6

Higher Education and Research Projects

Instant and Organically Developing Campuses

Modern higher education in the region has an established history that dates back to 1866, when the Syrian Protestant College was founded in Beirut through a charter from the state of New York. The private, independent, nonsectarian institution, which in 1920 was renamed the American University of Beirut (AUB), evolved to become the region's most prestigious university. AUB was shortly followed by other universities such as Saint Joseph University, established by the Jesuits in 1875, also in Beirut, and Damascus University, which has roots dating back to 1903, when a school for teaching medicine and pharmacy was founded. Since then, dozens of universities and colleges offering higher education have emerged throughout the region. Until the 1990s, universities were primarily under the control of the state, which considered them an integral part of a modern state-led nation-building process (institutions such as AUB and Saint Joseph University were the exception). Since then, however, private universities have become more common.

While the universities of the region, with minor exceptions, generally have not yet been successful in becoming centers of research with international presence, they nonetheless always have been very important as teaching institutions in a region where a high percentage of the population is young and where higher education is greatly sought after.[1]

In examining the evolution of institutions of higher education in the region as works of architecture and planning, the design of the newly established Baghdad University in the late 1950s is of particular importance. It is the first example of a university campus in that part of the world to be designed in full and at one stage, rather than through the accretion of individual structures built over time. Moreover, the design was carried out by one of the primary pioneering masters of Modern architecture, Walter Gropius, and his firm, the Architects Collaborative of Cambridge, Massachusetts. During the 1970s and 1980s, a wave of university campus construction following the Baghdad University model overtook the region as part of an overall oil-funded building boom. The region's governments carried out a good part of that building activity to satisfy the growing need for new large-scale institutional facilities.

The long list of campuses constructed during the 1970s and 1980s includes the Arabian Gulf University in Manama by Japanese architect Kenzo Tange (d. 2005); the Jordan University of Science and Technology in Irbid by Kenzo Tange in association with Jordanian architect Jafar Tukan; Qatar University, for which the conceptual design was developed by Egyptian architect Kamal Kafrawi (d. 1993); Sultan Qaboos University in Muscat by the British firm YRM; the University of Petroleum and Minerals

in Dhahran by the American firm Caudill Rowlett Scott, later acquired by Hellmuth, Obata & Kassabaum (HOK); and the King Saud University in Riyadh by HOK.

Considering the persistent importance of accommodating the needs of a large young population, the construction of campuses for institutions of higher education has more or less continued uninterrupted even after the region's first building boom came to an end. However, the intensity with which such projects were conceived declined. With the advent of the second construction book in the first decade of the new millennium, these projects have taken on a new life. Their wide range includes al-Najah University in the Palestinian city of Nablus, where political tensions connected to the Arab-Israeli conflict are high and financial resources are restricted, and the Police Academy in Kuwait, a highly specialized training institution for which considerable financial resources are available. Also, a significant number of highly ambitious academic projects are under way. The most prominent of these are Education City in Qatar, the Masdar Institute of Science and Technology in Abu Dhabi, and the King Abdullah University of Science and Technology in Saudi Arabia. These projects are intended not only as institutions for higher education but also as centers for carrying out advanced, internationally recognized research and development in the applied sciences.

Education City, the flagship project of the Qatar Foundation, includes a number of university campuses as well as the Qatar Science and Technology Park. Through its Information and Technology Transfer Centers, it will concentrate on attracting technology-based companies, including start-ups, from all over the world, with the aim of establishing a knowledge economy in the country. The Masdar Institute of Science and Technology, located in Masdar City (which is featured in this catalogue's chapter on new cities), aims at conducting advanced research on alternative energy and sustainable technology. The King Abdullah University of Science and Technology occupies an HOK-designed campus located 80 km north of Jeddah, along the Red Sea coast. It was inaugurated in late 2009 and is intended as a global graduate research university. All are establishing partnerships with internationally acclaimed universities and corporations with strong research capacities, primarily from the United States. These include the Massachusetts Institute of Technology, Carnegie Mellon University, ExxonMobil, and Boeing. This goal of establishing universities dedicated to research rather than only teaching was also repeatedly asserted, but not realized, during the first construction boom. Whether these current projects will be successful in achieving such goals will become apparent over the coming years.

From the planning and architectural perspectives, these campuses are not the result of an organic development process that takes place over time to accommodate the growing and continuously changing needs of the institutions and their users. They all are "instant" campuses created as a result of a single design exercise, as if presenting a fixed one-time event rather than an evolving process. This often makes later additions to them appear somewhat awkward. There are, of course, numerous campuses in the region that have evolved more gradually and organically. One example is the University of Jordan. Its campus has grown significantly since its establishment on the site of an agricultural experiment station outside Amman in the early 1960s. Its buildings have been added in a generally improvised manner rather than according to a master plan. Its College of Arts and Design is the latest addition.

It is AUB that presents the most intense process of evolution for a university campus in the region, which now contains more than 70 buildings occupying an area of about 30 hectares. This is not surprising considering that it is the region's oldest. The evolution of the AUB campus has also needed to address the opportunities and challenges presented by a densely planted and sloping site in the center of Beirut overlooking the Mediterranean.

Two recent developments are shaping the planning and architectural evolution of the

AUB campus. The first is the preparation in 2002 of a master plan that is to guide the university's growth within the borders of its finite site. The master plan team involves four design groups: the American firms Sasaki Associates, Machado and Silvetti, and MGT of America, as well as the Cairo- and Beirut-based international firm Dar al-Handasa (Shaer and Partners). The master plan aims at addressing the campus in a holistic manner that examines its past, present, and future.

The second development is that the university has been undergoing a serious branding process that involves commissioning well-established architects from both inside and outside Lebanon to design a number of its new buildings. These include Nabil Gholam, Zaha Hadid, and Machado and Silvetti (who also are involved in academia as faculty members at Harvard's Graduate School of Design). The AUB projects that this chapter features present snapshots of the latest episode in its long and rich architectural evolution.

