

AU RESEARCH NEWSLETTER

Academic Year 2024/2025
Issue 6

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INTERNATIONAL RESEARCH AWARD

GRANT AWARDED FOR CLIMATE RESILIENCE RESEARCH IN CHINA



Dr Masoud Irannezhad, Assistant professor of Civil Engineering, secured a major grant from China's Henan Province Foreign Expert projects to develop digital twin systems for managing hydroclimate extremes. His multi-year role as a research professor at North China University of Water Resources and Electric Power (NCWU) highlights AU's expanding global impact in climate science. Henan Province Foreign Expert projects are provincial initiatives to attract top international scientists, entrepreneurs, and specialists to boost economic growth and innovation. Modelled after national programs, they focus on advancing high-tech manufacturing, modern agriculture, AI, and life sciences through talent recruitment, research collaboration, and technology transfer. Key initiatives include the International Talent Cooperation Program, the "100 Talents Plan," and Distinguished Professorships.

RESEARCH FUNDING NEWS

AU 7TH CALL FOR INTERNAL FUND

In January 2025, AU Scientific Research Center released the 7th Call for Research proposals.

The focus of the Call was focus on the following main fields:

- Water and Environment
- Renewable Energy
- Robotics and Artificial Intelligence
- Cybersecurity
- Advanced Materials and Manufacturing
- Electric Vehicle Cars

- Digital Transformation (e.g., Education, Health, Finance, Society, etc)
- Innovation and Entrepreneurship
- Business Management, Finance, and Marketing

This Call offered different types of grants:

- Seed grant,
- Collaborative research grants between AU colleges and schools (e.g. CoB & CoE, CoE & Aviation, CoB & Aviation), and
- AU-CQU multidisciplinary research proposals.

This Call was open to the entire AU faculty members. The seed and collaborative proposals were reviewed internally while the AU-CQU research grant proposals were evaluated by up to three external reviewers in addition to internal review by the Scientific Research Center. A total of 13 research applications were submitted under the 7th Call for Internal Research Proposals for the academic year 2024–2025. The distribution of proposal types is as follows:

- 11 proposals were submitted under the Seed Grant category.
- 2 proposals were submitted under the AU–CQU Multidisciplinary Research Grant category.

A visual representation of the submission breakdown is provided in Figures 1 and 2 below.

