

A House of Wisdom, A Beacon of Tolerance

There is a revolution brewing in the Arab world, but it is not making any of the headlines that you are currently hearing about in the news. Unfortunately, it is the bad news of war, terror and death that we all seem to instantly ascribe to a large section of the world's territory and population. But that is not always the whole story...

The Kingdom of Saudi Arabia and Saudi Aramco have launched a radical new social experiment right in the heart of a very traditional and conservative culture: KAUST – King Abdullah University of Science and Technology.

From the university's Vision and Mission Statement:
“KAUST will be a globally renowned graduate research university that makes significant contributions to scientific and technological advancement, and will play a crucial role in the development of Saudi Arabia and the world.”

KAUST, a public institution, is a new entry on the scene of higher learning in a very competitive global academic arena. Ground was first broken in 2006 and in less than a thousand days a modern university stood ready to welcome students and faculty from over 60 countries, representing a strong commitment to global connection and diversity. To date, there are more than 800 students and 70 professors, as well as numerous support staff and associates, making up the university's diverse population. KAUST opened its doors on September 23, 2009, Saudi National Day, in

Thuwal, Saudi Arabia, right on the shores of the Red Sea, in a wonderful display of celebratory pride.

It seems a fitting time to return to a commitment to higher learning, when the Western world is looking carefully at a culture that seems inscrutable and unknowable, and even, at times, anachronistic - a time to build bridges of cooperation and understanding. The Arab world is the seat of civilization, and the roots of algebra, itself an Arab word, can be traced back to the ancient Babylonians. What better way to link the ancient past to a modern future for the benefit of all mankind?

Besides global aspirations of great influence, KAUST is Saudi Arabia's flagship commitment to a shift from a resource-based economy to deepen and diversify the Kingdom's knowledge-based economy – a new vision of the future.

KAUST is dedicated exclusively to post-graduate and specialized research, linking up with similar institutions all over the world. English is the official language of instruction. It is the first mixed-sex university in Saudi Arabia and women are allowed to dress as they please; the religious police are prohibited from patrolling the campus. This has created some heated discussions in certain circles but radical and controversial change is always a cause for distant rumblings. But with the absolute support from the highest levels of the Saudi government, KAUST is here to stay and to spread its message of change.

KAUST has a three-part mission:

- Research at KAUST – both basic and goal oriented – is dedicated to advancing science and technology of regional and global impact. Research excellence inspires teaching and the training of future leaders in science and technology
- Research and education at KAUST energize innovation and enterprise to support knowledge-based economic diversification.
- Through the synergy of science and technology, and innovation and enterprise, KAUST is a catalyst for transforming people's lives.

And with this mission statement in mind, KAUST is built on a foundation of seven core values: achievement, passion, inspiration, diversity, openness, integrity and citizenship.

KAUST organizes interdisciplinary collaborative research teams of faculty and students, without regard to disciplinary boundaries, across three academic divisions:

- Chemical and Life Science and Engineering
- Mathematical and Computer Sciences and Engineering
- Physical Sciences and Engineering

KAUST offers two graduate programs in the various fields: a Master of Science degree (18 months), and a PhD program that takes 3-4 years requiring original research that

culminates in a dissertation involving comprehensive faculty and peer review.

KAUST offers programs in engineering and life sciences, computer sciences and physical sciences. The curriculum is focused on four key fields where research drives the educational process:

- 1) Biosciences and Bioengineering – combating disease, famine and other environmental challenges.
- 2) Resources, Energy and the Environment – searching for sustainable new sources of clean energy while reducing the environmental impact of traditional energy sources.
- 3) Materials Sciences and Engineering – searching for stronger, lighter and more durable materials.
- 4) Applied Sciences and Mathematics – applications to science and research across a wide range of scholarly disciplines.

To support these four key fields, KAUST has established several multidisciplinary research centers, focusing on the following:

- Catalysis
- Clean Combustion
- Computational Bioscience
- Geometric Modeling and Scientific Visualization

- Membranes
- Plant Stress Genomics and Technology
- Red Sea Marine Science and Technology
- Solar and Alternative Energy Science and Engineering
- Water Desalination and Reuse

Degrees at KAUST are offered in eleven fields of study:

- Applied Mathematics and Computational Science
- Bioscience
- Chemical and Biological Engineering
- Chemical Science
- Earth Science and Engineering
- Electrical Engineering
- Environmental Science and Engineering
- Marine Science
- Material Science and Engineering
- Mechanical Engineering

The KAUST campus is situated on fourteen square miles (36 square kilometers) on the Red Sea, which houses a marine sanctuary and numerous state-of-the-art research laboratories.

The campus is a completely self-contained community that allows faculty, staff, associates, students and their families to enjoy an atmosphere of freedom, freedom to focus on their research and studies and to partake in open thought and discourse. The architecture has won numerous awards and the campus layout is designed to allow the residents to

interact with the natural and academic environment, and to enjoy a rich and broad range of educational programs and social amenities.

