ORYX GTL EXCELLENCE PROGRAM

SUMMARY OF QATARI STUDENT WORK AND CONTRIBUTIONS
TAMUQ in collaboration with founding supporter ORYX GTL has launched the program on October 20th, 2015, to prepare highly skilled engineers and technical staff needed to lead and operate Qatar’s world-class industrial facilities.

Advance Qatar’s leading role in GTL field and excellence program in natural gas processing for value-added chemicals and fuels.

Develop courses/programs in the area of GTL as well as synthetic fuels characterization and processing. Provide professional services and training courses within Qatar in areas relevant to GTL.

Support Qatar’s 2030 vision in building human and research capital in the clean energy field.

Service and research
- Formulate and characterize GTL synthetic fuels and chemicals
- Develop new generation products from ORYX GTL syn-crude
- Investigate techno-economic assessments of GTL related products and processes

Teaching, and training
- Develop special courses and training programs within TAMUQ
- Establish student internship programs in ORYX GTL
- Enhance student research experiences in TAMUQ
- Establish special GTL programs for graduate students of TAMUQ
- Support ORYX GTL recruitment efforts

Community service
- Support ORYX GTL Community Awareness Programs about GTL and the global search for cleaner Vision
TEACHING & COMMUNITY OUTREACH PROGRAMS
Four high school students participated in this program in our Fuel characterization lab (FCL). The two weeks program aimed to familiarize the prospective students with gas and fuels technology. The program (see attachments) included hands-on engineering activities and experiments.

Upon completion of this Program, students learned about:
- Characterizing liquid fuels from different sources (conventional and renewable fuels)
- Fuel properties
- Blending of fuels to achieve targeted property enhancements
The TEES Gas and Fuels Research Center (GFRC), under the umbrella of the ORYX GTL Gas-to-Liquid Excellence Program, launched an outreach program to educate middle and high school Qatari students about the role of natural gas in the global energy market. The program presents simple models to students about the technologies used for natural gas utilization in Qatar. GFRC researchers visited the Arrazi Elementary School, Al Wakrah Girls Preparatory school, Tariq bin Ziyad Secondary School and Gharnata Girls Preparatory fall of 2016 (see copy of brochure used in the program).
# ORYX GTL SCHOOL & COMMUNITY ORIENTATION PROGRAMS

To support STEM program and orientation on natural gas roles in energy market

## Fall 2016

<table>
<thead>
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<th>School</th>
<th>Date</th>
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<tbody>
<tr>
<td>Arrazi Boys Preparatory school</td>
<td>Oct. 23, 16</td>
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<tr>
<td>AlWakrah Girls Preparatory school</td>
<td>Nov. 13, 16</td>
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<tr>
<td>Tariq bin Ziyad Secondary school</td>
<td>Nov. 27, 16</td>
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<tr>
<td>Gharnata Girls Preparatory school</td>
<td>Nov. 27, 16</td>
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## Spring 2017

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<tr>
<td>Amna Bint Wahab Girls Preparatory school</td>
<td>March, 2017</td>
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<tr>
<td>Rouda bint Mohammed Secondary school</td>
<td>April, 2017</td>
</tr>
<tr>
<td>Musab bin Omair Secondary school</td>
<td>May, 2017</td>
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</tbody>
</table>
ARRAZI BOYS PREPARATORY SCHOOL (AROUND 60 STUDENTS ATTENDED)
OCTOBER 23, 2016
ALWAKRAH GIRLS PREPARATORY SCHOOL (AROUND 90 STUDENTS ATTENDED)

NOVEMBER 13, 2016
TARIQ BIN ZIYAD SECONDARY SCHOOL (AROUND 80 STUDENTS ATTENDED)
NOVEMBER 27, 2016
GHARNATA GIRLS PREPARATORY SCHOOL (AROUND 90 STUDENTS ATTENDED)
NOVEMBER 27, 2016
NEW GRADUATE AND UNDERGRADUATE COURSE

Chemical Engineering, CHEN 489-689 Gas and Petrochemicals Processing

Chemical Engineering and Petroleum Engineering, CHEN 459/ PETE 489 Midstream in Oil and Gas Industry and natural Gas Processing Treatment and Processes

Midstream
Natural gas cleaning

Upstream
Exploration
Identify, pursue, capture, and evaluate high-quality exploration opportunities

Development
Develop safe, cost-effective facilities for oil & gas fields identified by Exploration

Production
Oil and gas fields in production

GTL fuels environmentally attractive

Downstream
Refining & Supply
Efficient network to provide clean fuels, lubricants, and other high-value products

Fuels Marketing
Products sold to customers around the world

Lubricants & Specialties

Graph showing emissions comparison:
- Fischer-Tropsch Ethanol
- Gasoline
- Diesel
- Ethanol
- Methanol
- No emissions

Note: The graph compares emissions of different fuels, highlighting the environmental benefits of Fischer-Tropsch Ethanol.
SPECIAL COURSE ON NATURAL GAS PROCESSING TECHNOLOGIES

BLOCK I

Global Energy Market
Qatar’s Energy Resources and Its Potentials

Dr. Nimir O Elbashir
Chemical Engineering, Texas A&M University at Qatar

HAMAD BIN KHALIFA UNIVERSITY'S
Executive Master in Energy and Resources

Block IV
Catalysis and the Petrochemical Industry

Qatar’s aspiration to become the “World Gas Capital” led to the building the largest GTL and LNG plants in the world.
ORYX GTL EXCELLENCE IN CHEMICAL ENGINEERING SEMINAR SERIES
Designing Fuel
- Computer Aided Model developed by DTU
- Composition of Shell Pearl Kerosine (SPK) along with additives are determined through the developed model and their relevant target properties are predicted.

Blending to Prepare Surrogate Mixtures
- Blends of SPK prepared in FCL

Experimental Analysis According to ASTM Standards
- Different properties are to be tested, e.g: Lower Heating Value (LHV), Flash point, Reid Vapor Pressure (RVP), Density, Kinematic viscosity, Heat of Vaporization, and Heat of combustion.
This course introduces the principles of design, testing, operation and maintenance of transformers in power systems and provide the participants with the necessary knowledge on the power and distributed transformers typically used for oil and gas industry.

This course has been designed to provide participants with an understanding of the proper construction, operation, and maintenance of power transformers, while emphasizing on the technology related to power transformers used within the industry power systems.

Four ORYX GTL technical staff have been sponsored by the program.
SPECIAL COURSE FOR ORYX GTL (ATTENDED BY 15)
FUNDAMENTALS OF GAS-TO LIQUID & ORYX GTL PLANT
OCTOBER 26, 2016

Session I:
Natural Gas Processing and Its Importance to the Energy Market: GTL versus LNG
Natural gas role in the energy market

Session II:
Sasol’s Gas-to-Liquid Technology

Session III:
Environmental Impact of GTL Transportation Fuels

Session V:
Lab Session

Session VI:
Visualization of the ORYX GTL Plant