new subjects (+ final project) related to sustainable NGOs management & operation (innovative features of delivery methodology + focus topics) within current study programmes. Students will achieve the competences to become high-qualified specialists to effective manage & operate NGOs.

WP5 LLL COURSES DESIGN & IMPLEMENTATION will create 3 LLL courses (of 1 week) * PC HEI that will be delivered by blended methodology (face-to-face & virtual) targeting NGOs managers & staff. They will be key for the improvement of their managerial & operational performance that will impact on the quality and sustainability of NGOs activities.

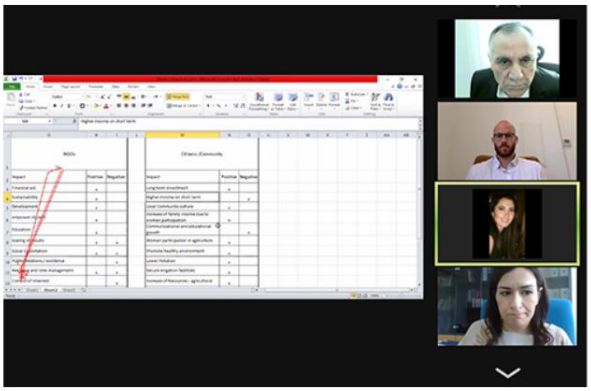
MORALE responds to the undeniable need of giving the leading role to PC HEIs, becoming the driving force to generate qualified NGOs professionals and for the update of current NGOs professionals. This will be possible only with a strict cooperation between HEIs/NGOs + the endorsement of competent authorities.

Social impact assessment methods tested in May 2021

Alicante delivered Social Impact Assessment training on 18 to 20 May 2021 for representatives of seven Lebanese and Syrian higher education institutions and more than 50 NGO professionals. Participants examined assessment methods, applied them to NGO projects from their own contexts and presented simulations for feedback. The partner record explains how lessons would inform curriculum enhancement and lifelong learning. This shows a shared international method being reviewed and adapted through practical cases under a BAU-coordinated project.

Evidence: Alicante original social impact assessment training record (18 to 20 May 2021)

2nd Online MORALE Training on Social Impact Assessment



The University of Alicante delivered an online training on Social Impact Assessment within the framework of the MORALE project from 18th to 20th May 2021. Representatives from 7 Lebanese and Syrian Higher Education Institutions together with more 50 NGO professionals from the region were taught by Dr. Guadalupe Ortiz, Senior Lecturer of the Sociology Department from the University of Alicante. The participants were provided with an in-depth understanding of the core concepts and methodological steps of the Social Impact Assessment discipline and reflected upon its implementation on NGO actions measured according to social impacts within their own contexts. The MORALE project is part of the Capacity Building Higher Education initiative, co-funded by the Erasmus+ Programme of the European Union in Lebanon and Syria. It aims at improving NGO capacities by collaborating with Higher Education providers in the region and is coordinated by the Beirut Arab University.

The formation provided, first, the theoretical knowledge by enabling MORALE partners to co-work with Dr. Guadalupe Ortiz on the basic concepts, history, typologies of Social Impact Assessment as a methodological tool to be applied within a political space of conflict. Afterwards, partners were guided through the different elements and methodological stages to fully develop their own *"(..) process of analysing (predicting, evaluating and reflecting) and managing the intended and unintended consequences on the human environment of planned interventions (such as NGO projects)"*.

In parallel, MORALE consortium had the opportunity to apply this theoretical knowledge into real and concrete examples extracted from their own context. As such, during the practical sessions, participants were divided in groups and carried out a simulation of a Social Impact Assessment on a specific NGO project, which was later presented to the rest of participants in order to obtain feedback and recommendations for improvement. Conclusions and lessons learnt in this process will help MORALE Consortium to develop other project actions related to curricula enhancement and well as the creation of life-long learning courses.

The MORALE project aims to strengthen to the capacities of Syrian & Lebanese Higher Education Institutions to train a new generation of high skilled professionals trained by PC HEIs to effectively manage and operate in NGO environment, enhancing inclusion of refugees and the rebuilding of the South Mediterranean society. MORALE will achieve this goal by delivering capacity building actions and trainings, modernizing curricula offers at partner countries as well as devising lifelong learning courses for professionals on the field.

European study visits inform course revisions in 2023

At Alicante on 17 to 19 January 2023, partners reviewed social development programmes, fundraising, volunteer management and Spanish refugee-support services. They agreed to incorporate the Alicante and Oldenburg visits into the needs-analysis reports, finalise capacity-building reports and revise lifelong learning courses. In May 2023, the Oldenburg visit examined refugee integration, sustainability and teaching methods. Its concluding session evaluated enhanced courses, their implementation and the lifelong learning provision. The sequence demonstrates comparison, feedback and revision within the partnership.

Evidence: BAU original Alicante consortium and study visit record (17 to 19 January 2023, decisions on reports and course revisions)

Evidence: BAU original Oldenburg study visit record (May 2023, partner presentations and course evaluation)

MORALE Consortium Meeting and Study Visit University of Alicante Alicante Spain





598318-EPP-1-2018-1-LB-EPPKA2-CBHE-JP “Capacity building for curricula modernization of Syrian and Lebanese HEIs and lifelong learning provision: towards sustainable NGOs management and operation with special focus on refugees/Morale.” Hosted by University of Alicante in Spain

The MORALE Consortium Meeting and Study Visit at the University of Alicante, took place from 17th to 19th January 2023. The meeting was held from 9:00 am to 3:00 pm and attended by representatives from partner institutions, including BAU, MUBS, LU, DU, AIU, IUST, BAUK, ARA, UOL and UA.

Naima Benaicha Ziani, professor at University of Alicante, and Dr. Sobhi Abou Chahine, grant coordinator from Beirut Arab University, welcomed all participants and introduced each member and their related institutions.

During the meeting, Dr. Sobhi presented an overview of the project, including the objectives, progress, and next plans. He discussed the achievements and challenges faced by the project and the consortium fixed the dates to visit Oldenburg in May 2023 and to hold Beirut Final Conference in July 2023.

