



The Gulf Nuclear Infrastructure Institute (GNEII)

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at **KHALIFA**
UNIVERSITY





Background

GNEII is designed to be:

- A **regionally based** institute for development of human resource capability
- A part of nuclear energy 3S (safety, safeguards & security) infrastructure for **development & education** in a regional context
- A **strategic effort** to develop a responsible nuclear energy culture in future program decision-makers

****Not intended to train nuclear engineers or operators, intended instead to educate and prepare future leaders of region's nuclear energy programs*



Background

GNEII is a **Strategic Partnership**

UAE PARTNER

Under the sponsorship of and implemented by:

- Khalifa University of Science, Technology & Research

With Support from

- The Federal Authority for Nuclear Regulation (FANR)
- The Emirates Nuclear Energy Corporation (ENEC)
- Critical Infrastructure and Coastal Protection Authority (CICPA)

US PARTNER

Under the sponsorship of:

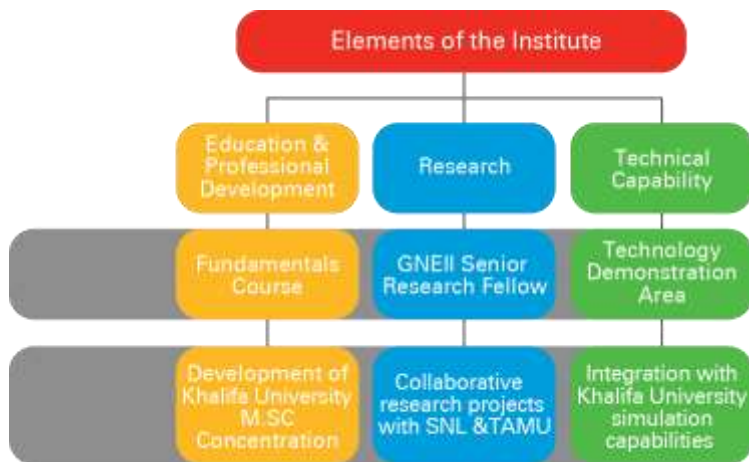
- **DOE/NNSA** – International Nuclear Safeguards and Engagement Program (INSEP)
- **DOS/CTR** – Partnership for Nuclear Security (PNS)

Implemented by:

- Sandia National Laboratories (**SNL**)
- Texas A&M University (**TAMU**)



GNEII - The INSTITUTE



GNEII Fundamentals Course

FUNDAMENTALS COURSE	# UAE Fellows			# Non-UAE Fellows	Total	Countries Represented
	ENEC	FANR	CICPA			
2011	4	5	1	0	10	UAE
2012	3	9	2	8	18 (22)	UAE, Kuwait, Saudi Arabia, Qatar, Jordan
2013	4	6	3	7	20	UAE, Saudi Arabia, Qatar
2014	6	3	3	0	12	UAE

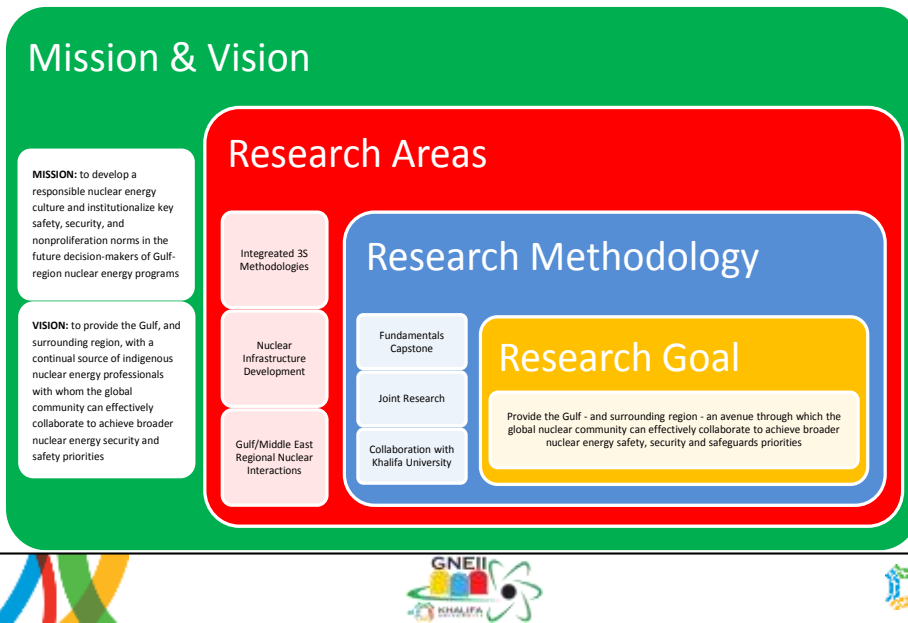
Total Fundamentals Course Alumni - **60 (64)**
UAE - **49**



GNEII 2015 Fundamentals Course Curriculum	
11-Jan Week 1	Intro, 3S, Critical & System Thinking, Scientific Method, Need for Nuclear, History, Components, Economics
18-Jan Week 2	Nuclear & Radiation Physics, Neutron Interactions, Basic Reactor Theory, Radiation Effects, Nuclear Technology
25-Jan Week 3	Reactor Operations, Power Plant Systems, Nuclear Fuel Cycle
1-Feb Week 4	Nuclear Nonproliferation History & Policy
8-Feb Week 5	SAFEGUARDS (2 weeks) State System of Accountancy Controls, Non-Destructive and Destructive Analysis, Bulk and Item Facilities
15-Feb Week 6	
22-Feb Week 7	Independent Capstone Research
1-Mar Week 8	SECURITY (2 weeks) Probabilistic Risk Assessment, Security Culture, Physical Protection Systems, Detect, Delay, Respond, Evaluate
8-Mar Week 9	
15-Mar Week 10	SAFETY (2 weeks) Safety Culture, Engineered Safety Features, Emergency Response Planning, Radiation Safety
22-Mar Week 11	
29-Mar Week 12	Capstone Research & Preparation (2 weeks)
5-Apr Week 13	
12-Apr Week 14	Capstone Preparation & Dry Runs
20-21 Apr	SYMPOSIUM: Capstone Presentations & Certificates



