

**IDAHO STATE UNIVERSITY**  
Radiographic Science Program  
R.S. 3330 & 3330 Lab, Radiographic Exposure  
Course Syllabus

**Course Credit:** 3 Credits and Lab  
**Time and Location:** Friday: Class 9:00-10:50,  
Friday: Lab 11:30-1:20 or 1:30-3:20  
NURS Rm 120  
**Instructor:** Christopher Wertz, EdD, RT(R)  
**Phone:** 208-282-2871 or 208-282-4042 (Alyssa, Admin)

**Overview:** This course will provide a fundamental presentation of topics that are important for students to master to become competent radiographers. It will provide a sufficient knowledge of exposure selection and manipulation. This will enable accurate selection of exposures in order to produce maximum information on the resultant radiograph. Study of exposure variables, selection, and manipulation of those variables will enable the student radiographer to understand and use this knowledge in a clinical setting.

In this course students will be instructed in the utilization of imaging equipment, accessories, optimal exposure factors, and proper patient positioning to minimize radiation exposure to the patients, themselves, and others. These practices assure radiation exposures are kept as low as reasonably achievable (ALARA).

**Textbooks:** Fauber, T. L. Radiographic Imaging & Exposure. 6th ed. St. Louis, Mo: Mosby; 2021. ISBN 978-0-323-66139-3

**Method of Presentation:** Lecture, PowerPoint, Handouts, Moodle Supplement

**Code of Ethics:** RS 3330 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:** This course has been designed to prepare student radiographers for the responsibilities of radiographic imaging. The student will learn the characteristics of the x-ray beam, and how image quality is achieved by manipulating exposure values; specifically, mA, kVp and time. Basic theory of exposure factor selection, automatic exposure control, and digital imaging, including digital fluoroscopy will be taught. At the conclusion of the course students will demonstrate understanding of the photographic and geometric properties, scatter control, grids, image receptors, and basic conversion factors used in the production of x-rays. Ultimately, the student will gain a better understanding of the process involved in obtaining a technically adequate radiograph. This classroom understanding prepares the student for the corresponding laboratory experience.

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

**IDAHO STATE UNIVERSITY**  
 Radiographic Science Program  
 R.S. 3330 & 3330 Lab, Radiographic Exposure  
 Course Syllabus

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."

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

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

| <b>A Three Part Foundation</b> |                                                                                                  |
|--------------------------------|--------------------------------------------------------------------------------------------------|
| 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    |
| <b>The Five Competencies</b>   |                                                                                                  |
| 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:**

| <b>Upon completion of this course the student will be able to:</b>                                                                          | <b>SCANS</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Identify the exposure factors and how they relate to each other; specifically, distance, mAs, kVp, grids, and receptor sensitivity.         | 1,2,6        |
| Discover the relationship of mAs/kVp and exposure to the image receptor as it relates to digital systems.                                   | 1,2,6        |
| Calculate receptor exposure maintenance by using the reciprocity law, 15% rule, grid factor/bucky factor, and SID.                          | 1,2,4,6,7    |
| Describe the relationship of contrast as it relates to high/short gray scale, and low/long gray scale.                                      | 1,2,4,6      |
| Discover how contrast is related to anatomical structures and how it changes when pathology and contrast media is introduced into the body. | 1,2,6,7      |

**IDAHO STATE UNIVERSITY**  
Radiographic Science Program  
R.S. 3330 & 3330 Lab, Radiographic Exposure  
Course Syllabus

|                                                                                                                                                                                                                       |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Explain why beam quality is controlled by kVp and filtration.                                                                                                                                                         | 1,2,6      |
| Determine how scatter radiation degrades image contrast and how it can be controlled via beam limitation, grids, and air gap techniques.                                                                              | 1,2,6,7    |
| Demonstrate how the choice of image receptors influences contrast.                                                                                                                                                    | 1,2,6,7,8  |
| Describe the relationship between brightness, window width and level, and how ambient light in the viewing area can impinge on displayed contrast.                                                                    | 1,2,6,7,8  |
| Define spatial resolution.                                                                                                                                                                                            | 1,2,6      |
| Explain the factors that influence spatial resolution; in particular, motion, geometric factors (blur width, geometric unsharpness, edge gradient), receptor (spatial resolution, light diffusion), and noise/mottle. | 1,2,6,7    |
| Understand the types of distortion according to shape (foreshortening/elongation) and size (geometric magnification).                                                                                                 | 1,2,6,7    |
| Appreciate how distance and tube/part/image receptor relationships produce distortion.                                                                                                                                | 1,2,6,7    |
| Determine how kVp and image receptor types change exposure latitude.                                                                                                                                                  | 1,2,6      |
| List the function and purpose of beam-limiting devices.                                                                                                                                                               | 1,2,4,,6,7 |
| List 4 types and applications of beam-limiting devices.                                                                                                                                                               | 1,2,6      |
| List 4 types of beam filtration.                                                                                                                                                                                      | 1,2,6      |
| Determine the function and mechanism of beam filtration devices.                                                                                                                                                      | 1,2,4,6,7  |
| Discover the purpose of compensating filters.                                                                                                                                                                         | 1,2,6,7    |
| Explain the impact of filtration on image characteristics.                                                                                                                                                            | 1,2,6,7,   |
| Compare and contrast filtration vs. HVL                                                                                                                                                                               | 1,2,6,8    |
| Understand the factors that influence scatter and secondary radiation; specifically: kVp, contrast agents, the patient, beam limitation, grids, and OID – air gap technique.                                          | 1,2,6,7    |
| Explain the effects of scattered and secondary radiation as it relates to effective patient dose, subject contrast, image quality, and occupational exposure.                                                         | 1,2,6,7,8  |
| Appreciate the function and construction of grids.                                                                                                                                                                    | 1,2,6,7    |
| Compare and contrast the following types of grids: focused, parallel, linear, crossed, moving, stationary, short dimension, and long dimension.                                                                       | 1,2,6,7,8  |
| Discuss the characteristics of grids by considering the focal distance/radius, focal range, ration, frequency, lead content, grid/bucky factor, contrast improvement factor, and selectivity.                         | 1,2,6,7,8  |
| Discuss the selection of grids by considering kVp values selected, patient or type of exam, beam limiting devices employed, and alignment latitude issues.                                                            | 1,2,6,7,8  |
| Determine the meaning of primary cutoff as it relates to grid usage.                                                                                                                                                  | 1,2,6      |
| Describe the purpose of exposure factor formulation as it relates to standardization of receptors and image consistency.                                                                                              | 1,2,6      |