The partners agreed to integrate the outcomes of the Alicante and Oldenburg visits into the WP2 reports, finalize the WP3 reports, and revise the LLL courses.

Dr. Daniel La Parra Casado, Professor Sociology II at University of Alicante, presented the Master programs at the Interuniversity Institute for Social Development and Peace.

Carolina Madeleine, Head of Institutional Project Office /UA, talked about fundraising for humanitarian or development projects, and Ester Maria Kalogeroudi from Four Elements discussed about fundraising and human resources/volunteer management

Lawyer Marina Galli presented a report about the refugees in Spain and Europe.

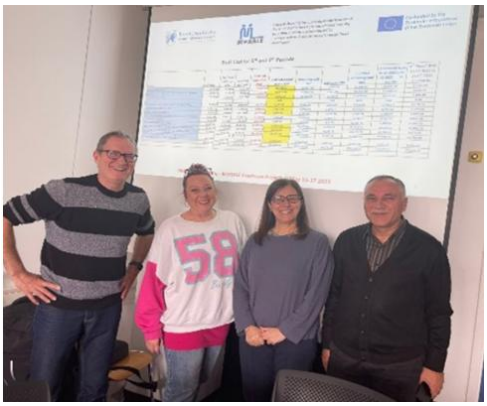
The Spanish Red Cross presented their refugee & immigration programs at the local and regional level. Three representatives spoke about their respective departments for legal assistance, employment insertion, and social inclusion. They discussed the figures and statistics related to international protection applicants and beneficiaries, the Spanish resettlement program, and workshops for refugees.

The consortium discussed the feedback received on curricular enhancement.

A meeting was held with the external quality expert, Mr David Alpera Green, He congratulates the consortium for the achievements of the project and advised the consortium to focus on sustainability measures.

A Visit was organized to Spanish Red Cross, the employees showed a film about their activities and the services offered by the Red Cross to take care of the refugees and immigrants. The visit is ended by going around different facilities in the Red Cross building.

MORALE Consortium Meeting and Study Visit University of Oldenburg Germany



MORALE Consortium Meeting and Study Visit University of Oldenburg, Germany, 15 -17 May 2023

Hosted by University of Oldenburg, Germany

The MORALE Consortium Meeting and Study Visit at the University of Oldenburg, took place from 15th to 17th May 2023. The meeting was held from 9:30 am to 17:00 pm and attended by representatives from partner institutions; including BAU, MUBS, LU, DU, AIU, IUST, BAUK, University of Alicante, University of Oldenburg, ARA, University of Bologna (online), and Four Elements

During the meeting, participants from all partner institutions engaged in fruitful discussions on various topics. The event commenced with a presentation on the progress of the MORALE project over the past few years, with researchers made on areas like sustainability, volunteering, cooperation, teaching, transfer activities, governance, online teaching, and international programs.

A prominent focus of the presentations was on addressing the increased number of refugees in Germany, particularly after the Ukraine Crisis. The attendees shared their efforts in supporting refugees and migrants, helping them adapt to everyday life, integrate into the culture and society, and explore opportunities for higher education through degree programs.

Each partner institution made a presentation, outlining their main goals and contributions to the project:

- Prof. Dr. Sobhi Abou Chahine provided an overview of the MORALE project and its primary objectives.
- Prof. Karsten Speck emphasized sustainability, volunteering, cooperation, and related aspects.
- Ms. Katja discussed the program's funding through the German Federal Ministry of Education and Research DAAD.
- Tim Zentner highlighted online teaching and International Programs, including internships, program duration, credit requirements, and admission criteria.
- The COAST team focused on research, teaching, transfer activities, and governance.
- Feilka Hawijah shared insights into the German-Syrian Society's efforts in supporting refugees and migrants.
- Hilger Konig and Omar Kaissi discussed their focus on enhancing integration into society.
- Dr. Julia Michaelis presented new teaching concepts, emphasizing cooperative, multidisciplinary, and competence-oriented approaches.
- Prof. Dr. Sebastian Lehnhoff discussed OFFIS's main focus on energy systems, robotics, sustainability, and the utilization of AI, as well as their collaborations with NGOs.

Subsequently, the participants visited the Youth Migration Services. The visit centered around the organization's long-term, individual support for young migrants in their educational and professional journeys. Discussions covered social-cultural projects, mental and emotional health education, and the importance of program sustainability.

Additionally, Franz Josef Franke presented Diakonia's migration advice services in Oldenburg. The services aimed to support activities and collaboration with the evangelical church community while addressing housing assistance and equal opportunities.

The final session revolved around discussing the project's results and achievements, including the project team, enhanced courses, their implementation, and the development and execution of lifelong learning (LLL) courses. The participants also evaluated outcomes, impact, and their overall experience with the project.

Results and recommendations disseminated in July 2023

The project's final conference record is dated 12 July 2023. BAU's account describes dissemination of NGO labour-market qualifications, developed courses and proposed policy recommendations for Lebanon and Syria, with the two countries' teams sharing outcomes. On 13 July, MORALE's coordinator and European representatives also shared achievements at MEDID 2023. These outputs support SDG 4 through relevant learning and SDGs 10 and 16 through refugee inclusion and stronger civil society capacity. Proposed recommendations are evidence of development and dissemination, without implying government adoption.

Evidence: BAU MORALE project event archive (12 July 2023 final conference record)

Evidence: BAU account of courses and policy recommendations (final conference content; project archive provides July chronology)

Evidence: BAU MORALE dissemination day record (13 July 2023)

Erasmus+ MORALE At Beirut Arab University





Beirut Arab university hosted the Erasmus + MORALE conference entitled "Capacity building for curricula modernization of Syrian and Lebanese HEIs and lifelong learning provision". It was held at BAU- Beirut Campus in the presence Dr. Ammar Houry, President of the Board of Trustees, and members of the academic and administrative staff, representatives of partner institutions, staff and volunteers of non-governmental organizations, and representatives from universities.

The conference aimed to gather academics, researchers, university students and NGO staff to disseminate the results of the MORALE project on:

- Qualifications required for the NGO labour market.