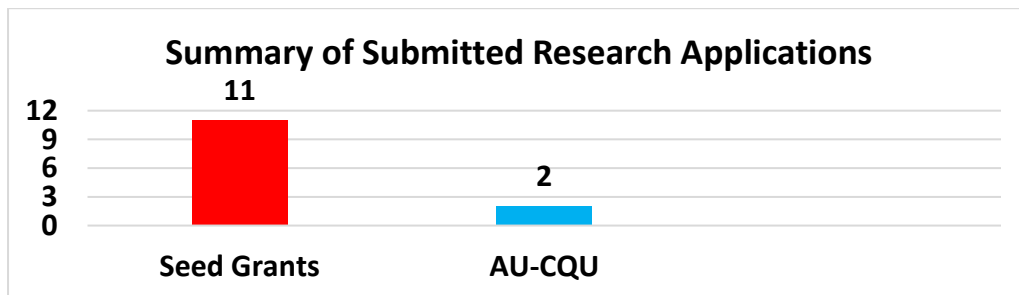


FIGURE 1

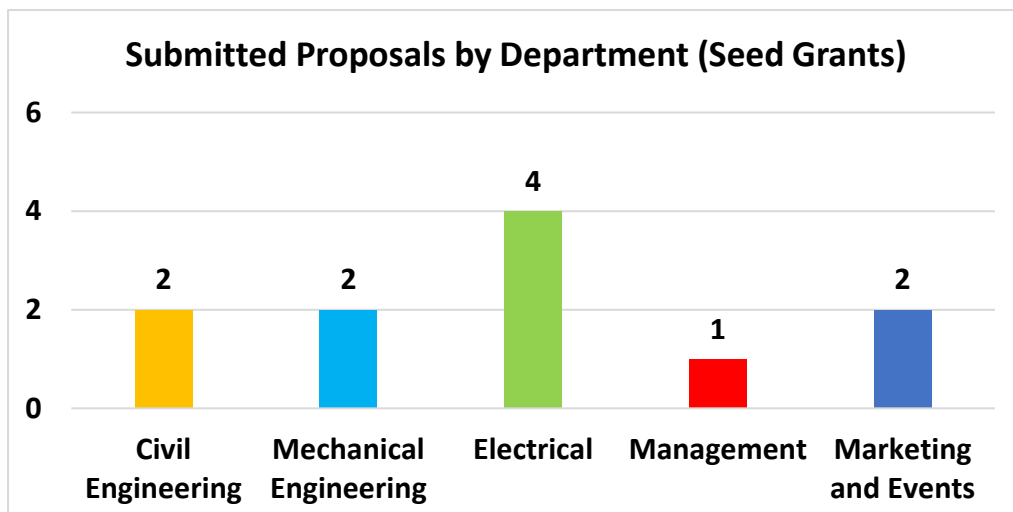


FIGURE 2

KFAS CALL FOR RESEARCH PROPOSALS



AU's strategy is to promote an environment rich in opportunities for original research, education, and innovation through the constant support of faculty, infrastructure, and collaboration with organizations, including the Kuwait Foundation for Advancement of Science (KFAS). Table 1 shows a summary of the approved KFAS grants for the Academic Year 2024/2025.

Table 1 Summary of the approved KFAS grants for the Academic Year 2024/2025

Sr.	Name of Funding Body	Title of the Project	Principal Investigator	Department	Local Collaboration	External Collaboration
1.	KFAS	Development of Novel Treatment for Osteoarthritis with Extended Pharmaceutical Effects and Improved Load Bearing Capacity and Joint Mobility	Dr Hayder Salem	Mechanical	N/A	University British Columbia
2.	KFAS	Deep Learning-Enhanced Automated Visual Inspection for Improved Structural Health Monitoring	Dr Mohamad Hani Yassin	Civil	N/A	Idaho State University
3.	KFAS	CYBERGEN: Advancing Cyber Resilience through AI in Collaborative Smart Grids and Hydrogen Mobility	Dr Majdi Al Omari	Electrical	N/A	CQU
4.	KFAS	Experimental Study on the Utilization of Kuwaiti Oil-Contaminated sand and Natural Fiber in Concrete as Sustainable Alternative to	Dr Zaibab Al Hajaj	Mechanical	N/A	N/A

Sr.	Name of Funding Body	Title of the Project	Principal Investigator	Department	Local Collaboration	External Collaboration
		Conventional Materials				
5.	KFAS	A Comparative Study of AI-Driven Green Energy Technologies and Ergonomics in Traditional vs. Smart Homes in Kuwait	Dr Nader Ghareeb	Mechanical	N/A	Multimedia University
6.	KFAS	The AI Paradigm Shift: Reshaping Assessment Strategies in Higher Education	Dr Hassan Salti	Electrical	N/A	CQU
7.	KFAS	Advancing Fouling Prediction and Mitigation Strategies in Al Zour Refinery (ZOR) Preheat Exchangers: Leveraging Empirical Evidence and Artificial Intelligence	Dr Mohamad Omer	Petroleum	KISR	Idaho State University
8.	KFAS	A Holistic Framework for Academic Performance Monitoring and Advising Using Deep Learning	Dr Arash Mehdizadeh	Electrical	N/A	George Washington University
9.	KFAS	Integrating Artificial Intelligence (AI) to Enhance Human Resource Management Capabilities of Small and Medium Enterprises in Kuwait	Ms. Hamsa Sarhan	HR	N/A	CQU

AU-KFAS RESEARCH OUTPUTS

AU is keen to play an important role in development and capacity building in research and technology through KFAS funded joint research projects with international universities. These proposals address national research priorities aligned with Kuwait National Development Plan. For the academic year 2024/2025, AU faculty members have published a total of 18 research work related to the funded KFAS grants (12 Journal papers and 6 Conference papers) and two journal papers under review as depicted in Figure 3. Many peer-reviewed papers were published in Q journals (ranking based on Scopus) as depicted in Figure 4. According to Scopus, 9 publications in Q1 Journals (research paper published in top 25% of the international journals), 2 publications in Q2 Journals (research paper published in the middle-high position – between top 50% and top 25%), and 1 in no Quartile journals.