NOTE

1. The percentage of the population in the region that is under 15 years of age is lowest in Lebanon, at 27 percent, but goes up to 38 percent in Saudi Arabia and 46 percent in Yemen. Such a demographic composition has meant that demand for various institutions of education will remain high.

College of Arts and Design, University of Jordan, Amman, Jordan

Designed by Jordanian architect Meisa Batayneh Maani of Maisam Architects and Engineers.
Under construction.

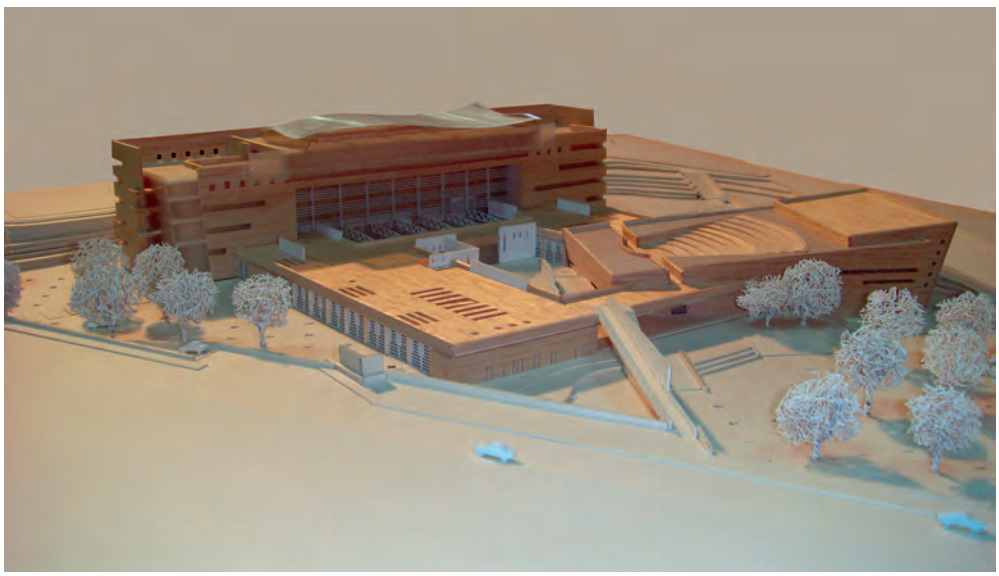
This 18,000 m^2 complex houses the various departments of the recently established College of Arts and Design. The complex has facilities for research and teaching and also will host musical, dance, and theater performances.

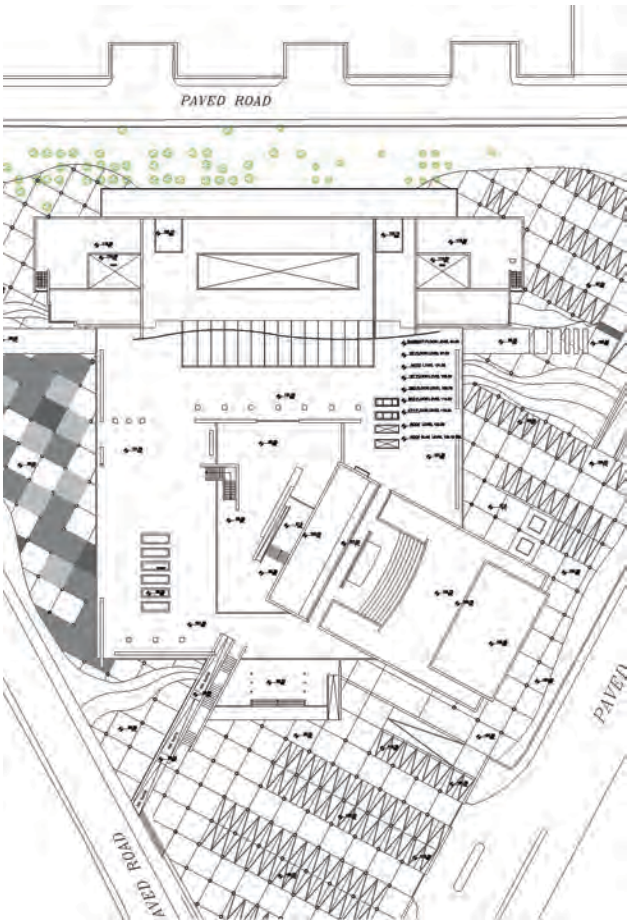
The college complex consists of three masses occupying a large triangular site located in the southern part of the university campus. The first, which the architects refer to as the "Academia" mass, is a six-story building that has an elongated rectangular plan and is aligned with the site's northern side. This building mass houses a variety of functions including studios, classrooms, exhibition areas, a library, a cafeteria, a lecture auditorium, and offices in the top two floors. It is capped by an undulating perforated fabric-like roof that shades its internal courtyard, which is intended as a main indoor congregational space.

The "Atelier" mass connects to the first building from the south. It is an expansive one-floor podium with a square plan. It houses music and dance studios as well as two small theaters, and includes a sizable courtyard intended as the college's main outdoor congregational space. The top of the podium functions as an exhibition/sculpture garden.

The "Theater" mass is situated off-center, at an angle to the other two masses, and it deliberately disrupts their more or less symmetrical planning arrangement, creating a level of dynamic tension with them. It intersects with the southern corner of the second mass and even takes up part of the courtyard. The angle at which this mass is arranged in relation to the rest of the complex allows for its alignment with the eastern side of the project's triangular site. In turn, the first building mass is aligned with the northern side. The site's third side runs along the university's main vehicular traffic artery, which links the university's northern and southern gates. This third mass houses the college's main auditorium and also features an outdoor theater on its roof.

Entrances to the college are located between the first and second building masses. The main entrance is through a portico with very slim columns located along the southern side of the college courtyard and leads to the university's main vehicular artery. In addition, a combination of ramp and stairs connect the main vehicular artery to the exhibition/sculpture garden at the top of the podium.





Figures 6.1.1–6.1.4. The College of Arts and Design at the University of Jordan consists of three interconnected masses: a six-story structure housing offices and teaching space, an expansive one-story structure housing studios and theaters that flank a large open courtyard, and the college's main auditorium. The auditorium is arranged at an angle to the rest of the complex, thus establishing a level of dynamic tension with the symmetrically arranged planning of the other two masses.