- Improved curricula and preparing and presenting relevant courses of lifelong education (LLL courses).

- Policies and recommendations on NGOs in Syria and Lebanon.

- Impact, achievements and sustainability of the MORALE project.

Opening speeches were given by: The president of Beirut Arab University Prof Amr ElAdawi, represented by Prof. Sobhi Abou Chahine, Dean of Student Affairs (BAU), Coordinator of MORALE project, Prof. Aref Al Soufi, Coordinator for the National Erasmus+ Office in Lebanon, Mrs. Orla Colclough Project Officer at the Delegation of the European Union -Lebanon and Dr. Mazen Al Khatib, Acting Director General of Higher Education in Lebanon.

The Dean of the Faculty of Business Administration at the Arab International University in Syria, Dr. Moaz Al Sherfawi, presented the proposal for recommendations to strengthen the higher education system (HE) in Lebanon and Syria with regard to NGO-related education.

The Project teams in Lebanon and Syria shared their experiences, discussing the developed courses, outcomes achieved and the overall impact of the MORALE Project in both countries. The Dean of the Faculty of Economics and Business Administration of the at Lebanese University, Dr. Salim Makdesi highlighted Lebanon's progress, while Dr. Suleiman Mousselli from Damascus University provided insight into Syria's experience in the project.

The concluding conference developed a platform to assess and present the impact, achievements and sustainability of the MORALE project, and to facilitate discussions and future directions of long-term viability.

MEDID Event



The final conference included a dissemination day (MEDID 2023). The MUBS Erasmus+ Dissemination and Info Day 2023 (MEDID 2023) held on July 13, 2023, served as a significant platform for spreading awareness and providing critical information about the Erasmus+ program and its various opportunities. By inviting participants from various countries and universities, it created an engaging environment for sharing experiences and insights about the program. The agenda was well-structured and covered a wide range of pertinent topics.

The Info Day also emphasized the real-life impacts of Erasmus+ through testimonials from the staff and students, providing a first-hand account of their experiences. Representatives from various universities across Europe and the Middle East also presented their Erasmus+ projects, illustrating the diverse range of topics and disciplines the program supports. The Morale project coordinator Prof Sobhi Abou Chahine and European representatives participated actively in this dissemination day, where an overview about the project and its main achievement, results and impact were shared with audience, which included all relevant stakeholders (HEIs, NGOS, Public authorities, EU delegation, NEO in Lebanon ….)

The MEDID 2023 served as a critical dissemination event. It raised awareness about the program and promoted a better understanding of its potential impacts on institutions, society, and individuals. The diversity of topics and speakers ensured a comprehensive view of the Erasmus+ program and its opportunities, thereby making it a beneficial event for all attendees, whether they were prospective students, academic staff, or institutional stakeholders.

In conclusion, the dissemination and networking activities carried out under WP6 have been crucial in highlighting the work of the MORALE project, engaging with a wider community, and influencing the higher education landscape in Lebanon and in Syria. They have also provided opportunities for learning and exchange, which were invaluable in our ongoing efforts to improve and adapt our project activities.

International benchmarking and applied energy research

DeCAIR jointly reviews international degree programmes

DeCAIR's consortium includes BAU and universities in Jordan, Italy, Spain and Germany, with a Greek development organisation. Its published bachelor-programme survey names BAU among the participating partners. The survey examines eleven programmes across the United States, Europe and Asia, comparing curriculum, syllabi, resources, staff expertise and industry links. This is an explicit comparative research output supporting shared educational development. The work package record connects these surveys with the creation or improvement of AI and robotics programmes in Jordan and Lebanon. Its relevance is to SDG 4 and the skills and innovation capacity addressed by SDG 9.

Evidence: DeCAIR original international programme survey (participating partners, objectives and summary recommendations)

Evidence: DeCAIR consortium and partner directory (BAU, European and Jordanian institutional partners)

Evidence: DeCAIR work package achievements (surveys and needs identification; curriculum development)

DeCAIR: Developing Curricula for Artificial Intelligence and Robotics

Co-funded by the Erasmus+ Programme of the European Union

DeCAIR

DeCAIR:
Developing Curricula for Artificial Intelligence and Robotics

Report on Surveying International B.Sc. Programs in AI and Robotics

Activity Information

Work Package	WP1 – Surveys and Needs Identification
Task	1.3 Survey and evaluation of AI and Robotics courses in similar bachelor programs
Activity Coordinator	TTU (Murad Alaqtash)
Participating Partners	TTU, UJ, BAU, UGR, UNIGE, UST, UNIPI
Objective(s)	• Surveying international B.Sc. programs that are specialized in AIR or have significant AIR component to identify their main attributes in terms of curriculum, syllabi, resources, faculty members' expertise and collaboration with industry.
Due Date	March 7th

Summary and Recommendations

Different international AIR related B.Sc. programs were explored. TTU and JU from Jordan and BAU from Lebanon surveyed 8 B.Sc. programs. In addition to three programs at our partner UST from Germany. Eventually, 11 bachelor programs from USA, Europe, and Asia were selected for this survey and listed below.

1. Computer science with artificial intelligence/ University of Nottingham, Malaysia
2. Intelligent Sys Engineering/ Indiana University Bloomington, USA
3. Artificial Intelligence/ Carnegie Mellon University, USA
4. Computer Science & Engineering: Artificial Intelligence, Robotics Track Option / University of Minnesota, USA
5. Computer Science, Intelligent Systems track / Columbia University, USA
6. Robotics and Intelligent Systems/ Jacobs University, Germany
7. Machine Intelligence and Robotics, 3 years / University for Information Science and Technology, Macedonia
8. Machine Intelligence and Robotics, 4 years/ University for Information Science and Technology, Macedonia
9. Mechatronics/ University of Stuttgart, Germany
10. Engineering Cybernetics / University of Stuttgart, Germany
11. Simulation Technology / University of Stuttgart, Germany

According to the comprehensive and intensive search, it is clearly noticed that the majority of undergraduate programs are either in computer science or electrical and computer engineering programs with minors or concentrations offer a set of courses in AIR.
In general, the following courses are common between all programs:

- Introduction to Artificial Intelligence
- Principles of Machine Learning
- Introduction to Natural Language processing
- Image processing and Computer Vision
- Introduction to Intelligent Robotic Systems/Autonomous Robotics

In addition, the following advanced topics were commonly listed as a compulsory or an elective for many programs:

- Artificial Intelligence II
- Machine Learning II
- Intelligent Systems/ Embedded Systems
- Introduction to Data Mining
- Neural Networks / Deep Learning

In general, these courses requires prerequisites on mathematics and programming that provide students with the fundamentals and the necessary background. These courses were covered in the relative engineering programs such as computer and electrical engineering.

