**IDAHO STATE UNIVERSITY**
Department of Radiographic Science
R.S. 3388, Radiation Protection
Course Syllabus

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| **Course Credit:** | 1 Credit |
| **Time and** | Monday, 11:00 a.m. - 11:50 a.m., |
| **Location:** | NURS Rm. 120 |
| **Instructor:** | Christopher Wertz, EdD, RT(R) |
| **Phone:** | 208-282-2871 or 208-282-4042 (Alyssa, Admin) |
| **Email:** | christopherwertz@isu.edu |

**Overview:** This course will study the effects of radiation exposure on biological systems, typical medical exposure levels, approaches used for measuring and monitoring radiation, and methods for protecting personnel and patients from excessive and/or unnecessary exposure. The content presents an overview of the principles of radiation protection, including the responsibilities of the radiographer for patients, personnel and public. Also, radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies and health care organizations are incorporated.

**Suggested Text:** Sherer, M.A.S., Visconti, P.J., Ritenour, E. R. & Haynes, K. W. (2018). *Radiation Protection in Medical Radiography*, 2018, 8th ed., Mosby Year Book, St. Louis.
**ISBN:** 9780323446662

**Method of Presentation:** Lecture, PowerPoint, Handouts/Assigned Readings, Forums

**Code of Ethics:** RS 3388 adheres to the ISU Code of Conduct. In particular, academic dishonesty, however small, creates a breach in academic integrity. A student's participation in this course comes with the expectation that his or her work will be completed in full observance of the ISU Code of Student Conduct.

**Course Learning Objectives/Goals:** The student will discover the biophysical mechanisms of radiation damage and the somatic and genetic effects of radiation exposure on humans, state typical dose ranges for routine radiographic procedures, explain basic methods and instruments for radiation monitoring, detection, and measurement, and apply appropriate radiation protection practices.

The **Secretary's Commission on Achieving Necessary Skills (SCANS)**: This commission was appointed by the Secretary of Labor to determine the skills people need to succeed in the work place. The Commission's fundamental purpose is to encourage a high-performance economy characterized by high-skill, high-wage employment. The Commission's research found that effective job performance is what business calls *workplace know-how*. This know-how has two elements: competencies and a foundation. The SCANS report identifies five competencies and a three-part foundation of skills and personal qualities that lie at the heart of job performance. While the Commission's work ended with the report, its recommendations must be implemented; as the report stated, "...defining competencies and a foundation is not enough. Schools must teach them. Students must learn them."

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http://www.academicinnovations.com/report.html

**Description of SCANS competencies are as follows:**

| **A Three Part Foundation** | |
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| 1. Basic Skills | reads, writes, performs arithmetic and mathematical operations, listens and speaks |
| 2. Thinking Skills | thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons |
| 3. Personal Qualities | displays responsibility, self-esteem, sociability, self-management, and integrity and honesty |
| **The Five Competencies** | |
| 4. Resources | identifies, organizes, plans and allocates resources |
| 5. Interpersonal | works with others |
| 6. Information | acquires and uses information |
| 7. Systems | understands complex interrelationships |
| 8.Technology | works with a variety of technologies |

Each of these foundations and competencies are listed after the objective that meet the competency or skill set described above.

**Course Learning Outcomes:**

**Unit I**

| **Upon completion of this material the student will be able to:** | **SCANS** |
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| Provide sound justification and reasoning for good radiation protection measures. | 1,2,6 |
| Identify the differences between somatic and genetic effects of radiation. | 1,2,6 |
| Discuss the concept of effective radiation protection. | 1,2 |
| Determine the potential biological damage that may occur with exposure to ionizing radiation. | 1,2 |
| Identify the differences between stochastic and nonstochastic effects of radiation exposure. | 1,2 |
| Explain the function of the radiation safety committee (RSC) in medical facility and describe the role of the radiation safety officer (RSO) by listing the various responsibilities he or she must fulfill. | 1,2 |
| Discuss the importance of documentation, occupational and nonoccupational dose limits, ALARA concept, comparable risk and negligible individual dose (NID) as it relates to a radiation protection program. | 1,2,4,6 |