Kuwait Police Academy, Safat, Kuwait

Designed by the American firm Skidmore, Owings & Merrill (SOM) in association with American sculptor James Turrell.
Under construction.

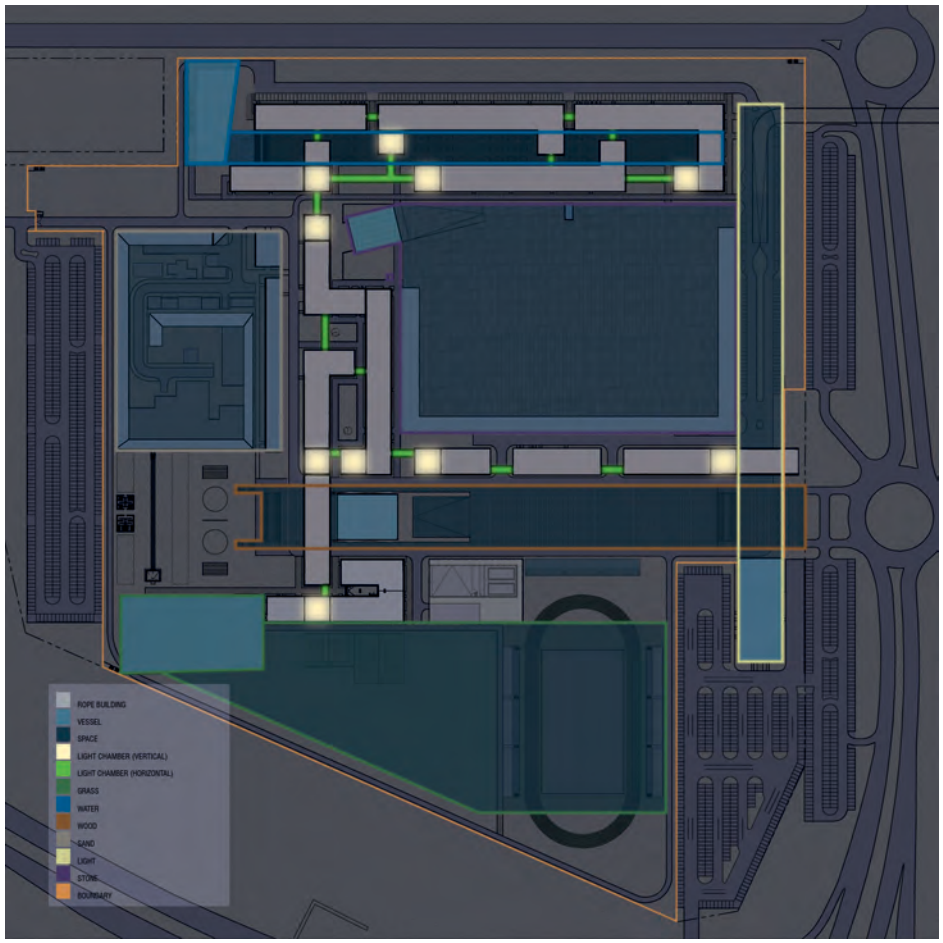
The Kuwait Police Academy quadruples the capacity of an existing 30-hectare facility and expands it to include 17 buildings. The complex is to be used for training and housing the Kuwaiti police officers' corps and will be the academy's administrative and symbolic center.

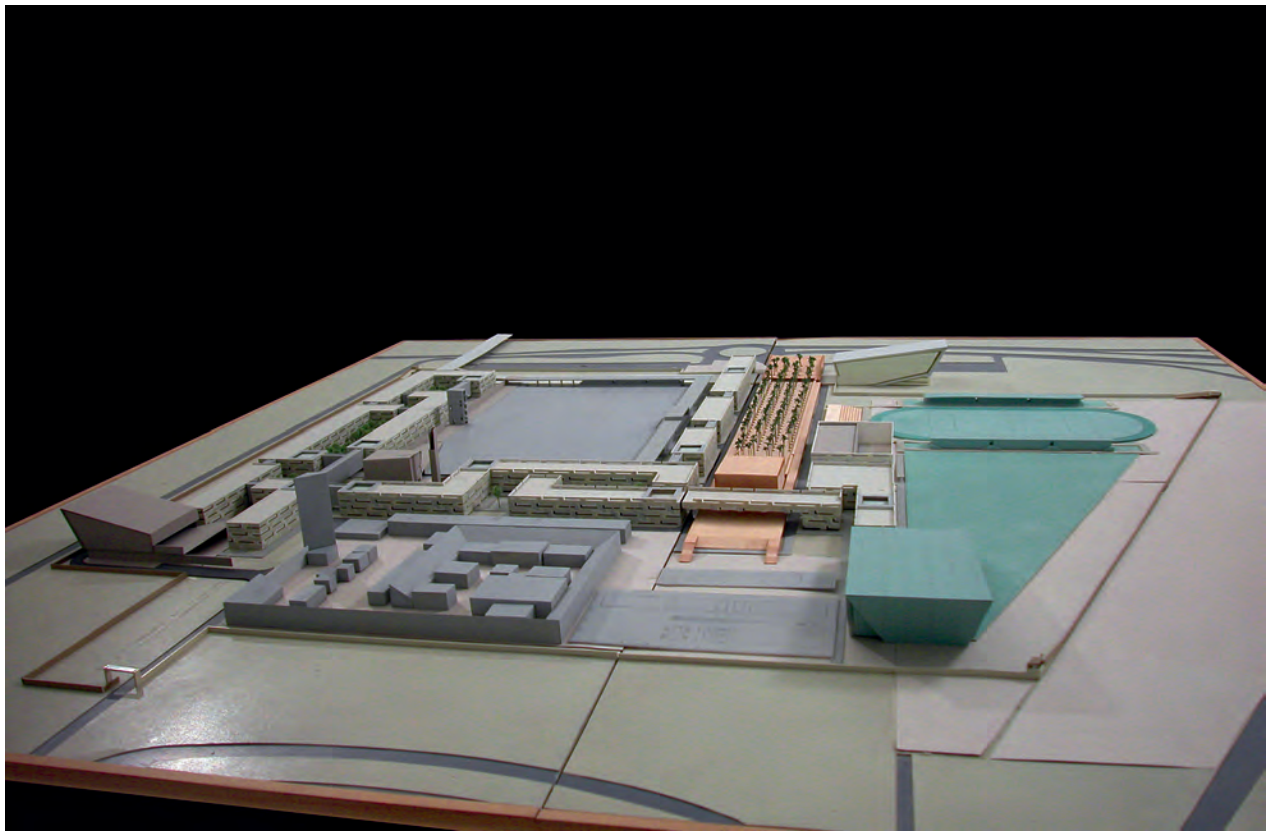
SOM's site plan employs what are identified as two building types. The first consists of linear "rope" buildings. These contain dormitories, classrooms, and administrative facilities, which are connected and define the Academy's sequence of spaces. The second set of buildings includes "vessel" buildings, which house special functions, such as the library and mosque, and serve as focal points in the vast complex. Each vessel building is paired with an open space and with a specific material (wood, grass, sand, or water).