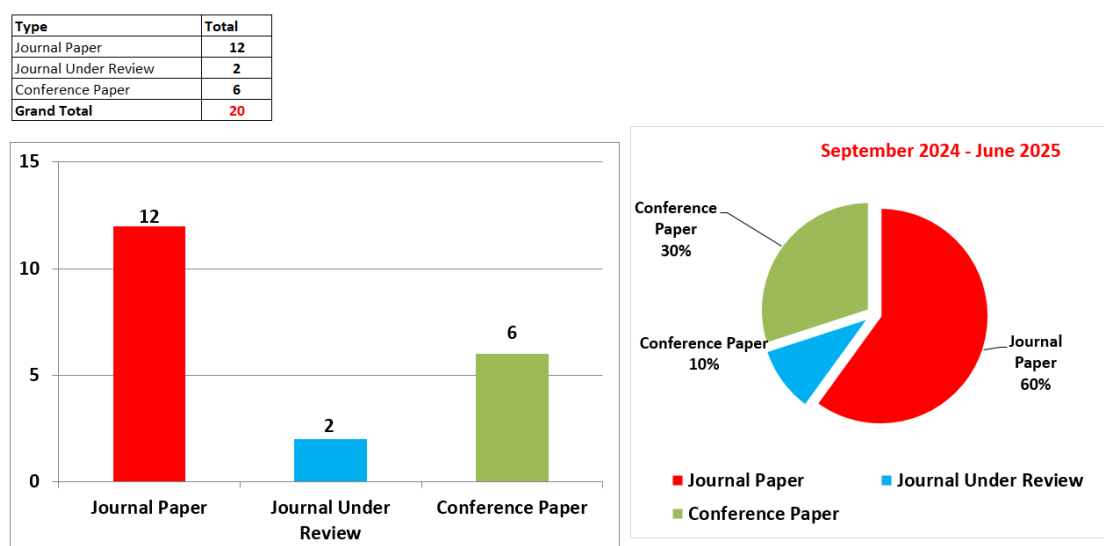


FIGURE 3. Summary of published research by AU faculty members as related to KFAS grants for the academic year 2024/2025