**Unit II**

| **Upon completion of this material the student will be able to:** | **SCANS** |
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| Define the following terms: Exposure (Coulomb/kilogram and Roentgen), absorbed dose (Gray and Rad), Kerma, Dose equivalent (Sievert and Rem), CT dose index, Multiple scan average dose in CT, Dose length produce (DLP), Radioactivity (Becquerel and Curie). | 1,2,6 |
| Become familiar with the U.S. Nuclear Regulatory Commission (NRC) Regulations (10 Code of Federal Regulations [CFR]) part 20 Standards for Radiation Protection. | 1,2,6 |
| List dose quantities as specified by the National Council on Radiation Protection and Measurement (NCRP) Guidelines concerning dose quantities (effective dose, collective effective dose, and average effective dose to an individual). | 1,2,6 |
| Differentiate between radiation detectors (area monitors and personal detectors). | 1,2,4,6 |

**Unit III**

| **Upon completion of this units the student will be able to:** | **SCANS** |
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| Become familiar with the Regulatory/Advisory agencies and regulations and the different types of surveys required to monitor controlled and uncontrolled areas. | 1,2,4,6 |
| Discuss the following regulatory agencies and their role in radiation safety: NRC, FDA, EPA, OSHA, and state agencies. | 1,2,6 |
| Discuss the following advisory agencies and their role in radiation safety: ICRP, NRCP, BEIR. | 1,2,6 |
| Discuss personnel monitoring from a historical perspective including the requirements for personnel monitoring and the different types of personnel monitors in use (film badge, TLD, OSLD, ring badge, etc). | 1,2,6 |
| Understand records of accumulated dose by reviewing reports of students in the program and ISU. | 1,2,3,4,5,6,7 |
| List the effective dose limits of occupational exposure, nonoccupational exposure, critical organ sites and dose limits to the embryo and fetus. | 1,2,6, |
| Determine the responsibilities for radiation protection from the standpoint of the radiographer, RSO, and the facility. | 1,2 |
| List several design applications that can be used to protect humans from exposure to ionizing radiation in a hospital setting, i.e. materials, barriers, HVL, controlled and uncontrolled areas, beam limiting devices, exposure control devices, on off switches, interlocks, visual/audio monitors, emergency controls, etc. | 1,2,6 |
| Discuss the current NRC recommendations and/or regulations. | 1,2 |
| Discuss the current NCRP recommendations and/or regulations. | 1,2 |
| Determine if there are any state regulations. | 1,2 |
| Discuss Public Law 97-35 (The Patient Consumer Radiation and Safety Act of 1981) and the CARE bill. | 1,2,6 |
| Argue the importance in time, distance, and shielding when providing radiation protection to patients and self. | 1,2,4,6 |

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| List the methods that can be employed to protect the patient from unnecessary exposure, i.e. beam-limiting devices, filtration, shielding, and exposure factors. | 1,2,4,6 |

**Academic Dishonesty Policy:**

Academic dishonesty (cheating, plagiarism, etc.) will not be tolerated in this class and may result in suspension or dismissal from this course and from the program. Cases will also be referred to the Dean of Students for possible dismissal from the university.

Cheating includes, but is not limited to, (1) use of any unauthorized assistance in taking quizzes, tests, or examinations; (2) dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or completing other assignments; or (3) the acquisition of tests or other academic materials belonging to the university faculty or staff without permission.

Plagiarism includes, but is not limited to, the use of, by paraphrase or direct quotation without correct recognition, the published or unpublished works of another person. The use of materials generated by agencies engaged in "selling" term papers is also plagiarism.

Many components RS 3388 are designed to be highly interactive. Students are encouraged to take full advantage of the many resources available including Internet sites, handouts and workbooks, other textbooks and journals, faculty, and peers. This interactive collegial learning environment is conducive for life-long learning.

***When students submit their efforts for grading, they are attesting that they have abided by these rules. Also, all assignments that are submitted are considered final and will be graded as such.***

**Classroom Procedure:**
1. **Attendance:** You are expected to attend class regularly. It is your responsibility to maintain a level of attendance which will allow you to derive maximum benefit from the instruction. Excessive absences (>10%) will result in a lower course grade if you are borderline between two grades. Conversely, if you have good attendance and are border line between two grades, I will award the higher grade.