In Jordan, particularly, the ministry of education and accreditation authority specify list of compulsory topics and courses related to different fields/ tracks, areas of specialty for engineering programs. In general, there are nearly 30 credit hours, i.e. 10 courses, out of the total 160 Cr.Hrs, can be designated for AIR.

Developing Curricula for Artificial Intelligence and Robotics Partners

The University of Jordan (UJ)

THE UNIVERSITY OF JORDAN IS THE FIRST UNIVERSITY ESTABLISHED IN JORDAN IN 1962 AND IS LOCATED IN THE CAPITAL CITY, AMMAN. THE UJ HAS GROWN TO BECOME JORDAN'S LARGEST AND LEADING INSTITUTION OF HIGHER

VISIT WEBSITE PROJECT LISTING

Jordan University of Science and Technology (JUST)

JORDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (JUST) IS A COMPREHENSIVE, STATE-SUPPORTED UNIVERSITY LOCATED ON THE OUTSKIRTS OF IRBID, IN NORTHERN JORDAN, 70KM NORTH AMMAN, THE CAPITAL CITY OF JORDAN.

VISIT WEBSITE PROJECT LISTING

Tafila Technical University (TTU)

TAFILA TECHNICAL UNIVERSITY (TTU) WAS ESTABLISHED IN JANUARY 2005. IT CONTRIBUTES TO THE DEVELOPMENT OF HIGHER EDUCATION IN JORDAN. SINCE THEN, IT HAS SOUGHT TO REALIZE ITS OBJECTIVES. ON TOP OF THES

VISIT WEBSITE PROJECT LISTING

Lebanese University (LU)

THE LU WAS FOUNDED IN 1951 AND IS THE ONLY PUBLIC INSTITUTION OF HIGHER EDUCATION IN LEBANON. IT IS RESPONSIBLE FOR PUBLIC UNIVERSITY EDUCATION. IT IS INTERESTED IN SOCIAL AND ECONOMIC PROBLEMS THAT

VISIT WEBSITE PROJECT LISTING

Beirut Arab University (BAU)

BEIRUT ARAB UNIVERSITY (BAU) FOUNDED IN 1960, BEIRUT ARAB UNIVERSITY (BAU) IS A PRIVATE LEBANESE INSTITUTION FOR HIGHER EDUCATION THAT HAS ESTABLISHED ITSELF AS A NATIONALLY AND INTERNATIONALLY RECOG

VISIT WEBSITE PROJECT LISTING

Università di Pisa (UNIPI)

THE UNIVERSITY OF PISA IS A PUBLIC INSTITUTION BOASTING TWENTY DEPARTMENTS, WITH HIGH LEVEL RESEARCH CENTRES IN THE SECTORS OF AGRICULTURE, ASTROPHYSICS, COMPUTER SCIENCE, ENGINEERING, ROBOTICS AND B

VISIT WEBSITE PROJECT LISTING

Universita' degli Studi di Genova – UNIGE

THE UNIVERSITY OF GENOVA HAS A STAFF OF ALMOST 3000 PEOPLE, MORE THAN 40000 STUDENTS AND 23 DEPARTMENTS AND 25 RESEARCH CENTRES. ESTABLISHED IN MAY 2012, THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINE

VISIT WEBSITE PROJECT LISTING

Universidad de Granada (UGR)

THE UNIVERSITY OF GRANADA (UGR), FOUNDED IN 1531, HAS OVER 60,000 UNDERGRADUATE AND POSTGRADUATE STUDENTS, WITH ANOTHER 20,000 STUDENTS TAKING ADDITIONAL COURSES. UGR EMPLOYS 3650 LECTURERS AND OVER

VISIT WEBSITE PROJECT LISTING

University of Stuttgart (UST)

VISIONARY SINCE 1829: THE UNIVERSITY OF STUTTGART STANDS FOR EXCEPTIONAL, WORLD-ACCLAIMED RESEARCH AND FIRST-CLASS TEACHING IN ONE OF EUROPE'S MOST VIBRANT INDUSTRIAL AREAS. THE UNIVERSITY IS A RELIA

VISIT WEBSITE PROJECT LISTING

CREATIVE THINKING DEVELOPMENT - CRE.THI.DEV

CRE.THI.DEV. IS A NON-PROFIT COMPANY AIMED AT COMMUNITY DEVELOPMENT THROUGH THE RESEARCH AND DEVELOPMENT OF ACTION PLANS, FOCUSED ON THE LOCAL AND SOCIAL ECONOMIES, MAINLY ON THE FIELDS OF LIFE-LONG

VISIT WEBSITE PROJECT LISTING

Developing Curricula for Artificial Intelligence and Robotics Work packages

WP:	WP 8
Name:	Establishing AI and Robotics Laboratories in Universities of Partner Countries
Leader:	Beirut Arab University
Description:	To support the current AIR courses in both the BSc and MSc programs at partner universities, the current labs must be updated with new equipment to support the course and program outcomes. The goal of this work package is to identify which labs must be updated or created, as well as which hardware and software packages must be procured and licensed. The hardware includes computer systems with sufficient computational power to run modern AI applications, specialized development kits to support both AI and Robotic systems, as well as robots and robotic arms.
Tasks:	Achievements • A comprehensive list of required hardware software was finalized. • A call for tender was announced for the required equipment by UJ for the three Jordanian partners (UJ, JUST, and TTU). Offers were received and studied, and orders for two thirds of the needed equipment were made, and many of these equipment have already been received. • Two calls for tenders were also announced for new equipment at LU and BAU (Lebanon) and many of these equipment have already been received.