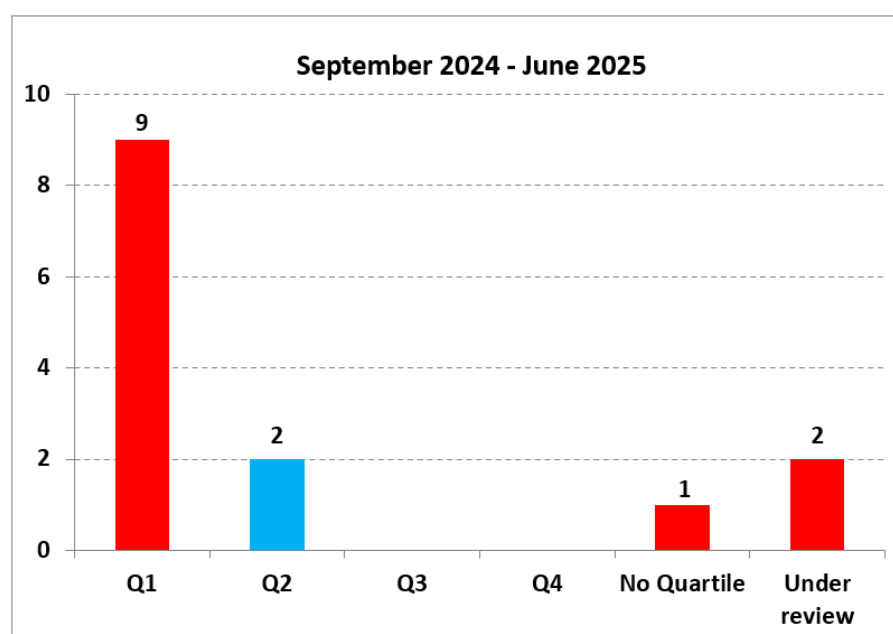


FIGURE 4. AU Research Faculty Output in Q-Journals for academic year 2024/2025

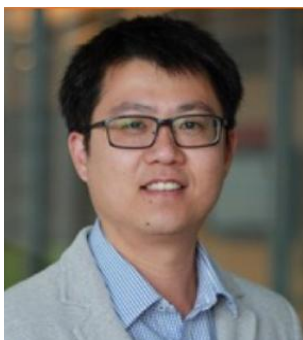
RESEARCH SEMINARS

AUTOMATED INSTRUMENT FOR TESTING NATURAL FIBERS PHYSICAL PROPERTIES



Fiber quality characterizations are needed to enable processors to compete in niche and higher-value markets, particularly where natural fibers like flax compete with established materials like glass, cotton, and synthetic fibers. For natural fibers to be competitive, they must have consistent quality and measurable properties, as presented by Dr. Hayder Salem. To achieve this, an automated instrument was developed to test the physical properties of flax and hemp fibers, commonly used in composite applications. This instrument measures fiber diameters according to ASTM Standards efficiently and automatically, minimizing human errors and reducing preparation time compared to traditional manual methods. It processes fiber batches by combing them to remove shives and minimize overlapping before scanning for measurement analysis.

MORE RELIABLE POWER ELECTRONIC CONVERTERS



Power electronic converters (PECs) are crucial for harnessing energy, electrifying society, and enabling emerging applications like wireless power transfer and microgrids. As PEC penetration increases, cost, performance, and reliability become critical. Failure of PECs can lead to blackouts and potential accidents. Rigorous testing, reliability standards, and physics of failure modelling are essential for studying the aging process of PECs. In this talk Dr. Dylan Lu discussed assessing and improving the reliability of two-port and three-port DC/DC converters. Additionally, the talk will cover modelling and delaying the aging process of power transistors. The discussion will also touch on remedial actions for critical applications requiring uninterrupted power supply, including fault detection and self-reconfiguration of PECs to ensure continuous power supply.

KUWAIT ENERGY TRANSITION AGENDA



The talk delivered by **Eng. Sara Akbar** described the road map for energy transition for Kuwait. It included a macro picture of the energy transition efforts internationally and its impact on the region and on Kuwait.

The talk covered all facets of energy transition elements including:

- Energy efficiency
- Emission control and monetization
- Energy substitution
- Alternative energy potential

URBAN MOBILITY SAFETY IN BARCELONA: AN EVALUATION OF RISK FACTORS AND TECHNIQUES TO ACHIEVE VISION ZERO



In order to converge towards the Vision Zero concept in road safety, traffic crashes require extensive study and analysis. This research, presented by **Dr. Ahmad Aiash** is aimed at this goal, applied to the urban and metropolitan environment of Barcelona. We use different techniques according to the objectives and data: traditional statistical models, time series analysis, and machine learning techniques. Random Utility Models such as Binary Probit Model, Chi-square Automatic Interaction Detector, Bayesian networks such as Tree Augmented Naïve tree, and Kohonen clustering are all utilized. The methodology is generic and can be extrapolated to other cities, regions/countries, and datasets.

ESTIMATING STRAIN INTRINSIC TRANSMISSIBILITY VIA INVASION TIMESCALE THRESHOLDING: A NONLINEAR DYNAMICS APPROACH"



The talk delivered by **Dr. Abdullah A. Al-Shammari** explored a model for the spread of an infectious disease driven by two competing strains. The focus was on understanding how the ability of one strain to dominate the other is influenced by two distinct strain-specific traits. A novel nonlinear dynamics approach was presented to disentangle this influence, providing new insights into the drivers of strain invasion.

CHALLENGES AND CONTRIBUTIONS OF GAS TURBINES IN THE ENERGY TRANSITION



As the world shifts towards sustainable energy sources, gas turbines play a pivotal role in the energy transition, balancing the need for reliable power generation with the urgency to reduce carbon emissions. This talk delivered by **Dr. Suleiman M. Suleiman** explored the multifaceted contributions of gas turbines, including their efficiency, adaptability, and ability to complement renewable energy sources. However, the transition is not without challenges: we will examine the technical, economic, and environmental hurdles that must be overcome to optimize gas turbine performance in a decarbonized future. By understanding both the benefits and obstacles associated with gas turbines, participants gained insights into their critical role in shaping a sustainable energy landscape.

