**RADT 63B Course Outline as of Fall 2012**

# CATALOG INFORMATION

Dept and Nbr: RADT 63B Title: RADIOBIOLOGY/RAD PROTECT
Full Title: Radiobiology Radiation Protection, and Quality Control
Last Reviewed: 9/25/2023

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---|---|---|---|---|---|---|
| Maximum | 3.00 | Lecture Scheduled | 2.00 | 17.5 | Lecture Scheduled | 35.00 |
| Minimum | 3.00 | Lab Scheduled | 3.00 | 17.5 | Lab Scheduled | 52.50 |
| | | Contact DHR | 0 | | Contact DHR | 0 |
| | | Contact Total | 5.00 | | Contact Total | 87.50 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 70.00 Total Student Learning Hours: 157.50

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| Title 5 Category: | AA Degree Applicable |
| Grading: | Grade Only |
| Repeatability: | 00 - Two Repeats if Grade was D, F, NC, or NP |
| Also Listed As: | |
| Formerly: | |

**Catalog Description:**
Principles of radiobiology, the short and long-term effects of radiation, health physics, introduction to fluoroscopy, quality control, and radiation protection procedures and design.

**Prerequisites/Corequisites:**
Course Completion of RADT 63A and Concurrent Enrollment in RADT 62AL

**Recommended Preparation:**

**Limits on Enrollment:**

**Schedule of Classes Information:**
Description: Principles of radiobiology, the short and long-term effects of radiation, health physics, introduction to fluoroscopy, quality control, and radiation protection procedures and design. (Grade Only)
Prerequisites/Corequisites: Course Completion of RADT 63A and Concurrent Enrollment in RADT 62AL
Recommended:
Limits on Enrollment:

Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

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|---|---|---|---|---|---|
| **AS Degree:** | **Area** | | | Effective: | Inactive: |
| **CSU GE:** | **Transfer Area** | | | Effective: | Inactive: |
| **IGETC:** | **Transfer Area** | | | Effective: | Inactive: |
| **CSU Transfer:** | Transferable | Effective: | Fall 1981 | Inactive: | |
| **UC Transfer:** | | Effective: | | Inactive: | |

**CID:**

**Certificate/Major Applicable:**
Both Certificate and Major Applicable

## COURSE CONTENT

**Outcomes and Objectives:**
Upon completion of this course students will be able to:
1. Define quality assurance and quality control.
2. Identify the early and late effects of radiation.
3. Differentiate between early and late effects of radiation.
4. Evaluate the radiosensitivity of tissues and organs.
5. Identify various stages of cell division, proliferation and cancer induction.
6. Describe the processes of mitosis and meiosis.
7. Explain the cardinal principles of radiation protection.
8. List, discuss, and explain the long and short term hazards of radiation to human beings.
9. Explain the cardinal principles of radiation protection.
10. Discuss the ALARA (As Low As Reasonably Achievable) principle.
11. Describe the radiation dose- response relationship.
12. Describe the three acute radiation syndromes.
13. Explain the theories and list the methods for radiation protection of medical personnel and patients.
14. List all of the State and National Radiation Health and Safety regulations for radiologic technology personnel.
15. List the fundamental principles of fluoroscopy and their impact on radiation protection.
16. Explain the design for radiation protection.

**Topics and Scope:**

1. Human response to radiation
    A. Cell theory
    B  Molecular composition
    C. Tissues and organs
2. Radiobiology
    A. Law of Bergonie and Tribondeau
    B. Radiation responses

C. Dose response relationship
D. Biological factors in radiosensitivity

3. Irradiation of macromolecules
   A. Point lesions
   B. Macromolecular synthesis
   C. Radiation effects on DNA
   D. Cell recovery
4. Linear energy transfer
5. Relative biological effectiveness
6. Acute radiation lethality
   A. Prodromal period
   B. Hematologic syndrome
   C. Gastrointestinal syndrome
   D. Central nervous system syndrome
   E. Mean survival time
   F. Local tissue damage
   G. Hematologic effects
   H. Cytogenetic effects
   I. Late effects of radiation exposure
7. Automatic Exposure Control
   A. Ionization chamber
   B. Exposure adjustment
   C. Effect of scatter radiation
8. Radiation Health Physics
   A. ALARA principle
   B. Pregnancy policy
   C. Occupational dose
   D. Patient exposure dose
   E. General public exposure dose
   F. Ethical considerations
9. Radiation Protection
   A. Cardinal principles
   B. Personnel monitoring and devices
   C. Dose limits
   D. Safe practices
      1. X-rays
      2. Pregnancy
   E. Design for radiation protection
10. Fluoroscopy
   A. Image intensifier
   B. Medical television system
   C. Image formation
   D. Radiation protection
11. Quality Control
   A. Radiographic
   B. Fluoroscopic
   C. Computerized tomography
12. Quality assurance procedure regulations/ dose limits
   A. Federal regulatory agency
   B. State regulatory agency

**Assignment:**

1. Weekly chapter readings (10 - 25 pages/week) and assignments (not graded).
2. Completion of 8 - 15 lab experiments (lab reports).
3. One ALARA project.
4. 6 -10 quizzes, 1 written final, 1 lab final.

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

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| None, This is a degree applicable course but assessment tools based on writing are not included because skill demonstrations are more appropriate for this course. | Writing<br>0 - 0% |

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

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| ALARA project | Problem solving<br>10 - 20% |

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

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| Lab final exam | Skill Demonstrations<br>20 - 30% |

**Exams:** All forms of formal testing, other than skill performance exams.

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| Quizzes, mid-term, written final | Exams<br>60 - 70% |

**Other:** Includes any assessment tools that do not logically fit into the above categories.

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| None | Other Category<br>0 - 0% |

**Representative Textbooks and Materials:**
Radiologic Science for Technologists, Bushong, S., Mosby, 2011
Instructor-prepared material