Documented implementation and exchange of results in 2023

The University of Jordan's project record confirms a visit to BAU on 11 and 12 January 2023, including inspection of engineering laboratories newly equipped through DeCAIR. At the final conference on 12 December 2023, BAU's Dean of Academic Affairs and International Relations presented the university's experience alongside other partners, project results and recommendations. These records connect the comparative work with institutional implementation and shared learning. The new laboratory inaugurated at the final conference was at the University of Jordan; BAU's own laboratory evidence comes from the January visit.

Evidence: Project coordinator record of new laboratories at BAU (January 2023 visit, reported 20 February 2023)

Evidence: BAU final conference experience and recommendations (event 12 December; report 14 December 2023)

Developing Curricula for Artificial Intelligence and Robotics Activities



On Wed and Thu 11 and 12/1/2023, representatives of the DeCAIR project visited Beirut Arab University (BAU). The project coordinators Gheith Abandah, Ahmad Bataineh, Murad Al-aqtash, and Dimos Papakonstantinou, and Lutfi Alsharif visited Dibbiyeh and Beirut campuses of the university. The visit included meeting with BAU president (Prof. Amr El-Adawi), Dean of Student affairs (Prof. Soubhi Abou Shaheen), and Dean of Engineering (Prof. Adel Elkordi). The visit also included visiting the engineering

labs including the new labs equipped through the DeCAIR project and meeting the Dean of School of Medicine to learn about this school's experience in modern teaching techniques.

The DeCair Erasmusplus CBHE Project Final Conference







Prof. Sobhi Abou Chahine, Dean of Academic Affairs and International Relations has participated along with Dr. Alaa Daher from the Faculty of Engineering in the DeCair Erasmus+ CBHE Project (Developing Curricula for Artificial Intelligence and Robotics) final conference that was held on Tuesday 12/12/2023. This conference is for informing the participants and sharing with them the results of the project and for disseminating its experiences and recommendations.

The conference was held in the Small Auditorium of the School of Engineering in the University of Jordan with more than 110 participants, including specialists from Jordanian higher education, academicians from public and private Jordanian and Lebanese universities, representatives of ministries, unions and industry, members of the project team, and a group of those interested in artificial intelligence and robotics.

The conference had an opening session and a second, technical session. The opening session had the following speeches with Dr. Mohammad Abd-Almajeed as master of ceremonies.

• Prof. Gheith Abandah / Project Coordinator

• Prof. Munawar Al-Tarakiya / Dean of the School of Engineering

• Prof. Ahmed Abu Al-Haija / Director of the Erasmus+ National Office

• Ms. Ines Alves / European Union Delegation to Jordan / Program Manager Education and Erasmus+ Focal Point

• Prof. Nathir Obaidat / President of the University of Jordan / Conference Patron

After this session, the President of the University of Jordan led the inauguration of the Artificial Intelligence and Robotics Lab. This lab was created through DeCAIR and has 16 student workstations, 2 supervisor laptops, 2 servers for large machine learning jobs, and 9 robots.

The second session presented the partners' experiences, student experiences, projects results, and recommendations. This session had the following 10 talks and was chaired by Dr. Adham Al-Sharqawi.

• The experience of Beirut Arab University / Prof. Sobhi Abou Chahine - Dean of Academic Affairs and International Relations

• The Lebanese University Experience / Dr. Majd Saeid

• The experience of the Jordan University of Science and Technology / Dr. Ahmad Bataineh

• Tafila Technical University Experience / Dr. Murad Al-Aqtash

• Experience of Computer Engineering Department / University of Jordan / Dr. Ramzi Saifan

• Experience of the Mechatronics Engineering Department / University of Jordan / Dr. Musa Yamen

• Student experiences / M. Muhammad Al-Rawashdeh and M. Rabie Al-Atoum

• Presentation of the project results and the project website / Dr. Ashraf Al Suyyagh

• Project recommendations and discussion / Prof. Iyad Jafar

Lebanon and Kuwait compare campus energy options in 2023

Mohamad Tarnini, Mohammad Alsayed and Abdallah El Ghaly of BAU coauthored Towards Energy Sustainability in University Campuses A Case Study of Beirut Arab University with Khaled Chahine of the American University of the Middle East in Kuwait. Published on 8 May 2023, the study compares diesel-only generation, solar with battery storage and solar coupled to existing diesel generators. It uses HOMER modelling to evaluate alternatives and documents implementation at BAU's Beirut Campus. The open access article provides a decision method for institutions facing unreliable electricity supply, contributing to SDGs 7 and 13. Its comparative results and installation record demonstrate an applied contribution to practice. Estimated savings and modelled emissions are not evidence of university-wide carbon neutrality or independently verified long-term reductions.

Evidence: Original Lebanon and Kuwait coauthored energy study (author affiliations; sections 2 to 4; DOI 10.3390/su15097695)

Towards Energy Sustainability in University Campuses: A Case Study of Beirut Arab University

Abstract

Lebanon has been suffering from severe challenges in its electric sector for decades owing to chronic supply shortages and faults in its aging power grid infrastructure. The deplorable situation of the Lebanese electric sector has been made worse by the economic meltdown that started in 2019, which eventually led to total power blackouts across the country. In this paper, we present a case study on the design and implementation of a solar microgrid system for Beirut Arab University, Lebanon. As a first step, simulation software for a microgrid and a distributed generation power system is used to compare different design scenarios. Considering the available installation area and the fact that the greatest demand occurs during the daytime, when both the educational and managerial facilities are running, it is found that a 500-kW photovoltaic system tied to the university's already present diesel generators is the optimal solution in terms of return on investment. The second step details the actual implementation of the system in the Beirut campus and the evaluation of the system's performance in terms of diesel cost savings and emissions reduction. We expect that the results of this case study will encourage other institutions and communities to adopt sustainable and renewable energy sources.

