



STARTING FALL 2022

With nuclear and radiological materials poised to play a significant role in national and international plans to develop safe, secure, clean, and affordable power, and in scientific and medical innovation, it is critical that facility designers, operators, and regulators understand foundational nuclear security. The Nuclear Material Accountancy and Control (NMAC) course (UNM 20242) was developed to ensure that the next generation of nuclear security experts understand the principles, concepts, technologies, and practices used in accounting and controlling nuclear material at nuclear facilities.

Course Description

This course serves as an advanced, comprehensive study of the principles, concepts, technologies, and practices used in accounting and controlling nuclear material at facilities that process and/or handle such material. Students will be exposed to technical concepts and methods, and they will be faced with open-ended questions and laboratory exercises that will allow them to learn and demonstrate mastery of these concepts. Particular attention will be paid to radiation detection and measurement concepts that apply to NMAC.

Student Knowledge Expectations

All students are expected to have some familiarity with nuclear facilities and competency with some level of data analysis software (Microsoft Excel at a minimum), as well as basic mathematics. University students are expected to have some background in the nuclear fuel cycle, nuclear physics, radiation detection and measurement, simulation, and programming in their choice of language (MatLab, C/C++, Root, Python, etc.). Students should be experienced with independent research to obtain relevant material including (but not limited to) nuclear data, computational tools, manuals, etc. There will be some modeling covered toward the end of the course; students are encouraged to acquire and install MCNP early in the course in order to allow ample time to resolve any issues.

COURSE DETAILS

Level: This course is intended for professionals, upper-level undergraduate students, and graduate students who have or plan to have careers in nuclear engineering, nuclear physics, nuclear security, nuclear safeguards, or any involvement with nuclear facilities in general.

Credits: 4 CEU
Start: Tuesday, Aug. 23, 2021
Times: Tu/Thu, 1:30-3:45 pm MT
Location: TBD
Cost: \$1200

To register:

- Log on to the UNM Continuing Education website at ce.unm.edu
- Search for Course 20242
- Select Course 20242, Nuclear Material Accountancy and Control (NMAC)
- Review the course description and select Add to Cart
- Pay for the course with a credit card by selecting Checkout; to use a



Week	Topics	Assignment Info
1	<ul style="list-style-type: none"> Intro to NMAC Part I Intro to NMAC Part II 	HW1 Assigned
2	<ul style="list-style-type: none"> Intro to NMAC Part III Matter, Nuclear Matter, and Why it Matters 	Intro to NMAC Quiz
3	<ul style="list-style-type: none"> Uranium and Plutonium – What are they? Some Nuclear Physics – Decay and Radiation Generation 	HW2 Assigned
4	<ul style="list-style-type: none"> Radiation Interactions with Matter Radiation Detection and Measurement Part I 	
5	<ul style="list-style-type: none"> Radiation Detection and Measurement Part II Gamma NDA 	Detection and Measurement Quiz HW3 Assigned
6	<ul style="list-style-type: none"> Neutron NDA Destructive Assay * 	NDA/Detection Quiz
7	<ul style="list-style-type: none"> Statistics in NMAC Part I Statistics in NMAC Part II 	
8	<ul style="list-style-type: none"> Midterm Exam * Fall Break, Thursday 10/14 	
9	<ul style="list-style-type: none"> Statistics Lab Exercise/Demonstration * Calorimetry Demonstration * 	Lab writeup assigned
10	<ul style="list-style-type: none"> Holdup Measurements * UNM Research Reactor Tour and Discussion 	
11	<ul style="list-style-type: none"> Laboratory Exercise – Gamma Measurements with NaI(Tl) Laboratory Exercise – Gamma Measurements with HPGe 	Lab writeup assigned
12	<ul style="list-style-type: none"> Laboratory Exercise – Neutron measurements with SNAP Nuclide Identification Exercise/Demonstration (FRAM) * 	
13	<ul style="list-style-type: none"> Intro to MCNP MCNP Burnup Calculations 	Nuclide ID Quiz, Modeling HW4 Assigned
14	<ul style="list-style-type: none"> Nuclear Material Movements & Tamper-Indicating Device Demonstration * Thanksgiving break Thursday 11/25 	
15	<ul style="list-style-type: none"> Portal Monitors * NMAC Case Studies Part I 	HW5 Assigned
16	<ul style="list-style-type: none"> NMAC Case Studies Part II Review for Final Exam 	
17	<ul style="list-style-type: none"> Final Exam Week (exact date and time TBD) 	

*Guest lecturer/proctor

CONTACT INFORMATION:

Christopher Johnson, crj@lanl.gov
Jacob Stinnett, stinnett@lanl.gov