



# Education and research programs at FEA in areas related to the oil and gas sector



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**The American University of Beirut (AUB)** has been accredited since 2004 by the **Commission on Higher Education of the Middle States Association of Colleges and Schools**

**The Faculty of Health Sciences'** Graduate Public Health program is the first such program to be accredited by the **Council on Education for Public Health (CEPH)** outside of North America.

**The Rafic Hariri School of Nursing** is the first nursing school beyond American territories that has the BSN and MSN programs accredited by the **Commission on Collegiate Nursing Education (CCNE)**.

The undergraduate and graduate programs at **the Suliman S. Olayan School of Business** are accredited by the **Association to Advance Collegiate Schools of Business (AACSB)**.

The undergraduate Engineering programs at AUB's **Faculty of Engineering and Architecture** are accredited by the **Accreditation Board for Engineering and Technology (ABET)**.

44 Bachelor Programs are offered:

## Faculty of Arts and Sciences

Applied Math  
 Arabic Language and Literature  
 Archeology  
 Art History  
 Biology  
 Chemistry  
 Computer Science  
 Economics  
 Education/Elementary  
 English Language  
 English Literature  
 Geology  
 History  
 Mathematics  
 Media and Communications (New)  
 Petroleum Studies  
 Philosophy  
 Physics  
 Political Studies  
 Psychology  
 Public Administration  
 Sociology-Anthropology  
 Statistics  
 Studio Arts

## Faculty of Agriculture and Food Science

Agribusiness  
 Agriculture  
 Food Science and Management  
 Landscape Design and Eco-Management  
 Nutrition and Dietetics  
 Veterinary Sciences

## Faculty of Engineering and Architecture

Architecture  
 Chemical Engineering  
 Civil Engineering  
 Computer and Communications Engineering  
 Construction Engineering  
 Electrical and Computer Engineering  
 Industrial Engineering (New)  
 Graphic Design  
 Mechanical Engineering  
 Petroleum Engineering (Forthcoming)

## Faculty of Health Sciences

Environmental Health  
 Medical Laboratory Sciences  
 Public Health

## Hariri School of Nursing

Nursing

## Olayan School of Business

Business Administration





# Graduate Degree Programs

## 64 Master Programs

### Faculty of Arts and Sciences

Anthropology  
Arabic Language and Literature  
Archeology  
Biology  
Chemistry  
Computational Science  
Computer Science  
Economics  
Education  
English Language  
English Literature  
Environmental Policy Planning  
Financial Economics  
Geology  
History  
Mathematics  
Media Studies  
Middle East Studies  
Philosophy  
Physics  
Political Studies  
Psychology  
Public Administration  
Sociology

### Faculty of Agriculture and Food Science

Agricultural Economics  
Animal Science  
Ecosystems Management  
Food Technology  
Irrigation  
Nutrition  
Plant Protection  
Plant Science  
Poultry Science  
Soil Science

### Faculty of Engineering and Architecture

Applied Energy  
Architecture  
Chemical Engineering  
Civil Engineering  
Computer and Communications Engineering  
Electrical and Computer Engineering  
Engineering Management  
Environmental and Water Resources Engineering  
Environmental Technology  
Mechanical Engineering  
Urban Design  
Urban Planning and Policy

### Faculty of Health Sciences

Environmental Health  
Epidemiology  
Population Health  
Public Health

### Faculty of Medicine

Biochemistry  
Doctor of Medicine  
Human Morphology  
Microbiology and Immunology  
Nursing  
Pharmacology and Therapeutics  
Physiology  
Neuroscience

### Olayan School of Business

Master of Business Administration  
Executive Master of Business Administration  
Human Resource Management

### Division of University Interdisciplinary Programs [Master Programs Under Review]

Master of Energy Studies  
Master of Environmental Studies  
Master of Public Policy and International Affairs



- Arabic Language and Literature
- Arabic and Middle Eastern History
- Cell and Molecular Biology
- **Civil Engineering**
- **Environmental and Water Resources Engineering**
- **Electrical and Computer Engineering**
- **Mechanical Engineering**
- Theoretical Physics
- Biomedical Sciences



- **Munib and Angela Masri Institute of Energy and Natural Resources**

## Research Themes

The Munib R. and Angela Masri Institute of Energy and Natural Resources supports advancing technical knowledge, scientific insight, and professional dissemination activities in the following priority research areas:

- Alternative Energy & Energy Efficiency
- Exploration & Recovery of Oil & Gas
- Water & Mineral Resources
- Efficient Downstream Processing of Oil & Gas
- Energy Management & Resource Planning Policy
- Research & Technology Need Assessment



- The Institute grants at least **\$100,000** per year on faculty research projects.
- We currently have 12 funded projects on the priority research themes.