2. System Design

As an educational institution, BAU requires a significant amount of energy to operate, making it a microgrid by itself. Normally, five low-voltage (380 V, 50 Hz) generators are used to cover the demand of the Beirut campus, which is 1700 kVA, but with soaring fuel prices, this solution is no longer considered economically feasible. Given the limited availability of utility power supply, these generators operate in a primary mode and establish a microgrid, which will henceforth be referred to as the grid. In other words, the grid in on-grid and off-grid terms refers to the microgrid formed by the diesel generators. On the other hand, for an institution such as BAU, reducing supply is not an option. Lebanon has many sunny days per year, and the same naturally goes for BAU. Here, solar energy is a practical solution to this problem. Based on this, three scenarios are considered, studied, and compared, and the most feasible solution is chosen. The first scenario is the strategy that was originally used, where diesel generators supply the load without any additional energy sources. In the second scenario, no generators are used, and the solar panels, together with a battery storage system, supply the load alone, making it an off-grid system. The third and final scenario to be discussed is an on-grid system in which the solar system is installed in conjunction with generators to feed the load.

2.1. Diesel Generators System

Thermal energy generation is one of the oldest ways to generate electricity. It is still the most common method of generating energy worldwide. Diesel generators are an example of this type and are currently the main suppliers of electric power in Lebanon, where electricity from the grid is practically absent. In BAU, five diesel generators are already present with a total capacity of 4500 kVA, satisfying the 2N + 1 redundancy method, which supplies the full load of the university but comes with the huge cost of both the fuel that keeps it running as well as the price of oil and filters for the generators. The generators, without the presence of any other energy sources, consume approximately 60,000 L of diesel per month in the study semesters, which is equivalent to USD 57,660. This is in addition to approximately USD 500 for oil, filter changes, and maintenance. This adds up to USD 58,110 per month, which is clearly too expensive to pay only for electricity. In addition, in Beirut, a big city where trees are rare, the emissions from these generators and the pollution they cause can never be taken lightly. Hence, things cannot continue as they are, and if no action is taken, serious health and economic consequences will be inevitable. Table 1 lists the advantages and disadvantages of the proposed method.

2.2. Off-Grid System

Another appealing solution to the electricity problem is an off-grid solar system. In this system, solar panels are used to feed the microgrid and charge the batteries whenever the sun is present; when sunlight is absent, the batteries are responsible for feeding the load. Therefore, there is no need for diesel generators, and they can be disconnected. Such systems are becoming more popular all over Lebanon and have proved to work well on a domestic scale. In this study, the number of batteries considered can feed the normal load of the university on a study day for eight continuous hours without other energy sources. The load considered is approximated to 1700 kW for 8 h; thus, 13,600 kWh of energy storage will be required. Lithium-ion batteries will be considered for this study owing to their advantages over other battery types. Hence, a 15 kWh LiFePO4 battery, with a unit price of around USD 2200 as per the Felicity brand in November 2022, will be considered. To supply the load for the required duration, 907 of these batteries will be needed. As a result, the cost of the batteries alone will be USD 1,995,000. In addition, to both feed the load and charge the batteries, more panels are required. The number of panels required was calculated to be 3000 panels. Each panel has an area of 2 m^2, and the total area needed is 6000 m^2, which far exceeds the available area of 2000 m^2. With 3000 panels, the cost of the system without batteries will be USD 3,100,000, so the overall cost of the project will sum up to USD 5,095,000. Therefore, this scenario presents great difficulties in terms of both economic and physical aspects, making it difficult to achieve. Table 2 presents the advantages and disadvantages of this scenario.

2.3. On-Grid System

In this system, the solar system is coupled with generators to supply the load. Such systems are especially popular in advanced countries with proper grid supply but are inapplicable in cases where the grid supply is unstable or, in Lebanon's case, absent. However, BAU possesses diesel generators large enough to make a micro-grid system; in this case, an on-grid system composed of a solar power system aided by the diesel generators becomes possible. Compared to the off-grid system, the on-grid system requires less solar generation capacity, which significantly reduces the investment cost. At the same time, the stress on the diesel generators significantly decreases, thus cutting down on both fuel and maintenance costs. The on-grid system requires 960,550 W solar panels and a number of on-grid inverters, amounting to USD 330,000, which is more logical than the high monthly cost of the diesel generators and the prohibitive investment cost of the off-grid system. In addition, 960 panels with an area of 2 m^2 per panel will occupy 1920 m^2, which is compatible with the available area of 2000 m^2. Table 3 presents the advantages and disadvantages of the proposed scenario. Additionally, BAU is a full-time higher educational institution that requires power for critical equipment, especially in laboratories; hence, the reliability of the power supply is necessary, which is also achieved in this system owing to the existence of diesel generators in the event of extended cloudy periods.

2.4. Feasiblity Study

BAU's main facilities usually operate for 176 h per month, and for every 100 kVA, a generator uses about 20 L of diesel per hour. For a main load of 1700 kVA, the amount of diesel needed is equal to 60,000 L per month, costing approximately USD 57,610 and increasing to USD 58,110 per month after adding the maintenance costs. It is possible now to determine the payback period of the off-grid system. For an overall cost of USD 5,095,000, knowing that the university spends USD 58,110 USD per month and that each study semester consists of four months, we conclude that the project has a payback period of 22 semesters or 11 years, which is too long based on the evaluation methods used in [20], especially considering that the batteries are to be replaced every 7 to 8 years. For the on-grid system, installing a 550 kW solar system decreases the load on the generators to 1150 kVA, hence consuming 230 L/hour or 40,000 L/month and decreasing the monthly fuel cost to USD 38,407. In addition, the maintenance cost decreases to half of the original owing to decreased stress and fewer operation hours, hence making the monthly cost USD 38,657, which shows a significant decrease of USD 19,453 against the original costs for a relatively low capital investment. As for the payback period of this system, where capital investment is USD 330,000, it is calculated to be four semesters, so this project returns its value in less than two years, which is a relatively short period for such a project. Figure 2 shows bar graphs for the monthly costs and investment costs of the different systems.