Research and GNEII

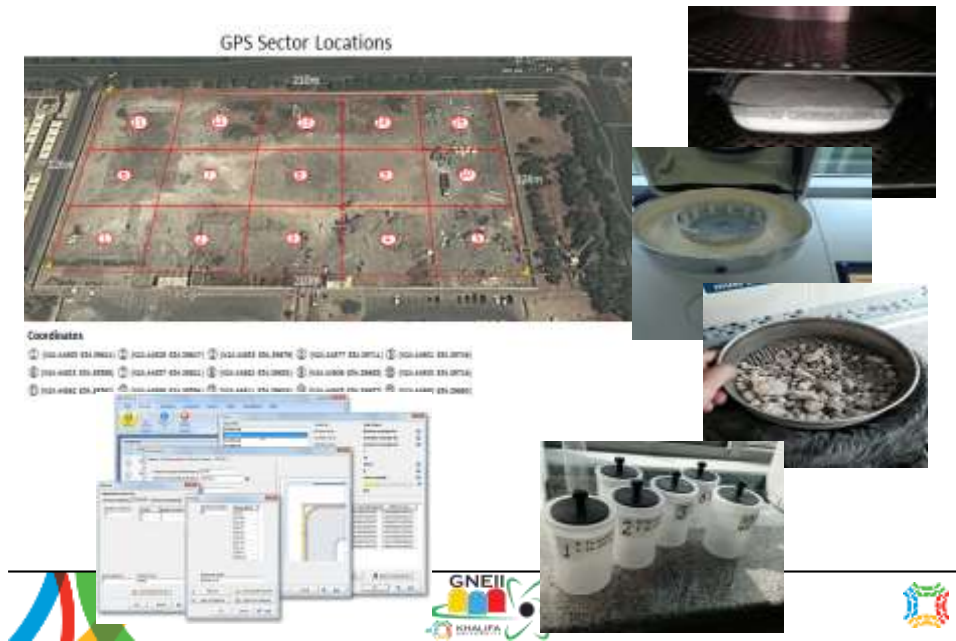


Ongoing and Future Research Efforts

- Radiation Baseline Measurements in Abu Dhabi Urban Environment
- A Search for Time-Variations in Radioactive Half-Lives
- Gamma-ray Detector Efficiency Transfer through Monte Carlo Modeling
- Border Security in Collaboration with Abu Dhabi Customs

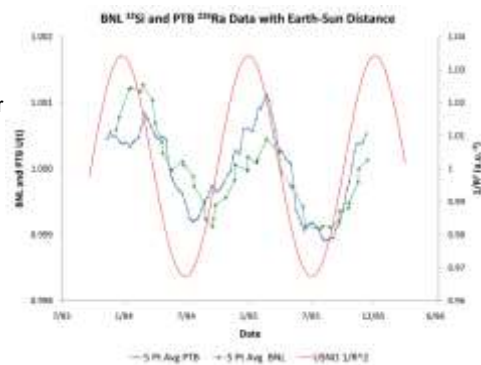


Radiation Baseline in AD Urban Environment



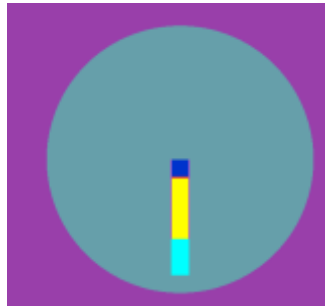
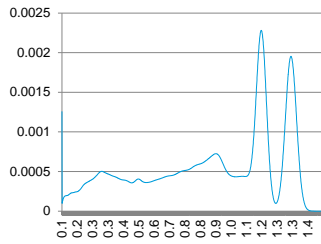
Time-Variations in Radioactive Half-Lives

- Purdue University has published data showing a slight variation in decay rates (0.1%) on a yearly cycle
- Khalifa University is setting up various detector systems to investigate Purdue University's claim
 - x2 shielded NaI detectors
 - x2 shielded GM detectors
 - Beta liquid scintillation detector
 - Alpha liquid scintillation detector
- Khalifa University is conducting both experimental and theoretical work related to this project



Monte Carlo Detector Modeling

- ANSWERS MCBEND Monte Carlo radiation transport software
 - model NaI, HPGe and CZT detectors
 - benchmark with experimental data
 - benchmark with ISOCS, ANGLE



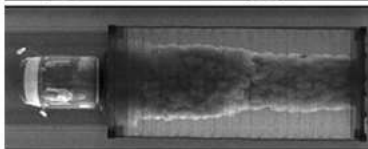
Abu Dhabi Port Security



Z Backscatter, Left



Z Backscatter, Top View



Z Backscatter, Right



* www.ortec-online.com



** www.as-e.com



Summary

- GNEII is based on three pillars: education, research and technical capabilities
- Research pillar is currently being actively developed in 3S areas
- Regional collaboration is of great priority
- Alan Heyes “An Assessment of the Nuclear Security Centers of Excellence”:
 - “An example is the Gulf Nuclear Energy Infrastructure Institute (GNEII) which was established to strengthen nuclear energy security, safeguards, and safety infrastructure throughout the Gulf region”



SHUKRAN

For more information or to nominate GNEII Fellows, please contact us:

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