NANOTECHNOLOGY: FUTURE TRENDS AND INNOVATIVE APPLICATIONS IN ELECTRICAL ENGINEERING



Nanotechnology is rapidly advancing electrical engineering, enabling the creation of smaller, more efficient, and powerful components. This presentation, delivered by **Dr. Amin Al Ka'bi** explored the latest developments and their potential to transform the field. By using nanomaterials such as graphene, carbon nanotubes, and nanowires, engineers are revolutionizing devices in areas like energy storage, sensing, and electronics. These innovations are not only enhancing performance but also supporting sustainable solutions that align with modern environmental demands. This presentation examines both the benefits and challenges of nanotechnology in electrical engineering, highlighting how these advancements will shape the future of technology and meet the needs of an increasingly connected world.

DYNAMIC DISEASE MODELS FOR ADVANCED FINANCIAL RISK MANAGEMENT



This talk, delivered by **Dr. Sadeq Damrah**, presented the SUIR model, adapted from epidemiology, to assess interest rate risk among borrowers. It categorizes clients as Stable, Unstable, Isolated, or Recovered, helping identify high-risk clients and evaluate interventions. The model uses a reproduction number to understand risk spread. I will discuss how this approach can enhance financial stability and its potential for the Islamic financial industry.

LIFE AS A CIVIL ENGINEER AND THE UMM AL HAYMAN WASTEWATER TREATMENT PROJECT



Exposure to commercial, project management, technical, construction, safety, environmental and personal development aspects related to the profession of Civil Engineering is a part of a typical day of Civil Engineer as presented by **Dr. Umair Farooq**. The construction of wastewater pumping stations in Egailah and Sabah Al Ahmed. The Installation of a record-breaking emergency Sea outfall involving 2km of Microtunnelling under the Sea. The construction of a state-of-the-art plant to treat 500,000m³ of wastewater per day. Over 16km of intermittent microtunnelling at depths close to 10 metres. Construction of 38 circular precast pre-stressed post-tensioned concrete structures holding close to a total 500,000m³ of treated water installed throughout South and East Kuwait. Installing a network of 450km of ductile iron pipe with diameters up to 1.6 metres.

COMPUTATIONAL FLUID DYNAMIC SIMULATION OF TURBULENT REACTING FLOWS



Computational fluid dynamics (CFD) is a powerful tool for design optimization. In this talk, **Dr. Mohammad Mahdi Salehi** shared his 20 years of experience in CFD simulations for various energy conversion systems. He briefly introduced different modelling approaches for turbulence, chemical kinetics, and the interaction between these phenomena. Dr. Mohammad then discussed several applications in energy conversion systems where such modelling tools are crucial in design optimization. These applications include gas turbine engines, aerospace propulsion systems, gas flaring in petrochemical industries, and his recent work on the design optimization of natural gas reforming reactors for hydrogen generation and carbon capture to reduce greenhouse gas emissions.

KNPC ROLE IN CLIMATE CHANGE MITIGATE



Climate change is one of the most pressing global challenges, driven by the accumulation of greenhouse gases (GHGs) in the atmosphere due to anthropogenic activities. The energy sector is a significant contributor to GHG emissions, primarily through the burning of fossil fuels and industrial processes. KNPC has recognized its role and initiated a pivotal role in mitigating climate change by adopting cleaner technologies, improving energy efficiency, and investing in sustainable practices. The presentation delivered by **Eng. Hosam Jamal** encompassed the issue of climate change and the efforts of the international community under UN to save the planet from deleterious effects. The presentation highlighted various initiatives and vision of KNPC to mitigate climate change.

CURRENT DEVELOPMENTS & FUTURE TRENDS IN ELECTRONICS &



The field of electronics and integrated circuits (ICs) has been a driving force behind technological progress for over half a century. From the invention of the transistor to the development of modern microprocessors containing billions of transistors, ICs have revolutionized industries, reshaped economies, and transformed daily life. Today, as we stand on the cusp of a new era defined by artificial intelligence (AI), quantum computing, and sustainable technologies, the electronics industry continues to evolve at an unprecedented pace. This presentation delivered by **Dr. Amin Al Ka'bi** explored both the current state and future trends of electronics and ICs, highlighting advancements in semiconductor materials, miniaturization, AI integration, and emerging paradigms such as neuromorphic and quantum computing.