In order to filter the harsh desert sun, the Academy's buildings feature interlocking precast concrete panels that contain fractured glass to create patterns of refracted light.

Sculptor James Turrell, who emphasizes the relationship between light and space in his work, designed "light chambers" for the entrances of the dormitory and the administration buildings.

The designers present aspects of the complex as alluding to elements of the Arabic heritage. Accordingly, the vessel buildings, which incorporate concrete-walled chambers enveloped within glass pavilions, are intended to recall images of nomadic tents when viewed from the exterior. Moreover, the interlocking precast concrete panels of varying shapes for the facades of the modularly designed rope buildings are intended to allude to the Arabic *Kufic* calligraphic script.





Figures 6.2.1–6.2.4. The design theme behind the Kuwait Police Academy incorporates what is identified as "rope" and "vessel" buildings. The rope buildings are linear structures that contain dormitories, classrooms, and administrative facilities. The vessel buildings, which serve as focal points in the complex, house special functions such as the library and mosque. Each vessel building is paired with its own open space and with a distinctive material.

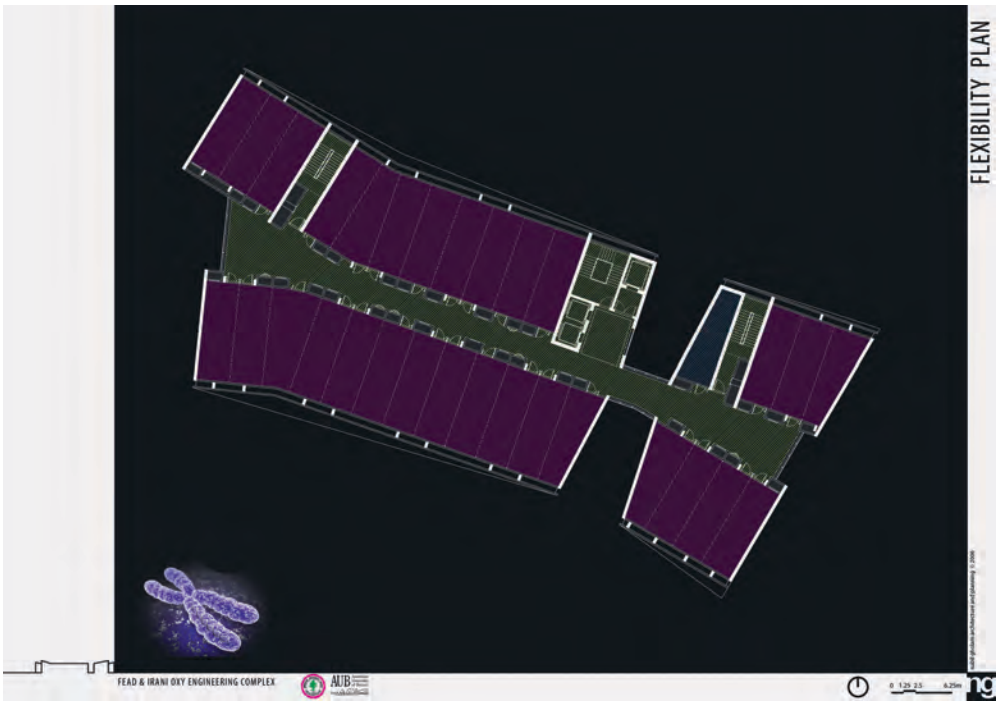
Irani/Oxy Engineering Complex, American University of Beirut (AUB), Beirut, Lebanon

Designed by Lebanese architect Nabil Gholam of Nabil Gholam Architects.
Under construction.

This winning competition design comprises the Irani/Oxy Engineering complex at AUB as well as the master plan for the Faculty of Engineering and Architecture District on the university campus as part of the new overall university master plan. The master plan for the faculty aims at revitalizing an underused part of the campus and integrating it within the overall campus. It is the third major architectural project that the university has undertaken, all selected through a competition process. The other two are the Suliman Olayan School of Business by Machado and Silvetti Associates and the Issam Fares Institute by Zaha Hadid.

The $10 million engineering complex, which will serve the civil, environmental, mechanical, chemical, electrical, and computer engineering departments, features twin, bent linear ribbons of labs located along an east-west axis flanking a spine consisting of circulation spaces and mechanical systems. It also includes an atrium that opens up views to the Mediterranean and frames the university's late nineteenth-century Clock Tower, a primary visual symbol of the university. Each floor occupies 1,500 m^2 of column-free space with shifting partitions. The spaces primarily will be used as laboratories, each of which will have its own access from the central circulation spine.