## **Material Characterization**

- Vapor-Liquid Equilibrium calculations for oil and gas mixtures,
- Mechanical/Physical characterization of crude oil and heavy distillates such as asphalt and heavy oil

## **Design for Offshore Structures (Blast, Fire, seismic)**

- Quantifying site specific seismic hazards and generating earthquake spectral charts in accordance with modern international codes of practice which are needed for seismic design of offshore rigs & facilities.
- Offshore structures are susceptible to fire and blast. We have ongoing research to ultimately provide new design guidelines for fire and blast resisting structures (safe design and operation of offshore oil and gas facilities)
- The analysis and design of foundations of oil rigs (both fixed and floating platforms) and the analysis and design of pipeline and flow systems that transport the oil to the rigs.
- Machine learning and pattern recognition applied to the multidimensional and large data collected during seismic events.
- Computer aided design
- Optimize drilling and production machinery and processes

## **Instrumentation, Control, and Wireless Sensing**

- Developing advanced analytics system for the Lebanese oil wells covering different aspects of automation, modeling, optimization, forecasting, faults modeling and prediction, and yield analysis.
- Instrumentation to measure the thickness of a slick of oil in the open sea.
- Hybrid wireless network system that will intelligently bring the data together (from sensors, Internet, databases) in a format that facilitates processing by humans or machines.
- Wireless sensor networks for monitoring the status of drilling operations and health monitoring of equipment.
- Design and control of station using environmental monitoring buoys operated on solar and wave energy.

## **Big Data**

- Developing a distributed computer system for accelerating the process of handling seismic data, which is characterized as huge (“BIG Data”) and drawing up conclusions as to where petroleum may be found
- Data (database) management, data analytics, and data mining.



## Modeling and Simulation

- Flow and polymer rheology
- Ultrasonic stimulation of oil wells for secondary oil recovery
- Reservoir modeling and production optimization (using Petrel and Eclipse) for enhanced oil recovery,
- Simulation of multi-fluid dispersed systems,
- Downstream applications : reactive extraction experiments, flocculation/deflocculation operations, studying the interfacial characteristics of dispersions, and modeling downstream processes using process simulators, e.g. Aspen Plus and Aspen HYSYS.
- Create virtual prototypes to simulate and capture the detailed workings of the equipment and processes used in gas and oil industry
- Understanding root cause and reduce failure, improve product reliability, evaluate new designs

## **Project Evaluation**

- Analyzing/benchmarking any capital project in the future, whether it entails exploration and drilling, offshore facilities and pipelines, or onshore facilities.
- Evaluating capital projects (e.g., building new refinery, gas plant, power plant, pipeline) from various perspectives including business planning, cost estimating, scheduling, contracting, staffing, and project execution plans.
- Production planning and control, Lean Construction, Supply Chain Management, Integrated Project Delivery Systems, Work Structuring, Target Value Design.

## **Risk Assessment and Worker Productivity**

- Assess and improve passive methods of cooling the body, such as phase change cooling vests, during work periods to increase productivity.
- Develop the predictive tool of human discomfort and error probability into safety enhancement procedures and human reliability assessment.
- Smart Fields - Effectively monitoring, predicting and proactively responding to oil and gas field events.
- Ensure equipment reliability and worker safety.

## Remediation of Oil Spills

- Bioremediation of contaminated shorelines. First controlled experiment performed on the shorelines of Delaware.
- Use of dispersants to retain oil in the water column and accelerate bioremediation.
- Assessment of environmental impact of oil spills and gas well blowout.
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- Advanced Software for reservoir modeling, computer aided design
- Wireless network lab
- Signal Processing lab
- Instrumentation and control lab
- Environmental Lab
- Material Characterization Lab
- Chemical Engineering Labs
- Structures and Seismic Lab
- Experimental Fluid dynamics Lab
- High Performance Computing
- Kamal A. Shair Central Research Science Laboratory (CRSL)
- Engineering shops