HIGHER-ORDER DISCONTINUOUS GALERKIN TIME DISCRETIZATION & CONVECTION STABILIZED PRESSURE ROBUST METHOD FOR TRANSIENT NAVIER-STOKES EQUATIONS INTEGRATED CIRCUITS



This talk, delivered by **Dr. Naveed Ahmed**, presented a higher-order discontinuous Galerkin (DG) time-stepping approach for solving the time-dependent Navier-Stokes equations with a convection-stabilized, pressure-robust finite element method. Extending Garcia-Archilla & Novo (2024), the fully discrete framework ensures unconditional stability and optimal convergence. Numerical experiments confirm robustness and accuracy, with an analysis of stabilization parameters' impact.

DATA DRIVEN APPROACH TO ENGINEERING NAVIER-STOKES EQUATIONS INTEGRATED CIRCUITS



This talk delivered by **Dr. Morteza Mohammadzaheri** aims to introduce different levels of data-driven methods in engineering, from data collection, data preparation to data analysis, data-driven modelling and data-driven decision making.

THE FUTURE APPEARANCE OF WATER SCARCITY IN THE ARABIAN PENINSULA



Water plays a critical role in achieving the United Nations' 2030 Sustainable Development Goals (SDGs), particularly in arid regions such as the Arabian Peninsula (AP). This study, presented by **Dr. Masoud Irannezhad** uses GRACE satellite observations and model simulations to evaluate future changes in terrestrial water storage (TWS) across the AP under different greenhouse gas scenarios. Projections indicate significant TWS declines in southeastern Saudi Arabia and eastern Yemen, while northern areas, including Kuwait, may experience increases. The impacts are expected to intensify toward the end of the century, especially under higher-emission scenarios. These results underscore the need for sustainable water management strategies to enhance resilience and support long-term development in the region.

RESEARCH CAPACITY BUILDING SEMINARS**NAVIGATING THE PUBLICATION PROCESS: FROM CHOOSING JOURNALS TO DEALING WITH REVIEWERS' FEEDBACK**

AU-College of Business in collaboration with AU-Scientific Research Center organized another cycle of the Research capacity building seminars. The distinguished researchers from AU-College of Business and AU-Scientific Research Center delivered seminars on the following topics:



This presentation, delivered by **Dr. Muath Abdelqader** will focus on how to successfully publish academic research. It will begin by sharing one of the published papers, explaining its main findings and contributions. Further, it demonstrates the procedures conducted during the publication process of such a paper, including choosing the journal, responding to reviewer comments, and improving the paper.

BRAND PERSONALITY AND COUNTRY OF ORIGIN SIGNALS IN EMERGING MARKET HIGHER EDUCATION

With major changes in the worldwide landscape of higher education, emerging market institutions are developing partnerships with western universities to boost their standing in the market. This study, presented by **Dr. Richard Rutter**, explores the more subtle processes with which the Higher Education Institutions (HEIs) in the Gulf Cooperation Council (GCC) country of Kuwait, employ international partnerships as 'signalling devices'. Employing signalling theory as a theoretical framework, the research explores how emerging HEIs deploy dual signals - country of origin and brand personality - to differentiate themselves within their domestic marketplace. The investigation focuses on the ways these institutions communicate quality, reputation, and distinctive institutional brand characteristics through their partnerships with Western universities. The study demonstrates scenarios of positioning of brands and marketing by the Kuwaiti HEIs as they pick and modify cues from their western partners. Furthermore, the study reveals differences between American affiliated and non-American institutions and how these institutions employ various brand personality traits such as 'Excitement', 'Competence'.

PLAY, LEARN, ACHIEVE: THE POWER OF GAME-BASED LEARNING IN EDUCATION



This session explored the transformative impact of game-based learning from both educational and research perspectives. **Dr. Vladimir Simovic** delved into the benefits of this innovative approach, showcased examples of serious games designed for education, and share insights from his current research in the field. He also discussed future directions for research in game-based learning, highlighting its potential to reshape modern educational practices.