The project emphasizes energy conservation and is the first in Lebanon to be registered for certification by the international green building system LEED (Leadership in Energy and Environmental Design). It incorporates an interactive double skin that provides added protection from the sun and increased thermal insulation along the southern and northern sides. This consists of a layer of double glass, perforated sliding aluminum panels, and projecting stainless steel canopies. When closed, the sliding panels shield the building interior from the sun and provide an additional layer of thermal protection. When opened, they allow for uninterrupted open views. In contrast, the eastern and western facades are primarily blank to prevent the morning and afternoon summer sun from entering the building. They are articulated by horizontal indented strips corresponding to the building's floor lines and are only interrupted by thin vertical window slits. The eastern and western facades also are sheathed with a pale yellow limestone cladding that aims at contextualizing the building within the campus's older structures.



Figures 6.3.1–6.3.4. The Irani/Oxy Engineering Complex features twin, bent linear ribbons of laboratory spaces served by a central spine. The design of the complex also emphasizes energy conservation through elements such as perforated sliding aluminum sunscreens and projecting stainless steel canopies that provide protection from the sun.

Issam Fares Institute for Public Policy and International Affairs, American University of Beirut (AUB), Beirut, Lebanon

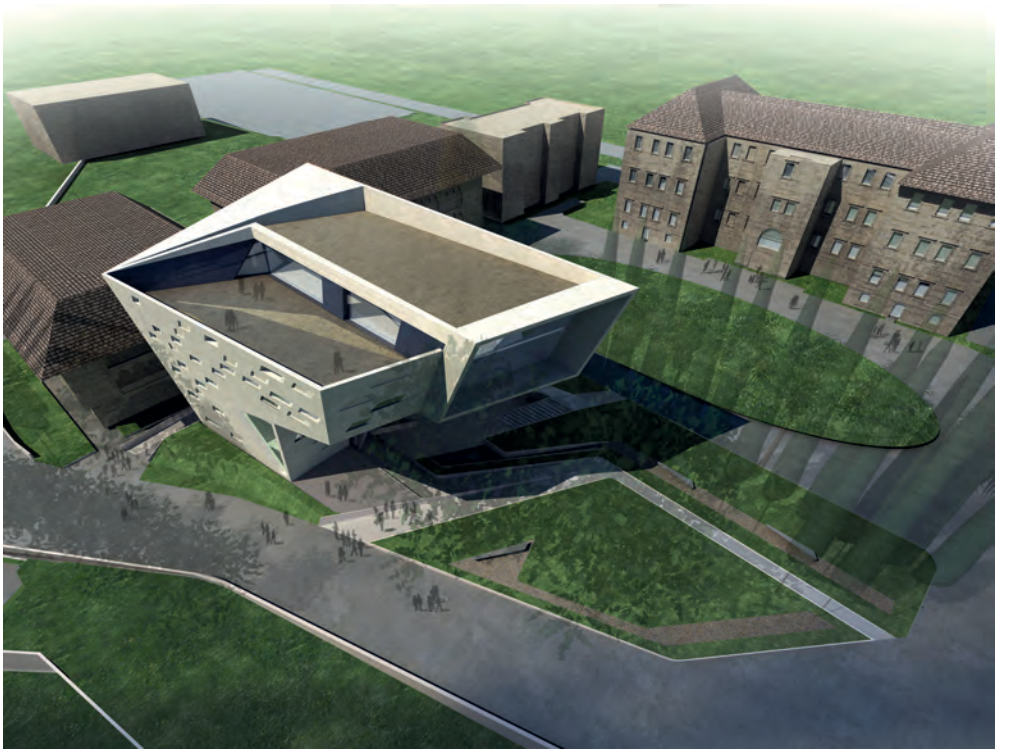
Designed by Iraqi-born British architect Zaha Hadid of Zaha Hadid Architects.
Under construction.

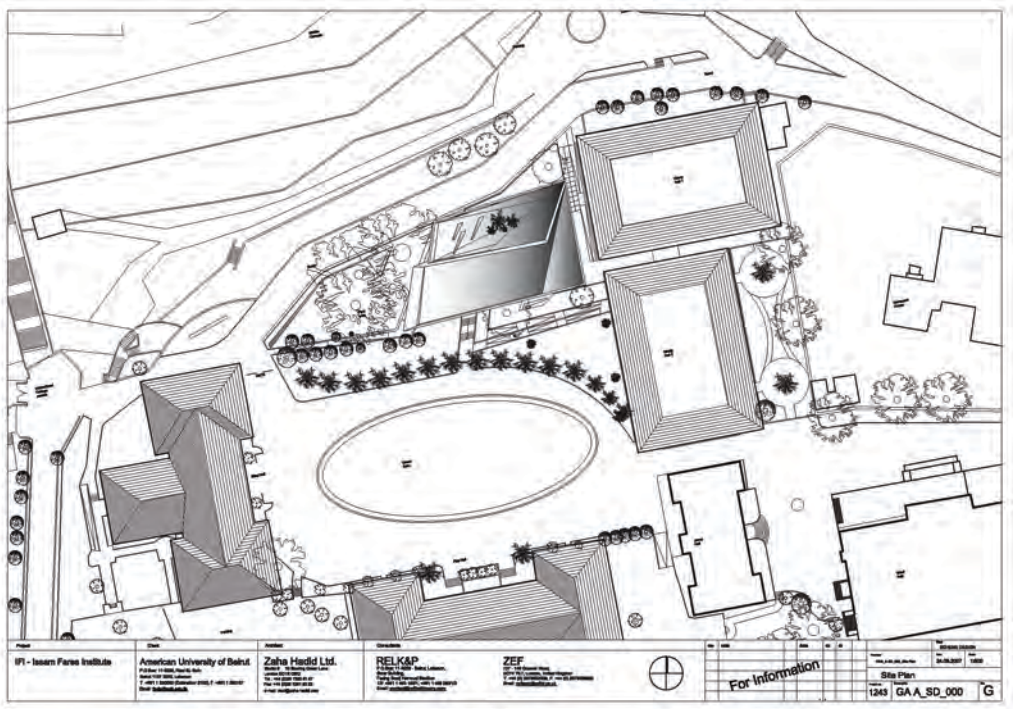
The Issam Fares Institute has been conceived as a think tank and a center for research and scholarly activity that deals with public policy and international relations, with an emphasis on the Middle East. Zaha Hadid was selected in 2006 to design the Institute's building through a competition to which a number of Lebanese and foreign architects were invited. AUB is Zaha Hadid's alma mater, as she had studied mathematics there before completing her education at the Architectural Association in London.

