

Course Objectives/Course Outline
Spokane Community College

Course Title: Radiation Biology and Protection

Prefix and Course Number: RAD 215

Course Learning Outcomes:

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

- Differentiate between the direct and indirect interactions
- Describe an ion and a free radical
- Describe relative biological effect (RBE), linear energy transfer (LET), and the quality factor (QF).
- Describe the general effects of radiation on other cellular constituents
- Describe the difference between a differentiate and undifferentiated cell
- List factors contributing to the radiosensitivity of tissues
- Describe the mechanisms of radiation damage to radioresistant and radiosensitive tissue
- Select the most radiosensitive and radioresistant organs and tissues

Course Outline:

- I. Fundamental Principles of Radiobiology
 - A. Law of Bergonie and Tribondeau
 - B. Physical Factors Affecting Radiosensitivity
 - C. Radiation Dose-Response Relationships
- II. Molecular and Cellular Radiobiology
 - A. Irradiation of Macromolecules
 - B. Radiolysis of Water
 - C. Direct and Indirect Effects
 - D. Target Theory
 - E. Cell Survival Kinetics
- III. Early Effects of Radiation
 - A. Acute Radiation Lethality
 - B. Local Tissue Damage
 - C. Hematologic Effects
 - D. Cytogenetic Effects

- IV. Late Effects of Radiation
 - A. Epidemiologic Studies
 - B. Local Tissue Effects
 - C. Lifespan Shortening
 - D. Risk Estimates
 - E. Radiation-induced Malignancy
 - F. Total Risk of Malignancy
 - G. Radiation and Pregnancy
- V. Health Physics
 - A. Definition
 - B. Cardinal Principles of Radiation Protection
 - C. Dose Limits
 - D. Radiation Exposure to the Public
 - E. Educational Considerations
 - F. X-rays and Pregnancy
- VI. Designing for Radiation Protection
 - A. X-ray Apparatus
 - B. Equipment
 - C. Protective Barriers
 - D. Radiation Detection and Measurement
- VII. Radiation Protection Procedures
 - A. Occupational Exposure
 - B. Patient Dose
 - C. Reduction of Occupational Exposure
 - D. Reduction of Patient Dose