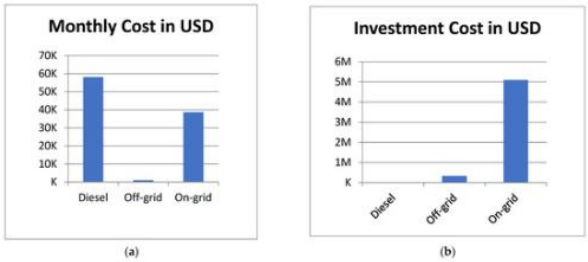


Figure 2. Comparison between the systems in terms of (**a**) monthly cost and (**b**) investment cost.

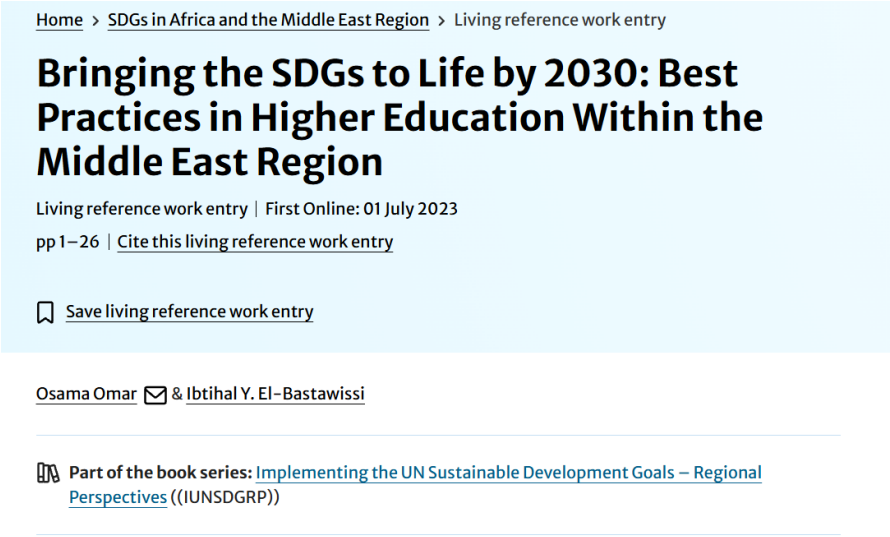
Published SDG practice and international dissemination

BAU authors document regional SDG best practices

Springer confirms that BAU authors Osama Omar and Ibtihal Y. El-Bastawissi wrote Bringing the SDGs to Life by 2030 Best Practices in Higher Education Within the Middle East Region. The living reference entry appeared on 1 July 2023; the 2024 edition appears in SDGs in Africa and the Middle East Region, pages 473 to 498. Its abstract describes a synthesis of successful initiatives in universities, schools and communities and recommends staff development, research groups and partnerships to support implementation. This is a published contribution to regional best-practice knowledge. Both authors have BAU affiliations, so the international publishing context supports dissemination rather than establishing foreign coauthorship. The two editions are versions of one contribution.

Evidence: Springer original 2023 chapter and BAU author affiliations (first online 1 July 2023)

Evidence: Springer 2024 edition publication record (first online 1 September 2024, pages 473 to 498)



Home > SDGs in Africa and the Middle East Region > Living reference work entry

Bringing the SDGs to Life by 2030: Best Practices in Higher Education Within the Middle East Region

Living reference work entry | First Online: 01 July 2023

pp 1–26 | Cite this living reference work entry

Save living reference work entry

Osama Omar & Ibtihal Y. El-Bastawissi

Part of the book series: Implementing the UN Sustainable Development Goals – Regional Perspectives ((IUNSDGRP))

International peer exchange through the IAU

BAU and Siam University in Thailand shared their sustainability experience at the IAU networking session on 21 January 2021 within the York conference, organised with partners in Canada and Japan. BAU presented work connecting education, research, innovation and community projects, and subsequently supplied seven community-engagement examples for IAU dissemination. This provides evidence of institutional knowledge exchange. The IAU Cluster's published purpose includes peer learning and joint initiatives; BAU's 2025 SDG 9 report supplies a later account of its research and practice. These records support the international exchange mechanism alongside the comparative outputs documented above.

Evidence: BAU original York conference and IAU knowledge exchange record (21 January 2021 session; follow-up dissemination)

Evidence: IAU Global HESD Cluster framework (peer learning and joint international initiatives)

Evidence: BAU 2025 SDG 9 report hosted by IAU (research examples and international project activity)

BAU participated in the Sustainable and Inclusive Internationalization Reimagining Approaches in Higher Education in an Era of Global Uncertainties Virtual Conference





Beirut Arab University, represented by Prof. Ibtihal Y. El-Bastawissi (Dean, Faculty of Architecture – Design & Built Environment) and Siam University, represented by Prof. Pornchai Mongkhonvanit (President of Siam University) have been invited by the IAU (International Association of Universities) to share their experience in engaging with the Cluster and sustainability in the Networking Session in the York Virtual Conference on Sustainable and Inclusive Internationalization.

The conference was organized by York University – Canada, in partnership with the IAU, Okayama University – Japan, and Canadian Commission for Unesco. The conference took place on 20-22 January 2021, while the Networking Session that has been hosted by the IAU was on 21 January 2021. In her presentation, Prof. El-Bastawissi focused on achieving the SDG goals generally and SDG9 particularly through education, research, conferences, new labs, innovation and community-based projects as well as wide-spreading BAU Journals, and developing partnerships with other universities.

Following this successful intervention in the conference, IAU represented by Hilligje van't Land, the Secretary General, welcomed BAU and Siam Universities to share concrete examples of community engagement focusing on social impact to be presented by IAU during the University World News Webinar entitled “Building Social Impact and Civic Engagement on 27 January 2021. Prof. El-Bastawissi shared with the IAU seven examples on BAU Community Engagement and on the university’s role in promoting sustainable urban development.

IAU Global Cluster on HESD

The IAU Global Cluster on HESD promotes the role and potential that HEIs globally have in order to achieve the SDGs and the 2030 Agenda. The Cluster encourages collaboration and takes a holistic approach to the SDGs, focusing specifically on the whole-institution approach.

The ***IAU Global Cluster on HESD*** brings HEIs from all continents together and encourages them to develop joint initiatives and synergies.

The Cluster works on all dimensions of the SDGs, ***combining environmental, social, cultural, and economic dimensions of sustainability,*** with ***partnerships as the key enabler*** for joint action.

