The Gulf Nuclear Energy Infrastructure Institute (GNEII): Two Years On

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Presentation Overview

- Background
- The Institute
  - History
  - Educational Philosophy
    - Systems Approach and Integrated 3S
  - GNEII’s Pillars
    - Education, Research, Technical Capability
- Recent Milestones & Progress
- Indigenization & Expansion
History

- Initial Conceptual Discussions (Spring/Summer 2009)
- International Consultations
- Gulf/Middle East Regional Scoping Trip (Fall 2009)
- Letter of Intent Signed (March 2010)
- Memorandum of Understanding (February 2011)
- GNEII Pilot Course (Spring)
- International Conferences

2011

- GNEII Fundamentals Course
- International Conferences
- GNEII Symposium

2012

The Institute

Elements of the Institute

- Education
- Research
- Technical Capability

Immediate

- Fundamentals Course
- GNEII Senior Research Fellow
- Technology Demonstration Area

Future

- Development of Khalifa University Graduate Programs
- Collaborative research projects with partners/stakeholders/implementers
- Integration with Khalifa University simulation capabilities
Educational Philosophy

A Systems Approach to the Nuclear Energy Enterprise

- Cultural
- Political
- Social
- Technical
- Financial
- International

How to optimize these interactions?

Responsible Nuclear Enterprise

Integrated 3S Curriculum

3S Breakdown
- “Technical Design & Objectives”
- “Operational Objectives”
- Direct & Indirect connections
- Technical & operational components
GNEII Fundamentals Course

Nuclear Energy Technical Foundations
- Critical Thinking, Systems Approach, Physical Foundations, Nuclear Fuel Cycle

Nonproliferation, Safeguards, Safety & Security
- International Nonproliferation Regime, International Safeguards, Safety Culture and Risk Analysis, Physical Protection and Security Culture, 3S Interactions

Capstone Research
- Educational and intellectual foundation for conducting independent research
- Bridges GNEII’s Education and Research elements

Outline for 2013 GNEII Fundamentals Course

<table>
<thead>
<tr>
<th>2013</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
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<tr>
<td>17-Feb</td>
<td>Introduction to 3S, Critical Thinking, and Systems Thinking</td>
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<tr>
<td>24-Feb</td>
<td>Technical Foundations: Introduction to Nuclear Physics, Radiation, &amp; Nuclear Power</td>
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<td>3-Mar</td>
<td>Capstone Intro / 3S Interactions</td>
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<td>24-Mar</td>
<td>Technical Foundations: Nuclear Materials Control, Nonproliferation History &amp; Policy</td>
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<td>SAFEGUARDS</td>
<td>(Tools, Systems Design, Applications, Assessments, Case Studies, Exercises)</td>
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<td>31-Mar</td>
<td>Model NFC Exercise</td>
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<td>7-Apr</td>
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<td>14-Apr</td>
<td>SAFETY (Tools, Systems Design, Applications, Assessments, Case Studies, Exercises)</td>
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<td>28-Apr</td>
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<td>5-May</td>
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<td>12-May</td>
<td>Review, Exam &amp; Case Study</td>
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<td>19-May</td>
<td>Capstone Preparation</td>
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<td>26-May</td>
<td>SYMPOSIUM: Capstone Presentations &amp; Certificates</td>
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Capstone Preparation

CONTE 2013
**Research**

**Capstone Research**
- Independent research projects on integrated 3S issues for nuclear power programs

**GNEII Research Fellow**
- Lead GNEII Researcher
- Mentor to GNEII Fellows
- Develops the GNEII Research Framework
- Past Research Fellow (2012) Dr. B.K. Kim
  - Korean Atomic Energy Research Institute, ROK – SSAC, IAEA/TC & SAGSI

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**Mission & Vision**

**VISION:** to provide the Gulf, and surrounding region, with a continual source of indigenous nuclear energy professionals with whom the global community can effectively collaborate to achieve broader nuclear energy safety, security and safeguards priorities

**MISSION:** to develop a responsible nuclear energy culture and institutionalize key safety, security, and nonproliferation norms in the future decision-makers of Gulf-region nuclear energy programs

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**Research Areas**

- Integrated 3S Methodologies
- Nuclear Infrastructure Development
- Gulf/Middle East Regional Nuclear Interactions

**Research Methodology**

- Research Goal

**Technical Capability**

**Technology Demonstration Area**
- Hands-on equipment
  - Radiation monitors, detectors, etc.
  - “3S Laboratory”

**Nuclear Engineering Dept. at Khalifa University**
- Radiation Sciences Lab
- Reactor Analysis & Simulation Lab
- Environmental Radiation Lab

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**Environmental Radiation Lab**

**Reactor Analysis, Design and Instrumentation Controls Lab**

**Radiation Sciences Lab**
Year Three
2013 Plans & Schedule

• **GNEII Fundamentals Course**
  - February 17\(^{th}\) - May 16\(^{th}\)
  - 12 week course, plus one-week mid-semester break
  - 5 weeks Technical Foundation
  - 6 weeks Integrated 3S
    - 2 weeks each of focused safeguards, safety, and security
  - 1 week dedicated Capstone (with additional Capstone throughout)

• **GNEII Symposium (3\(^{rd}\) Annual)**
  - May 19-20
  - GNEII Fellows’ Capstone presentations

• **Technical Demonstration Area**
  - New radiation-measurement equipment

• **Research Component**
  - Papers & conference presentations
  - American Nuclear Society (ANS)
  - Institute for Nuclear Materials Management (INMM)

Indigenization & Expansion

A Self-sustaining Institute

• Increase integration with Khalifa University
  - Nuclear Engineering and Civil and International Security Departments
  - Nuclear Engineering faculty as Instructors
• Self-sustaining 5 years after implementation

Guest lecturer program

• WINS, IAEA, MESIS
• Select GNEII graduates
• Leverage UAE relationships with global nuclear energy community.

Regional Expansion

• Qualified participants from Gulf Cooperation Council (GCC) Countries
  - UAE (2011 - 2013)
  - Saudi Arabia (2012 & 2013)
  - Qatar (2012 & 2013)
  - Kuwait (2012 & 2013)
  - Oman (2013)
• Other regional participants
  - Jordan (2012 & 2013)
  - Morocco (2013)
• Other countries as appropriate and demand dictates
Expanding GNEII’s Mission & Scope

• Additional core & elective courses
  – Education opportunities beyond the Fundamentals Course
• New Nuclear Engineering Master’s Degree Theme
  – Nuclear Safeguards & Security
    • New supporting electives
  – Fuel Cycle & Materials
    • Formerly Fuel Cycle & Security
  – Reactor Design & Analysis
• Expand applied research capabilities
  – Integrate GNEII expertise with Khalifa University’s research capabilities
    • Nuclear Engineering and Civil & Infrastructure Security
• Regional workshops on Integrated 3S and related topics
  – Future outreach and distance learning within the region

Measured Expansion for Sustainability

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Thank you!

For more information:

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