

## External Radiation Dosimetry

April 28-May 2, 2025 ♦ “Live” Online Instruction

Course Fee: \$1395

This 5-day course provides a review and update of recommended approaches to external dosimetry with a focus on the nuclear power industry (but the discussions on personnel monitoring and portable survey instrumentation are applicable to any radiation protection program). Also, included is a discussion of special exposure situations including hot particle exposures and multiple badging requirements. Standards applicable to personnel monitoring devices and portable survey instruments will be discussed in addition to recommended calibration techniques.

### A COURSE DESIGNED TO HELP YOU UNDERSTAND ...

- The basic principles used to determine absorbed dose equivalent to the whole body, skin, extremities and affected organs.
- Recent ICRP recommendations and limits for external exposures.
- Operating principles of personnel monitoring devices, including the advantages and limitations of various TLD types.
- The latest techniques for determining shallow skin dose from hot particles.
- Record keeping and reporting of regulatory compliance.
- Assessment of the need and approach to multiple badging.
- The proper selection of portable survey instruments to assess exposure rates.
- The principles of effective ALARA program design and documentation.



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# COURSE TOPICS

## Using Units and Dimensions

- Units and dimensions
- Special units
- Manipulating units
- Exponential and unit notation
- Orders of magnitude
- Fundamental conversions
- Radiological Unit conversions
- Greek Alphabet

## Charged Particle Interactions

- Types of charged particles
- Types of charged particle interactions
- Transmission through material
- Charged Particle Detection Methods

## Photon Interactions

- Types of photon interactions
- Transmission through material

## Neutron Interactions

- Neutrons and their classification
- Sources of neutrons
- Neutron interactions
- Quantification of neutron interactions
- Neutron cross sections
- Important neutron interactions
- Neutron detection mechanisms
- Interaction analogies

## Radiation Quantities

- Development of radiation quantities
- Fields of photons
- Energy in materials
- Dose to tissues
- Deep and shallow doses (external)
- Committed dose quantities (internal)
- Collective dose quantities
- Comments on regulatory quantities

## Radiation Detector Fundamentals

- Basic approach to detection
- Types of detection systems
- Detector performance
- Gas-filled detectors
- Scintillation detectors
- Semiconductor detectors

## Gamma Ray Spectroscopy

- Motivation for gamma ray spectroscopy
- Gamma ray spectroscopy equipment
- Spectral features
- Factors affecting spectra
- Spectrum analysis methods

## Practical Detectors

- Choosing the correct detector
- Practical hints on operating detectors
- Portable survey instrumentation
- Area and portal monitors
- Friskers
- Air sampling
- Finding and characterizing spills
- Wipe tests
- Environmental monitoring with integrating dosimeters
- Field monitoring (surveillance of large areas)
- As-measured vs. as-reported data
- In-situ gamma ray spectroscopy
- High radiation field environments
- Two-dimensional and three-dimensional radiation field characterization

## External Dose Estimation and Shielding

- Approaches to external dose limitation
- Flux and fluence
- The specific gamma ray constant
- Point sources
- Dose to a volume due to a point source
- Integrating over volume sources and targets
- Line sources
- Plane circular sources
- Cylindrical sources
- Simple approach to shielding problems: Buildup Factor
- Buildup factor
- Shielding charged particles
- Shielding photons
- Shielding neutrons
- ICRP and NCRP reports
- Shielding codes: Point kernel approaches
- Shielding codes: Monte Carlo approaches

## Personnel Dosimetry

- Requirements for external dosimetry
- Detectors
- Personnel Dosimeter (Badge) Design

## Regulations and Practices

## External Dose Problem Solving

## External Dosimetry Knowledge Review

## HOW TO REGISTER ...

Visit our website at [www.tmscourses.com](http://www.tmscourses.com) and register online, or call 860-738-2440.

Registration questions can be emailed to [info@tmscourses.com](mailto:info@tmscourses.com).