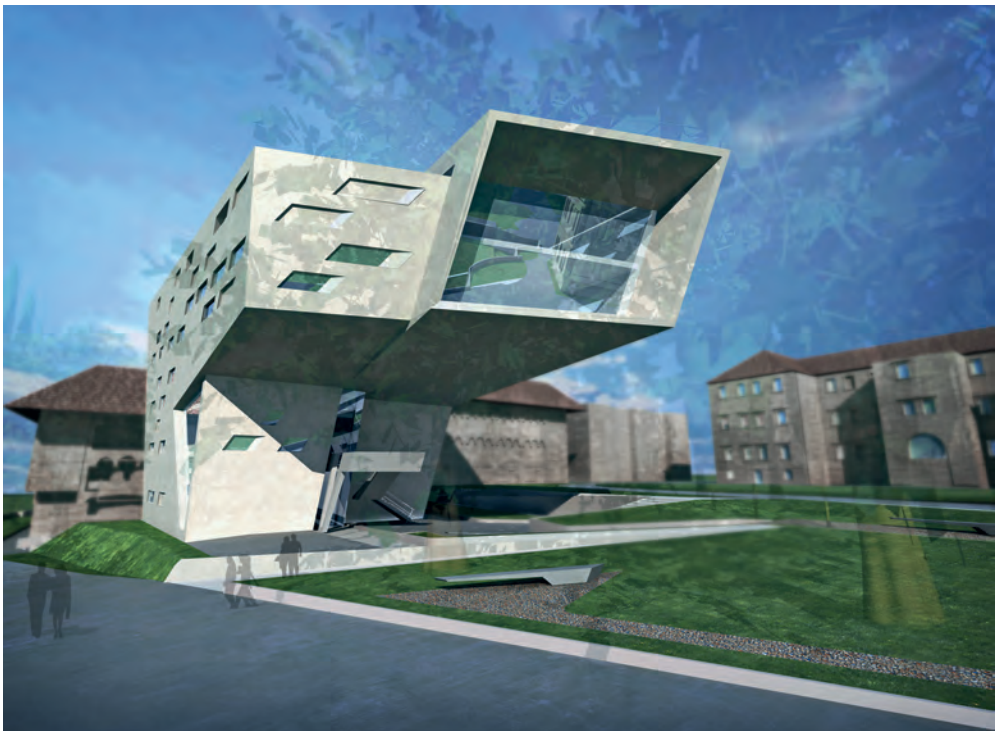
The building is located in the southern part of the AUB campus and is situated according to the new master plan developed for the university. The 1,850 m^2 structure is expected to cost $2.5 million, and it replaces the university's infirmary building, which is being relocated within the campus.

The project presented the challenge of working within the context of a campus characterized by successive layers of interventions dating to its establishment about a century and a half ago. Hadid's design attempts to establish links to the geometry of the surrounding pedestrian paths, which take their shape from negotiating the campus's steeply sloping terrain. However, it also has a strong, if not aggressive, presence within its context. The concrete building has leaning load-bearing exterior walls, cantilevered forms, and punched-in openings in the shape of parallelograms. Hadid describes the design as one that "emerges fluidly from the geometry of the surrounding network of paths," with a resulting form that "flows as an undulating extension of the site moving up to create different dynamic spaces and then vanishes back into the terrain."

The ground floor includes conference/workshop spaces and lounges, with an auditorium located in the basement. The top floor contains a reading room that opens onto a roof terrace to take advantage of the surrounding views. Offices and lounge spaces occupy much of the remaining three floors.







Figures 6.4.1–6.4.4. Winning the design competition for the Issam Fares Institute at the American University of Beirut provided Zaha Hadid with the opportunity to design a project at her alma mater. The building design, with its leaning concrete bearing walls and parallelogram-shaped window openings, is inspired by the geometry of the surrounding network of paths.

Suliman Olayan School of Business, American University of Beirut (AUB), Beirut, Lebanon

Designed by the Boston-based American firm Machado and Silvetti Associates.
Under construction.

Machado and Silvetti Associates present this 12,000 m^2 proposal, which received the Progressive Architecture 2004 Citation Award, as one that aims at achieving "maximum pedestrian connectivity, desirable lines of vision and the proper building mass (building height and profile, etc.) according to its location and its relations to adjacent buildings."

The site plan for the Suliman Olayan School of Business includes a large green oval located along an axis that is part of AUB's new master plan. The axis is intended to bring students down from other parts of the AUB campus to the elevated edge of the Beirut Corniche overlooking the Mediterranean, where the building site is located. The building is conceived as one that brings the street into the campus, while giving the School of Business its own nameable and identifiable space.

The building is an L-shaped four-story complex with a ground floor consisting of four enclosed segments traversed by paths. These are grouped around the school's central space, a triangular open courtyard intended as an area of congregation. The ground level is conceived as a cluster of individual glass "pavilions" that allow for visual and physical permeability as students enter or pass through the building. It contains various public and administrative facilities, including the school's lobby, auditorium, library, café and adjoining terrace, as well as student facilities, mailboxes, and related social programs. A corner of the building also provides views of the Mediterranean.

The grounds of the complex include a stone garden wall and planters that define the campus edge as well as a pedestrian gate, the only one along the Corniche. This gate will constitute the northern terminus (the southern one being the university's Main Gate) of the only north-south promenade connecting the New Lower Campus, in which it is located, to the Upper Campus.

The undergraduate education facilities are located on the second floor, graduate education—the MBA program—on the third, and the Executive Education program on the uppermost fourth floor, which also contains the Dean's Office in its corner. All overlook the building's central triangular courtyard. A number of double-height courtyards also are located throughout the complex to create an environment that is amenable to increased interaction among faculty and students.