**IDAHO STATE UNIVERSITY**  
Radiographic Science Program  
R.S. 3330 & 3330 Lab, Radiographic Exposure  
Course Syllabus

|                                                                                                                                                                                             |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Compare and contrast 4 types of exposure factor formulation systems, i.e. optimum kVp/variable mAs, variable kVp/variable mAs, automated exposure, and anatomically programmed radiography. | 1,2,6,7,8 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|

**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 3330 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.

***What does this mean:*** I have allowed 'printed material' from the Web site to be available to the student. This can present problems if not used properly. Material from quizzes and tests should be used for your OWN study endeavors. Because the quizzes are open book, you should not obtain the answers from other students prior to taking the quizzes. This defeats the intended learning methodology. Also, DO NOT obtain material (quizzes and tests) from previous students who have taken this course. I will consider this cheating and could result in an automatic 'F' for the quiz and the course. You may print the quizzes at your discretion, but I DO NOT allow PRINTING of tests. Additionally tests cannot be reviewed after they have been taken except in my presence. Failure to follow these instructions will result in a failure of the course.

***When students submit their efforts for grading, they are attesting that they have abided by these rules.***

**Classroom Procedure:**

**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.

**IDAHO STATE UNIVERSITY**  
 Radiographic Science Program  
 R.S. 3330 & 3330 Lab, Radiographic Exposure  
 Course Syllabus

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. Attendance counts for both in-classroom and synchronous online instruction.

If we are forced to use the “hyflex” model because of university requirements to limit the number of students in a classroom, we will only be allowed to have 11 students in the classroom at one time. In this event the cohort will be split into two groups. One group will be assigned to be in class for the lecture one week and synchronously online the next week; the other group will be on the opposite schedule. Unless prior arrangements are made, you will be expected to be in the place you are assigned for class.

You are expected to attend lab 100% of the time during your scheduled section. If something urgent arises you may trade lab sections with another student. **There are no make-up sessions for missed labs, so unless prior arrangements are made if you miss lab you will receive a 0.**

That said, I understand we are in uncharted territory this semester with extra protocol and precautions. You are not expected to come to class or lab if you are exhibiting any symptoms of COVID-19. The key is to communicate early and often with me. I am much more accommodating if you communicate before or as soon as issues arise.

**Grading Procedure:**

| Assessment Method     | Percentage Value |
|-----------------------|------------------|
| Test #1 = Units I-III | 20%              |
| Test #2 = Units I-VI  | 20%              |
| Final= Units I-X      | 20%              |
| Lab assignments       | 10%              |
| Assignments           | 25%              |
| In class quizzes      | 5%               |
| Total                 | 100%             |

**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  |

**IDAHO STATE UNIVERSITY**  
Radiographic Science Program  
R.S. 3330 & 3330 Lab, Radiographic Exposure  
Course Syllabus

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

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 are required to use a lab computer when testing unless COVID 19 or university restrictions dictate otherwise.

**Computer Account:** All students are required to have an ISU student computer account. Student computer accounts are covered by your tuition.

**Make-up:** There will be no late work accepted for quizzes and assignments. Students must submit their work prior to the deadline or they will receive a zero (0) for that assignment.

If you are unable to sit for an examination, you may request a make-up exam. You must inform me that you will not be present for the examination **prior** to the scheduled time. An additional 10% drop in the test grade will result if prior notification is not given and is not accepted by me prior to taking the test. The highest grade you can receive for a make-up exam is 89% unless you provide me with an acceptable excuse. An acceptable excuse is defined as **very sick**; a death in the immediate family; some unforeseen circumstance that would prohibit you from taking the exam. The key is to communicate with me directly via email, phone, or in person. Do not speak to another faculty member or the program secretary. I'm very easy to catch with email, but make sure your email is received by me prior to the test deadline.

*In addition, it is a requirement to take all tests offered during the semester. An incomplete will be issued for the class if a test is not taken.*

**For Your Information:** *Material from tests you have taken during the semester will be presented again on future tests. This means when you are taking test 2 you may find material from test 1 on the exam, etc. The material builds on itself and needs to be remembered.*

**Cell phone policy:** Cell phones should not be used in class. They should be placed in silent or vibrating mode or turned off. Additionally receiving and retrieving text messages should not occur during class or in labs. Failure to follow this policy will result in a deduction of grade up to 10% at the discretion of the instructor. If you need to communicate to someone outside of the class in an emergency situation please inform the instructor so accommodations to this policy may be made.

**IDAHO STATE UNIVERSITY**  
Radiographic Science Program  
R.S. 3330 & 3330 Lab, Radiographic Exposure  
Course Syllabus

**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](mailto: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.