KAUST is Saudi Arabia's first and the world's largest LEED-certified project. Because of this the campus facility was chosen by the American Institute of Architects (AIA) Committee on the Environment (COTE) as one of the 2010 Top Ten Green Projects. KAUST is setting the example of environmental responsibility by leading the way.

In a committed effort to expand its global reach and influence, KAUST has aligned itself with numerous outstanding academic and research institutions across the globe:

- Massachusetts Institute of Technology (MIT)
- Woods Hole Oceanographic Institute
- Imperial College of London
- Hong Kong University of Science and Technology
- Indian Institute of Technology (Mumbai)
- Institute François du Petrole
- National University of Singapore
- American University of Cairo

In 2008 KAUST established and funded the KAUST-Cornell Center for Energy and Sustainability. KAUST-CU is one of four research centers worldwide funded by KAUST through its Global Research Partnership. KAUST-CU supports research at six partner institutions (University

of Cambridge, Columbia University, Princeton, University of Houston, UCLA, and Yale University) and collaborates with researchers at Ecole Polytechnique Federale at Lausanne and Stanford University.

Research at KAUST-CU focuses on a unique class of hybrid nanomaterials recently discovered at Cornell University, organic-inorganic hybrids termed nanoparticle ionic materials, or NIMs.

This discovery has formed the cornerstone of KAUST-CU's research efforts and focuses on four specific areas:

- Photovoltaics and energy storage systems.
- Desalination and advanced water purification.
- Nanomaterials for oil and gas exploration and production.
- Carbon dioxide capture and advanced sequestration technologies.

The KAUST Economic Development Program has been established to link the academic with the commercial in partnerships with local and international businesses. To date there are more than forty EDP Partners, to include:

- Saudi Basic Industries (SABIC)
- Dow Chemical
- Siemens
- GE
- Shell

- Sumitomo Chemical
- IBM

In collaboration with IBM, KAUST has formed the IBM Center for Deep Computing Research located on the Thuwal campus. Shaheen – the Arabic word for peregrine falcon – is the fastest supercomputer in the Middle East and one of the most powerful in the world. The machine is capable of an astounding 222 teraflops, or 222 trillion floating operations per second. Other research institutions in Saudi Arabia will link to the university's supercomputer and other laboratory facilities through the ten gigabits per second (Gbps) Saudi Arabian Research and Education Network (SAREN). These Kingdom institutions include:

- King Fahd University of Petroleum and Minerals
- Prince Sultan Center for Science and Technology
- King Abdulaziz City for Science and Technology
- Saudi ARAMCO Advanced Research Center

Other cutting-edge laboratories will enable researchers to make major scientific breakthroughs at KAUST, in collaboration with their domestic and worldwide network of partners:

- Visualization Labs – CORNEA is a fully immersive, six-sided virtual reality facility that gives students and researchers the ability to turn data into 3D structures with which they can examine, interact and manipulate.

The facility was built in partnership with the University of California, San Diego.

- Nanofabrication, Imaging and Characterization Labs – A clean-room environment with leading-edge tools to support research in advanced materials, biotechnology, electronics and photonics. The NICL includes a suite of ten advanced nuclear magnetic resonance (NMR) spectrometers allowing scientists to examine nanostructure devices and surfaces down to the level of individual atoms.
- Coastal and Marine Resources Labs – Located right on the Red Sea, the CMRL facilitates state-of-the-art marine research. These labs build and deploy modern oceanographic instrumentation and provide operational and logistical services to support research vessels for marine exploration, diving and sampling. Indoor and outdoor seawater facilities allow researchers to culture marine organisms. The CMRL has entered into a research partnership with the Woods Hole Oceanographic Institute in the United States.
- Analytical Core Labs – These labs boast highly skilled staff focusing on spectroscopy, chromatography and mass spectrometry, trace metals analysis, wet chemistry, and surface analysis.
- Biosciences and Bioengineering Labs – These facilities include genomic and proteomic labs essential to the cellular molecules for DNA sequencing and genetic analysis, as well as the investigation of cellular functions.

So, again, King Abdullah University of Science and technology is just the beginning of a bold experiment in the Arab world. Time will tell where this will all lead, but the prognosis is good and the concept has been warmly received around the world given the number of affiliations with top-level academic institutions and major multinational corporations – as well as by the number of students applying for admission and faculty requesting a posting.

But who better to sum up the future vision of this exciting new institution than the man for whom it is named:

“It is my desire to that this new University become one of the world’s great institutions of research; that it educate and train future generations of scientists, engineers and technologists; and that it foster, on the basis of merit and excellence, collaboration and cooperation with other great research universities and the private sector...Our intention is to create an enduring model for advanced education and scientific research...In providing a strong foundation for all aspects of life and work in the University, we aim to ensure its success in promoting the economic development and social prosperity of the people of the Kingdom and the world.”

--King Abdullah Bin Abdulaziz Al Saud