The design makes architectural references to the Mediterranean Lebanese architecture of the 1960s. This is evident in the use of perforated limestone facades that function as external screens and of irregular stone external paving units. The perforations in the facades become larger at the higher levels to take advantage of views to the sea. The screens also are intended to take on a climatic role as they supply shade and include cavity walls that provide thermal protection in both summer and winter. In addition, the cavity walls incorporate what are identified as wind towers. Along with the central courtyard, these help circulate cool air in the building during the summer months.

Figures 6.5.1–6.5.4. The American University of Beirut is the only university in the region undergoing an extensive branding process. This includes commissioning new buildings such as the Suliman Olayan School of Business. Within the context of the AUB campus, the School of Business is intended to connect the campus to the Beirut Corniche, along which it is located, and to bring students down from the upper parts of the campus through a north-south promenade.

New Campus of al-Najah National University, Nablus, Palestinian Authority

Designed by Jordanian architect Jafar Tukan of the Consolidated Consultants for Engineering and Environment–Jafar Tukan Architects.
Under construction, with some parts already completed.

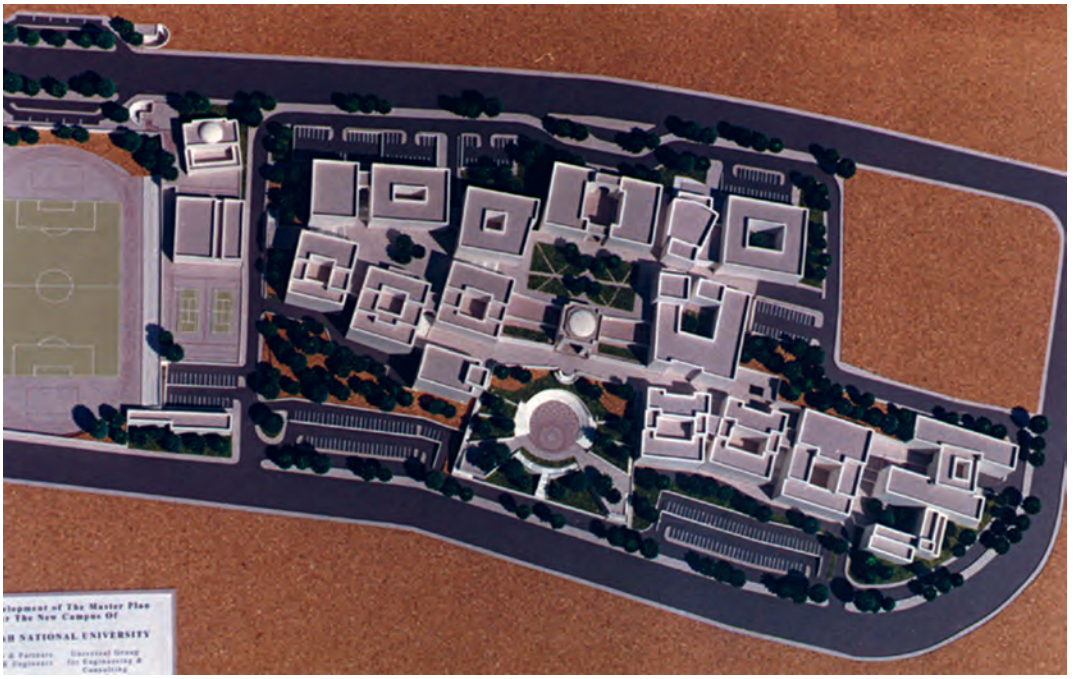
Jafar Tukan designed this project in the city of his birth, where his family has strong historical roots. The New Campus of al-Najah National University is located at the west of Nablus, the largest city in the West Bank, in proximity to the university's old campus, which was built during the 1980s. The 12-hectare campus is situated on a hilly site that slopes down from south to north. It accordingly was designed so that its buildings are arranged in rows forming terraces. These follow the site's contour lines and are separated from each other by intervals of 4 m in height.

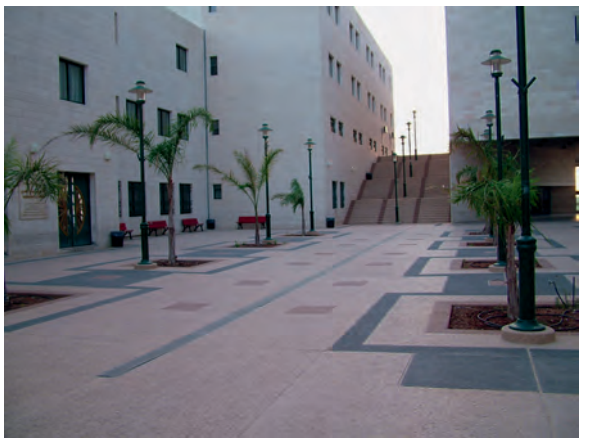
The campus features an internal road that loops along its inner border and incorporates two main circulation spines: an "Educational Spine," which runs along an east-west axis, and a "Student Facilities Spine," which runs along a north-south axis. The circulation along those axes expresses a hierarchy of spaces. Accordingly, small courtyards are placed within individual faculty buildings. In turn, these connect through staircases to larger plazas along which groups of faculty buildings are located. These plazas, in turn, lead to the main central plaza. Shading is provided in these various spaces to encourage their use during hot weather.

The campus's zoning arrangement places the sports facilities and the university mosque at the site's eastern edge. These facilities are intended to serve both the university community and adjacent neighborhoods. Accordingly, this zone of the university has been designed in a manner that allows it to function without disturbing day-to-day activities in the campus. The university soccer field, which occupies the campus' eastern border, is intended as a buffer zone between the campus and its surroundings.

This easternmost zone is preceded by the zone devoted to the sciences and engineering faculties. In turn, this leads to the central campus zone, which is referred to as the Student Activities zone. This zone includes the library, an auditorium, restaurants, shops, the student activities building, as well as the main administration building. The administration building is conceived as the heart of the campus. It has two sections separated by a courtyard. One section consists of administrative offices, and the second includes facilities that directly serve students, such as the registrar's office, medical clinic, and computer center. As with the mosque and sports facilities, the library and auditorium are intended to serve the community at large and therefore are located close to the campus's main central southern entrance. They also have an independent public circulation system that allows them to be accessed separately from the rest of the campus.

