RDTK 2640
RADIATION BIOLOGY AND PROTECTION

Fall 2006

2 CR (2 Lec, T 9:30-11:30)

Instructor: Laurie Weaver, 268-2587 Home: 265-6828

Office: HS 105 Hours: Monday/Tuesday 12:00-1:00
Thursday, 8:30-9:30/11:30-1:30

Course Description:
The effects of ionizing radiation on biological systems and essential radiation protection guidelines to minimize radiation exposure of the radiographer, the patient, and the public are covered.

Prerequisites:
ZOO 2010, RDTK 1610.

Required Texts:
Essentials of Radiation Biology and Protection, Forshier, Steve, Delmar, 2002
Workbook, 2002

Methodology:
Lecture, discussion, presentation and demonstration.

Objectives:
The student will:

1. Gain a respect for ionizing radiation and its effects on the human being - self and others.
2. Define terms related to the measurement of radiation.
3. Identify regulations related to the field of radiobiology.
4. Identify parts and functions of cellular structure for further study on cellular effects of radiation.
5. Understand the different system syndromes in relation to radiation exposure.
6. Explain the differences between hematologic and cytogenetic effects of radiation.
7. Analyze the stochastic and nonstochastic effects of radiation exposure.
8. Identify the risk estimation models involved in radiation biology.
9. Discuss the possible genetic and fetal effects of irradiation.
10. Gain a working knowledge of the areas important in radiation protection of personnel and how to reduce the exposure during specific procedures.
11. Explain the different radiation monitoring devices.
12. Identify the structural shielding requirements for radiation protection.
13. Define the dose limits for occupational and non-occupational exposure.
14. Gain a working knowledge of the areas used to reduce patient exposure during imaging procedures.
15. Know how to apply the ALARA concept in daily practice.
16. Understand how to protect patient and other personnel from radiation
17. Through case studies use critical thinking skills to explore different problems and situations associated with radiation biology and protection.
**Course Requirements:**
1. **Attendance and Punctuality:** Grade can drop for unexcused absences. See Program Policies (sec. 4.0, #3).
2. **All assignments are due at the beginning of the designated class period.**
3. **Late assignments will be penalized 10%/day late.**
4. **Cheating or plagiarism will result in a course grade of F and thus dismissal from the Program.**
5. **Test may be made up only when pre-arranged with instructor. Make-up test will only be given during the same week that the original test was given.**

**STUDENT RIGHTS & RESPONSIBILITIES:**

Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College student.

**Accommodations:** It is the policy of Casper College to provide appropriate accommodations to any student with a documented disability. If you have a need for accommodation in this course, please make an appointment to see me at your earliest convenience.

**Grading Scale:**

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>92 - 100%</td>
</tr>
<tr>
<td>B</td>
<td>83 - 91%</td>
</tr>
<tr>
<td>C</td>
<td>75 - 82%</td>
</tr>
<tr>
<td>F</td>
<td>0 - 74%</td>
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</tbody>
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**Grading Components:**

1. **Assignments:**
   - Critical Thinking Activity 50 points
   - Life Cycle 50 points
2. **Tests** 100 points x 4
3. **Final** 200 points
4. **Articles:** 25 points each

**Last Day To Withdraw:** November 3
# Radiation Biology and Protection

**SCHEDULE* WITH COURSE CONTENT:** Schedule subject to change with instructor notice.

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
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| 8-31  | Course introduction
Review Game (Watch out for flying candy!!)   |
|       | **Imaging group assignment**                                             |
| 9-7   | Ch. 1 – History of Radiobiology  
Ch. 2 – Cellular Anatomy & Physiology  
Part A CD2                                           |
| 9-14  | **WSRT Conference**                                                     |
| 9-21  | Assignment Presentations: Life Cycle of an X-ray  
Ch. 3 – Cellular Effects of Radiation  
Part B CD2                                           |
| 9-28  | **Test, Chapter 1, 2, 3 Article due: In class discussion**             |
|       | **Critical Thinking Groups formed and cases given: Presentations due 11-9** |
| 10-5  | Ch. 4 – Biological Effects of Radiation Exposure                         |
| 10-12 | Ch. 4 cont’d.                                                           |
| **10-19** | **Test Ch. 4**                     |
|       | Ch. 5 – Effects of Long Term Exposure to Radiation                        |
| 10-26 | Ch. 5 cont’d.                                                           |
| 11-2  | **Test – Ch. 5**                                                       |
|       | Ch. 6 – Protection of Personnel                                          |
| **11-9** | **Critical Thinking Activity Case Presentations**                        |
| 11-16 | Ch. 6 cont’d.                                                           |
| **11-23** | **Thanksgiving Break**                                           |
| 11-30 | Ch. 7                                                                    |
| **12-7** | **Test – Ch. 6, 7- Article due: In class discussion**            |
| 12-14 | Review Game                                                             |

**Finals week December 18-21**  
**Comprehensive final covering Ch. 1-7**

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**RDTK2640-01**  
**FALL 2006**
Assignments:

I. Article Review: 1 due September 28 and 1 due December 7

The student will be required to review two current articles related to radiation biology and protection. A one-page, typed, summary of each article will be turned in for grading. The articles can cover any topic associated with radiation biology and protection. On the dates listed above the student will be expected to discuss the articles’ content with the other students in class. The article reviews and presentations will be worth 25 points each for a course total of 50 points.

Presentation Criteria:

1. Summary of the article is clear and presented in a logical manner.
2. Student has a basic knowledge of the subject matter.
3. Student related the information in regard to radiation biology and protection.
4. Student correlated the information to the clinical setting.

Article review should include the following:

1. Select current readings from periodicals and journals.
2. A complete bibliography must be included with each article review.
3. A summary of the content and ideas presented in the article must be presented in a clear and concise manner.
4. A personal evaluation of the work’s applicability in the clinical setting.
5. Grammar, neatness and spelling, as well as content will be evaluated.

II. Critical Thinking Activity:

Students will be split into groups and given a problem related to radiation protection and biology. The case study will involve a dilemma in which the group must support or not support through presentation of research they have investigated. Each group will present their case to the entire class, they will discuss solutions/actions that each student thought were appropriate and why, with research to back up their case. 50 points Debate scheduled November 9

III. Life Cycle of an Electron Assignment/Presentation:

This assignment will help the student to review the life cycle of x-ray production. Students will form groups and design a drawing which outlines the life cycle of an x-ray, from its beginning inside the x-ray tube as an electron, to the interactions occurring at the anode to produce the x-ray, as it travels through the remainder of the x-ray tube and finally its interaction with matter within the patient. The drawings will be presented in class and each group will discuss a different aspect of the cycle. Group project 50 points presentation due date September 21