COMMUNICATING THE RESEARCH TO NON-SPECIALISTS



This seminar highlighted the importance of effective science communication and the consequences of misinformation. The session, delivered by **Dr. Vladimir Simovic**, explored how to present research findings in a way that captures public interest while maintaining accuracy. Participants also learned key writing strategies to enhance understanding and engagement. Additionally, the seminar provided insights on collaborating with press offices and journalists to effectively convey research to a wider audience, along with an overview of alternative communication platforms that researchers can use themselves.

FACULTY NEWS



Dr. Jean El Achkar, Assistant Professor in the Petroleum Engineering Department, has been awarded the prestigious KFAS Fellowship at the London School of Economics and Political Science (LSE). During the summer of 2025, he conducted research on integrating organic waste into Kuwait's renewable energy policy. This achievement further reinforces AU's leadership in sustainability. During the conference held in cooperation with LSE, KFAS reaffirmed its commitment to support scientific research and align it with KFAS 2025-2029 strategy. During this conference titled "The Future: Planning for Sustainability and Transformation in Kuwait", Dr El Achkar discussed bioenergy and organic waste recycling.



A collaborative project between AU and Idaho State University earned first place at ISU's Research and Creative Works Symposium. Led by Dr. Taha Ahmad and Dr. Mohammad Hany Yassin, the study explored sustainable pavement solutions using fiber-reinforced concrete, highlighting AU's commitment to international research collaboration.

PUBLICATIONS: JOURNALS, CONFERENCES AND BOOKS

AU faculty members published a total of 159 research work covering the period from September 1st, 2024, through August 1st, 2025 (100 journal papers and 59 conference papers). AU faculty received 9 funded KFAS projects and 10 AU internal research grants as shown in Figure 5. Many peer-reviewed papers were published in Q journals (ranking based on Scopus), as depicted in Table 1 and Figure 6. According to Scopus, 43 publications in Q1 Journals (research paper published in top 25% of the international journals), 36 publications in Q2 journals (research paper published in the middle-high position – between top 50% and top 25%), 7 publications in Q3 journals (middle-low position), 2 publications in Q4 journals, and 12 in no-Quartile journals.

Type	Total
Journal Paper	100
Conference Paper	59
Book Chapter	5
AU Research Grant	10
KFAS Research Projects	9
Grand Total	183

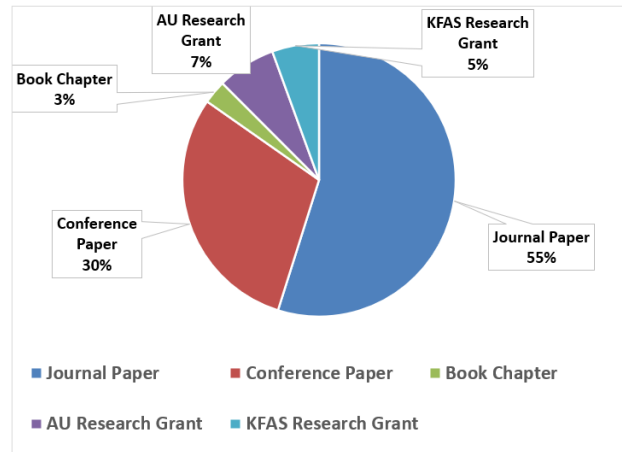
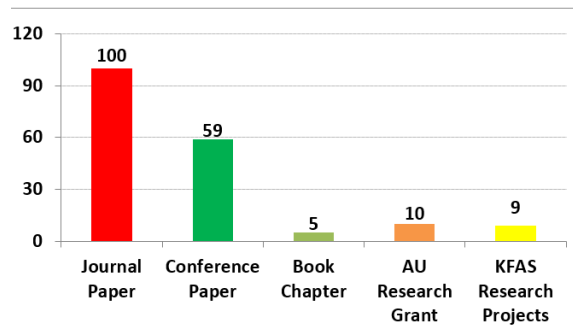


