

## Course Abstract:

This course is an introduction to non-destructive assay (NDA) measurement techniques that may be used for nuclear material accountancy by the International Atomic Energy Agency (IAEA) or within a State's System of Accounting and Control (SSAC). The course is designed to teach students the fundamentals of gamma-ray detection and provide an introduction to neutron detection. The course will explore the application of NDA measurements techniques typically used for international safeguards. Students will also receive a refresher on the nuclear fuel cycle and learn about the basics of nuclear material accountancy, including IAEA sampling plans and material balance evaluations.

Day 1	Monday, September 9, 2019 TA-66 Training Facility	
Time	Topic or Activity	Presenter or Responsible Party
8:45	Welcome	
9:00	Safety and Security Briefing	Bill Geist
9:20	Introductions of Participants and Staff	All
9:40	Coffee Break	All
10:00	Non Proliferation, the IAEA Safeguards System, and the Importance of Nuclear Material Measurements	
10:30	Nuclear Fuel Cycle, Nuclear Materials Subject to Safeguards, and Safeguards Measurements	
11:00	Basics of Gamma Ray Detection	
12:30	Lunch	All
1:30	Laboratory Exercise: Basics of Gamma Ray Detection	
4:30	Daily Review and Wrap Up	
5:00	Depart for hotel	

<b>Day 2</b> <span style="float: right;">Tuesday, September 10, 2019 TA-66 Training Facility</span>		
Time	Topic or Activity	Presenter or Responsible Party
8:30	Isotope Identification	
9:10	Enrichment Measurements with low-resolution detectors	
10:00	Coffee Break	All
10:40	Isotopic Composition Measurements with high-resolution detectors	
11:20	HM-5 (Isotope Identification, Attribute, and Enrichment Measurements)	
12:00	Lunch	All
1:00	Laboratory Exercise: Isotope Identification <b>Group A &amp; Group E</b>	
1:00	Laboratory Exercise: Enrichment Measurements with low-resolution detectors: <b>Group B</b>	
1:00	Laboratory Exercise: Isotopic Composition Measurements with high-resolution detectors: <b>Group C</b>	
1:00	Laboratory Exercise: HM-5 <b>Group D</b>	
4:30	Daily review and wrap up.	
5:00	Depart for hotel	

<b>Day 3</b> <span style="float: right;">Wednesday, September 11, 2019 TA-66 Training Facility</span>		
Time	Topic or Activity	Presenter or Responsible Party
8:30	Laboratory Exercise: Isotope Identification <b>Group B</b>	
8:30	Laboratory Exercise: Enrichment Measurements with low-resolution detectors: <b>Group C</b>	
8:30	Laboratory Exercise: Isotopic Composition Measurements with high-resolution detectors: <b>Group D</b>	
8:30	Laboratory Exercise: HM-5 <b>Group A &amp; Group E</b>	
12:00	Lunch	All
1:00	Laboratory Exercise: Isotope Identification <b>Group C</b>	
1:00	Laboratory Exercise: Enrichment Measurements with low-resolution detectors: <b>Group D</b>	
1:00	Laboratory Exercise: Isotopic Composition Measurements with high-resolution detectors: <b>Group A &amp; Group E</b>	
1:00	Laboratory Exercise: HM-5 <b>Group B</b>	
4:30	Daily Review and Wrap Up	
5:00	Depart for hotel	

Day 4 <span style="float: right;">Thursday, September 12, 2019 TA-66 Training Facility</span>		
Time	Topic or Activity	Presenter or Responsible Party
8:30	Laboratory Exercise: Isotope Identification <b>Group D</b>	
8:30	Laboratory Exercise: Enrichment Measurements with low-resolution detectors: <b>Group A &amp; Group E</b>	
8:30	Laboratory Exercise: Isotopic Composition Measurements with high-resolution detectors: <b>Group B</b>	
8:30	Laboratory Exercise: HM-5 <b>Group C</b>	
12:00	Lunch	All
1:00	Basics of Neutron NDA	
2:00	Laboratory Exercise: Basics of Neutron NDA	
4:30	Daily Review and Wrap Up	
5:00	Depart for hotel	

Day 5 <span style="float: right;">Friday, September 13, 2019 TA-66 Training Facility</span>		
Time	Topic or Activity	Presenter or Responsible Party
8:30	Neutron based NDA Measurements for Safeguards	
9:00	Demonstrations of Neutron Assay Systems (AWCC, HLNC, UNCL)	
11:00	Coffee Break	All
11:10	IAEA Sampling Methodology	
11:35	NDA Measurement Contribution to the Material Balance Evaluation	
12:00	Lunch	All
1:00	Good Practices for NDA Measurements	
1:30	Application of NDA Techniques in Support to State's Needs - Discussion	All
2:30	Wrap-up and Course Evaluation	
3:00	End of course	