

**Course Objectives/Course Outline**  
**Spokane Community College**

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**Course Title:** Radiation Physics

**Prefix and Course Number:** RAD 132

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**Course Learning Outcomes:**

**By the end of this course, a student should be able to:**

- Describe and list the major sources of natural and manmade radiation
- Define terms: exposure, absorbed dose, and dose equivalent
- Name the units of radiation (R, RAD, and REM) for each given quantity
- Describe the interrelationship of the units of radiation
- Define and explain the inverse square law
- Describe the basic components of an x-ray tube and their functions
- Define electromagnetic radiation and give examples (EM)
- Recognize and explain the wave formula
- Define the quality of the x-ray beam
- Describe the production of x-rays
- Define the half value layer (HVL)

**Course Outline:**

- I. Basic Concepts of Radiation Science
  - A. Matter and Energy
  - B. Ionizing Radiation
- II. Radiographic Definitions and Mathematics Review
  - A. Definitions of Radiography
  - B. Mathematics and Algebra Review
- III. Fundamentals of Physics of Radiation Science
  - A. Units of Measurement
  - B. Standards of Measurement
  - C. Systems of Measurement
  - D. Mechanics
- IV. The Atom
  - A. Centuries of Discovery
  - B. Combinations of Atoms
  - C. Fundamental Particles
  - D. Atomic Nomenclature
  - E. Atomic Structure
  - F. Radioactivity
  - G. Types of Ionizing Radiation
- V. Electromagnetic Radiation
  - A. Photons
  - B. Electromagnet Spectrum
  - C. Wave/Particle Duality
  - D. Matter and Energy Review

- VI. Electricity
  - A. Electricity
  - B. Electrostatics
  - C. Electrodynamics
- VII. Magnetism
  - A. History of Naturally Occurring Magnetic Materials
  - B. Introduction
  - C. Classification of Magnets
  - D. Magnetic Laws
- VIII. Electromagnetism
  - A. Electromagnetic Force
  - B. Laws of Induction
  - C. Electromechanical and Electronic Devices
- IX. The X-ray Unit
  - A. Operating Console
  - B. High Voltage Generator
  - C. Single-phase Power
  - D. Three-phase Power
  - E. Power Rating
- X. The X-ray Tube
  - A. External Structure
  - B. Internal Structure
  - C. Tube Failure
- XI. X-ray Production
  - A. Electron/Target Interactions
  - B. X-ray Emission Spectrum
  - C. Factors Affecting X-ray Emission Spectrum
- XII. X-ray Emission
  - A. Quantity
  - B. Quality
- XIII. X-ray Interaction with Matter
  - A. Scattering
  - B. Differential Absorption
  - C. Attenuation
  - D. Radiologic Contrast Agents