2. **Grading Procedure:**

| Assessment Method | Percentage Value |
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| Reading Material/Worksheets/Handouts/Video Quiz/etc. | 10% |
| Chapter Quizzes | 30% |
| Test 1 | 15% |
| Test 2 | 15% |
| Final Comprehensive Exam | 30% |

**This grading Scale will be used:**

| +/- System | | | |
|---|---|---|---|
| 93-100% | A | 73-76% | C |
| 90-92% | A- | 70-72% | C- |
| 87-89% | B+ | 67-69% | D+ |
| 83-86% | B | 63-66% | D |
| 80-82% | B- | 60-62% | D- |
| 77-79% | C+ | 59% Below | F |

*Note: A grade of C or better is required in this course in order to receive a degree from the Department of Radiographic Science.*

The minimum requirements to earn a passing grade are successful completion of all tests (70% minimum). Tests and Quizzes will be a combination of either written or computer based. Tests will be scheduled to be taken in a computer lab on campus. The lab in the nursing building on the ground floor is the lab I try to schedule for tests; however, the Turner Lab is close to our classroom, and is the one I will try to schedule if the nursing building lab is not available. It is the student's responsibility to know when and where tests are scheduled. Dates are posted in the Web Course Calendar and reminders will be given in class. Students may use their own wireless laptops if they have one if tests are given in class; otherwise, students are required to use a lab computer when testing.

3. **Computer Account:** All students are required to have an ISU student computer account. There is a fee required for this account. Obtain the account at the Computer Center, which is located in the basement of the College of Business Building or in the Rendezvous Lab.

4. **Make-up:** If you are unable to sit for an examination, you may request a make-up exam. However, please text, email, or call me prior to the exam if you are not able to sit for an exam. There will be an automatic 11% drop in the test grade if prior notification is not given and is not accepted by me before the set exam time. Additionally, the highest grade you can receive for a make-up exam is 89% (if you did not notify me prior to the exam). If you have a valid excuse, there will be no automatic grade drop; you will receive the grade that you earn on the make-up exam. The validity of an excuse will be evaluated on a case by case basis.

It is a requirement to take all tests offered during the semester.

There will be no late work or make-up opportunities for other assignments (chapter quizzes, video quiz, worksheets, etc.) accepted in this course. Only rare exceptions will be made for extreme circumstances. The validity of an excuse will be evaluated on a case by case basis.

**Cell phone policy:** Cell phones should not be used in class. They should be set to silent mode or turned off. Texting is unacceptable during class. Failure to follow this policy will result in final grade deduction up to 10% at the end of the semester. If you need to communicate to someone outside of the class in an emergency situation please inform me so accommodations to this policy may be made.

**Statement on Success:** Success in this course depends heavily on your personal health and wellbeing. Recognize that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. I encourage you to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term, before the demands of exams and projects reach their peak. Please feel free to reach out to me about any difficulty you may be having that may impact your performance in this course. If you are experiencing stress in other areas of your campus life, I am happy to help you get in contact with other resources on campus that stand ready to assist you. In addition to your academic advisor, I strongly encourage you to contact the many other support services on campus that are available.

**Disability Services:** Students with disabilities who wish to have accommodations provided by the University must self-identify with Disability Services (208-236-3599) in order to have accommodations provided. Information and applications are available in the Center and may be picked up in person or requested by telephone. The URL is
https://www.isu.edu/disabilityservices/

**Statement on Services:** ISU Counseling and Testing Services (CATS) would like to remind all students who are enrolled in the current semester (part-time or full-time) they are eligible for free, confidential counseling services. CATS offers individual, group, and couples counseling, as well as Biofeedback Training. We also offers crisis intervention services Monday through Friday from 8-5.
Location in Pocatello: Graveley Hall, 3rd floor of the south side. To schedule an appointment call 208-282-2130 or just stop by. Walk-ins are welcome Monday-Friday from 8am - 4pm.

**COVID 19:** Idaho State University requires all faculty, staff, and students to wear face coverings indoors—regardless of vaccination status—unless alone in a private office, campus residence, or workspace. This on-campus face covering requirement for indoor spaces will be reviewed every two weeks and removed as the local situation improves. This precaution will allow us to maintain a safe classroom environment, continue face-to-face instruction, and meet our shared duty to care for others in our community.

The University also strongly encourages all individuals to receive a COVID-19 vaccine. Students who are experiencing COVID-19-like illness should NOT come to class and should contact the COVID Health Committee at COVID@health.isu.edu or (208) 282-2705. All confirmed cases of COVID-19 should be provided to the COVID Health Committee on the self-reporting form. All students are required to fully participate in the university's contact tracing process and follow all instructions related to quarantine and isolation.