Further west is the medical faculties area, which includes the schools of medicine, nursing, dentistry, and pharmacy. Finally, the female dormitories are located along the campus's western edge, which is its quietest area.





Figures 6.6.1–6.6.4. The design of the new al-Najah National University campus accommodates its site's north-south slope by arranging rows of buildings along a series of terraces. The buildings also are arranged along two axes. an east-west axis referred to as an "Educational Spine," and a north-south axis referred to as a "Student Facilities Spine."

Qatar Science and Technology Park, Doha, Qatar

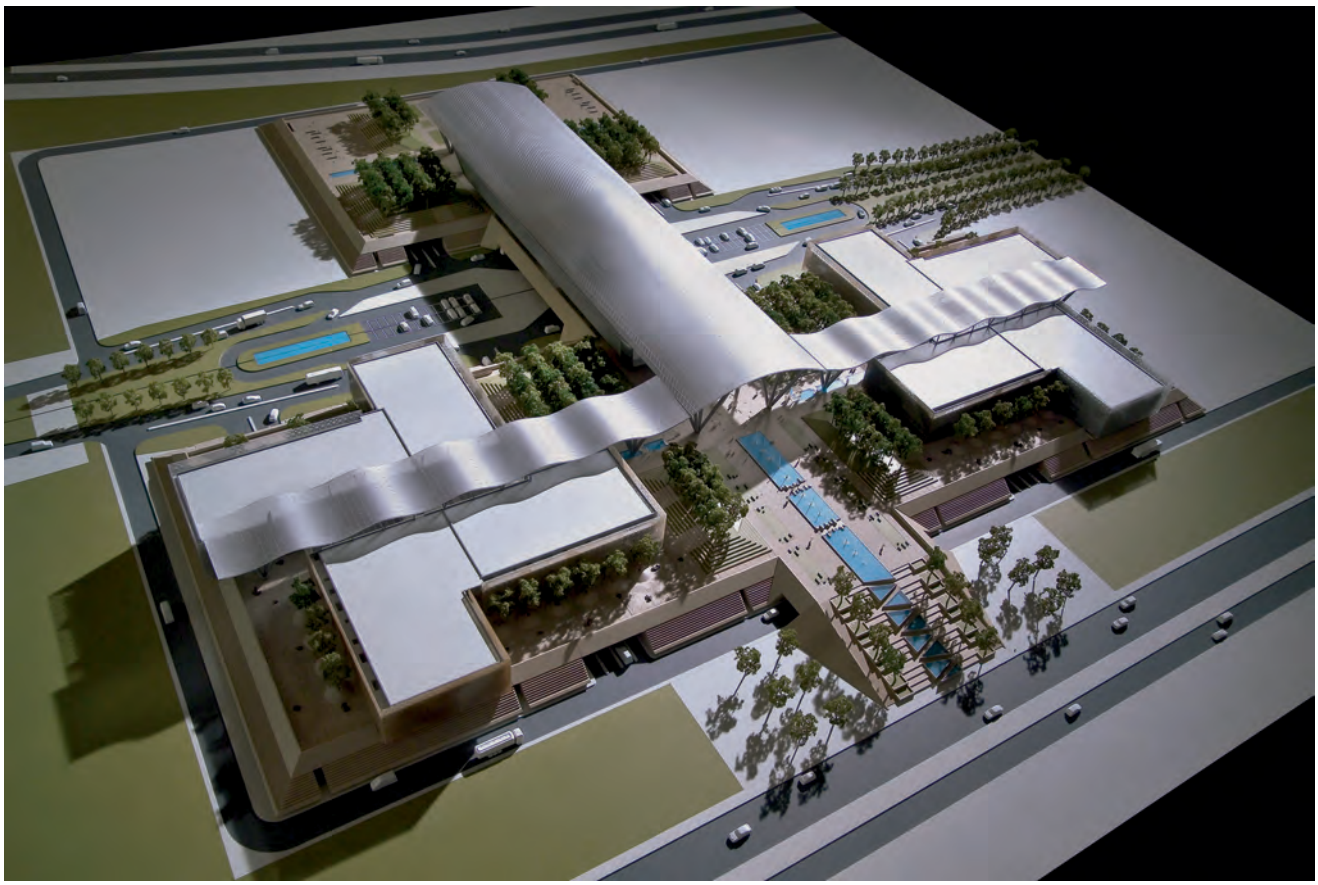
Master plan and stage I designs prepared by the Australian firm Woods Bagot.
Completed in 2009.

This 120-hectare science and technology park is part of the Education City master plan and is intended as the largest commercial research and technology park anywhere. It is envisioned as hosting technology-based companies from around the world, and also as an incubator for start-up enterprises, all part of an attempt to develop a knowledge economy in Qatar.

The park includes what is identified as Innovation and Technology Transfer Centers. These are placed in a pair of two-story buildings intended to accommodate large-scale laboratory equipment and office space in a flexible manner.

Phase I of the project features a 12,000 m^2 Incubator Center that also includes administrative and business offices. These are located along what is identified as a "ceremonial axis," which is a central spine that cuts through the complex. This, in turn, is flanked on both sides by the first two Innovation and Technology Transfer Center buildings, each of which occupies 20,000 m^2. The three buildings are sheathed by a connecting "veil structure" that provides shaded paths combined with misting and humidifier sprays to allow people to comfortably move between them and to use the outdoor spaces during hot weather. Grids of the local Sidr tree (*Ziziphus spinachristi)* define landscaped areas and provide shade.

Companies establishing themselves in the Qatar Science and Technology Park in the future will be able to design and build their own facilities there.



Figures 6.7.1–6.7.5. The Qatar Science and Technology Park is intended to host technology-based companies from around the world and to take on the role of incubator for start-up enterprises. The first phase of the master plan features three large buildings linked by a connecting "veil structure." The structure provides shaded paths combined with misting and humidifier sprays to allow people to comfortably use outdoor spaces during hot weather.