Peer-to-peer learning sparks new ideas and creativity among the Members of the Cluster and will encourage other universities to step up their game towards achieving a more sustainable future. The Cluster helps generate ***joint and collaborative projects and other initiatives.***

The Cluster is composed of ***16 lead Institutions***, each championing and working on one specific SDG while at the same time linking it to other relevant SDGs, with additional Institutions invited on board as ***'Satellites'*** around each SDG. Currently, around ***70 universities*** (leads and subclusters) are engaged in the Cluster. Work on ***SDG 17: Partnerships,*** is led by the *IAU* and includes ***working with other organisations in the higher education and sustainable development sphere.*** The Cluster is supported, monitored and steered by the IAU Working Group on HESD, with the Initiatives developed by the Cluster being available to all IAU Members.

Find the latest report on the activities of the IAU HESD Cluster from 2025-2026 here.

Discover key documents for the IAU HESD Cluster

- *NEW* **IAU HESD Cluster Position Paper** (July 2026)
- The IAU HESD Cluster Work Plan 2025-26 (January 2025 - currently being revised)
- Terms of Reference for IAU HESD Cluster Members (November 2023)
- The Statement on the Joint vision from the IAU Higher Education for Sustainable Development (HESD) Cluster members (March 2022)

"BAU's Journey towards SDG 9: Fostering Industry, Innovation and Infrastructure"

"BAU's Journey towards SDG 9: Fostering Industry, Innovation and Infrastructure"

Beirut Arab University (BAU) is dedicated to advancing Sustainable Development Goal 9 (SDG 9) – "Industry, Innovation, and Infrastructure." Through diverse initiatives and partnerships, BAU leads the way in promoting innovation, supporting industrial growth, and improving infrastructure in Lebanon. Here are some key achievements that showcase BAU's commitment to SDG 9:

1. Campus Sustainability Initiatives:

- Expansion of Solar Energy Systems:
  - BAU has significantly scaled up its renewable energy infrastructure, directly supporting SDG 9's targets for sustainable industrialization and resilient infrastructure. In 2025, the Beirut Campus increased its solar capacity from 310 kW to 435 kW through rigorous maintenance and system optimization.
  - By the end of 2026, solar systems will be extended to the Debbieh Campus (1.6 MW) and Bekaa Campus (100 kW), ensuring clean energy access across all campuses and reducing reliance on unstable power grids.
- The new designed BAU campus in Bekaa region will serve as a research and education hub for sustainable practices strengthening rural-urban connectivity while preserving the natural assets within an agricultural context.

- LED Lighting Upgrade for Energy Efficiency:
    - As part of its commitment to sustainable infrastructure (SDG 9), BAU has replaced 15% to 40% of conventional lighting with LED systems at the Beirut Campus, with plans to reach 80% coverage by end-2026. This initiative enhances energy efficiency, cuts operational costs, and reduces the university's carbon footprint.
- Artificial Lake for Water Conservation:
    - The excavated artificial lake on the Debbieh Campus stores rainwater for irrigation, addressing water scarcity while promoting sustainable land use (linked to SDG 9's infrastructure resilience goals).
- Beehives for Biodiversity:
    - The installed beehives on the Debbieh Campus support pollination and local ecosystems, aligning with SDG 9's emphasis on environmentally sound industrialization.

Therefore, key SDG 9 Contributions can be demonstrated as:

- Renewable Energy Infrastructure: Solar expansions and LED upgrades demonstrate BAU's investment in clean energy technologies (SDG 9.4).
- Resilient Campus Systems: Rainwater harvesting and energy-efficient lighting reflect climate-resilient infrastructure (SDG 9.1).
- Innovation in Sustainability: Projects like solar energy scaling and smart lighting exemplify applied technological innovation (SDG 9.5).

These initiatives showcase BAU's leadership in translating SDG 9 into actionable, measurable outcomes for sustainable development.

2. Research and Innovation for Sustainable Development:

Through the ongoing refinement of our strategy and platform, we have successfully gathered data on research that supports SDG 9, as outlined below:

2.1- Research Driving Industrial Innovation

Beirut Arab University has demonstrated significant commitment to advancing SDG 9 through impactful research and practical applications during the 2024-2025 academic year.

The university's research portfolio shows strong engagement with industrial innovation, with SDG 9-related work accounting for **35%** of total publications across key faculties. The Faculty of Engineering leads this effort, contributing **60%** of all SDG 9 research output, while the Faculties Science, Business Administration, and Health Sciences provide important complementary contributions as well.

2.2- Practical Research with Direct Industry Impact

A compelling example of BAU's practical work comes from the Faculty of Health Sciences, where researchers partnered with the Ministry of Economy and Trade to conduct a market study on tomato paste adulteration. This rigorous investigation analyzed local and imported products, developed new testing methodologies, and established quality benchmarks that are now informing national food safety standards. The project exemplifies BAU's ability to translate academic research into tangible industry benefits.

2.3- Fostering Innovation Through Strategic Partnerships

The university actively cultivates innovation through programs like the LIRA Innovation Program 2025, which connects researchers with EU funding opportunities to develop solutions for Lebanon's agricultural and healthcare sectors. This initiative reflects BAU's strategic focus on bridging academic research

Institutional contribution and evidence assessment

BAU's role is established through named faculties, project coordination, university researchers and official project participation. Students contribute through research and applied learning, while academics and administrative representatives develop, evaluate and share curricula and methods. Community participation is visible in the Beirut fieldwork, urban health learning resources and NGO education. Together, the evidence supports a Yes response: international partners provide comparative reference points, BAU helps adapt the findings, and published or delivered outputs make the resulting knowledge available for wider use.

The most direct evidence is the urban recovery comparison, the delivered course with the BAU case, MORALE's documented course revisions and DeCAIR's joint international survey. The energy paper adds international coauthorship and applied comparison. The Springer chapter and IAU exchange support dissemination. This evidence establishes contributions to international best-practice development; it does not claim that every output is an internationally adopted standard. Submission-year eligibility should follow the applicable THE reporting period.