FIGURE 5 AU Research Faculty Output for 2024/2025

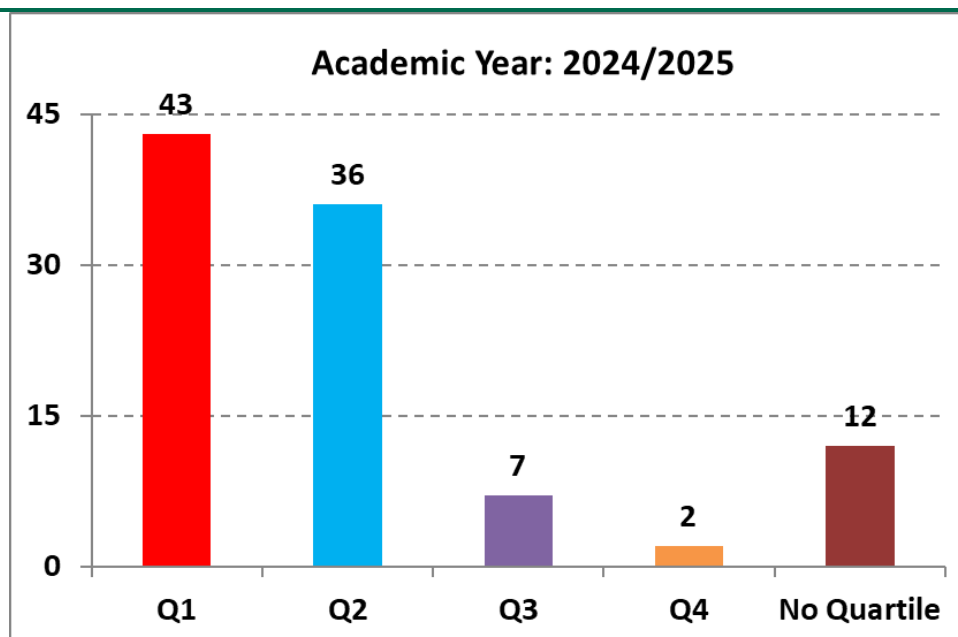


FIGURE 6 AU Research Faculty Output in Q-Journals for 2024/2025

AU COB SCIENTIFIC CONFERENCE 2025 – SERBIA, SEPTEMBER 11 – 13, 2025

The College of Business at Australian University, Kuwait has co-organized a 20th International Strategic Management Conference entitled:

LEVERAGING STRATEGIC MANAGEMENT FOR SUSTAINABLE DIGITAL ECONOMY

The conference was organized by the International Strategic Management and Managers Association (ISMMA) in cooperation with Australian University, Kuwait, Gebze Technical University, Turkey and Yildiz Technical University, Turkey. It took place in Serbia between the dates of September 11th and September 13th, 2025 at Institute of Economic Sciences, Belgrade, Serbia. The Conference mode was hybrid.



4TH AU COB ANNUAL CONFERENCE ICDSA 2026, INTERNATIONAL CONFERENCE ON DIGITAL TRANSFORMATION, SUSTAINABILITY, AND AI

Organized by the Australian University, Kuwait, in collaboration with the Centre for Business Analytics (CBAP) at University of Surrey, United Kingdom, the event aims to foster inclusive dialogue and actionable strategies to build resilient, AI-enabled futures. The conference will be preceded by three pre-conference workshops designed to provide hands-on learning and deeper engagement with key themes. ICDSA 2026 will explore the profound impact of the Fourth Industrial Revolution where AI, humanoid robotics, and human-machine collaboration are driving transformative change. As governments and



THE FUTURE OF HIGHER EDUCATION IN THE ARTIFICIAL INTELLIGENCE AGE



The Teaching and Learning Center organized its 6th Annual Forum on the 21st of May, 2025. Artificial intelligence (AI) continues to reshape the global landscape; higher education institutions must adapt to emerging challenges and opportunities and rethink their future and way of conducting their operations to ensure sustainability. This forum aims to explore the evolution of AI in higher education and how it affects pedagogy, assessments, student engagement, and institutional decision-making.

Please share with us any updates on your research, scholarly, or creative activities. Updates may be related to a paper that has been accepted for publication in a high-impact journal, a book chapter you've just published, or other updates you wish to share with our Scientific Research Center. Send details to research@au.edu.kw

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