



Department: Radiologic Technology
Course Title: Radiographic Imaging Equipment
Section Name: RADR 2309.203
Semester: Fall 2013
Time: MW 9:00am-10:20am
Classroom: CT 107

Instructor: Carrie Nanson
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Phone: (432) 335-6469
Office Hours: TBD

Course Description:

Equipment and physics of x-ray production. Includes basic x-ray circuits. Also examines the relationship of conventional and digital equipment components to the imaging process.

Required Texts:

Radiologic Science for Technologists, 10th. Ed. Stewart Bushong
Radiologic Science for Technologists Workbook, 10th. Ed. Stewart Bushong
The Integrated Radiography Workbook, 5th. Ed. Robert DeAngelis

Description of Institutional Core Objectives (ICO's)

Given the rapid evolution of necessary knowledge and skills and the need to take into account global, national, state, and local cultures, the core curriculum must ensure that students will develop the essential knowledge and skills they need to be successful in college, in a career, in their communities, and in life. Therefore, with the assistance of the Undergraduate Education Advisory Committee, the Coordinating Board has approved guidelines for a core curriculum for all undergraduate students in Texas.

Through the application and assessment of objectives within the institution's core curriculum, students will gain a foundation of knowledge of human cultures and the physical and natural world; develop principles of personal and social responsibility for living in a diverse world; and advance intellectual and practical skills that are essential for all learning. Appropriate Odessa College faculty periodically evaluates all of the courses listed in the descriptions on the following pages of this catalog and keys them to Odessa College's Institutional Core Objectives (ICOs), as defined by the Texas Higher Education Coordinating Board (THECB). (Source: *Odessa College Catalog of Courses 2012-2013, page 73*)

Odessa College's Institutional Core Objectives (ICOs):

- 1) *Critical Thinking Skills* - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- 2) *Communication Skills* - to include effective development, interpretation and expression of ideas through written, oral and visual communication

- 3) *Empirical and Quantitative Skills* - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- 4) *Teamwork* - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
- 5) *Personal Responsibility* - to include the ability to connect choices, actions and consequences to ethical decision-making
- 6) *Social Responsibility* - to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

Learning Outcomes for RADR 2309 Radiographic Imaging Equipment(Source: *Odessa College Catalog of Courses*)

Outcome	ICO
	<i>Critical Thinking Skills</i> - to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
	<i>Communication Skills</i> - to include effective development, interpretation and expression of ideas through written, oral and visual communication
Students must manipulate data to solve equations involving Ohm's Law and series and parallel circuits.	<i>Empirical and Quantitative Skills</i> - to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
	<i>Teamwork</i> - to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal
	<i>Personal Responsibility</i> - to include the ability to connect choices, actions and consequences to ethical decision-making
	<i>Social Responsibility</i> - to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

End of Course Outcomes:

The student must differentiate between conventional and digital equipment; explain the physics of x-ray production; describe x-ray circuits; and relate conventional and digital equipment components to the imaging process.

Odessa College Policies

Academic Policies

Note that the OC Student Handbook states (page 32) that “[i]n cases of academic dishonesty, the instructor has the authority to impose appropriate scholastic penalties. Complaints or appeals of disciplinary sanctions may be filed in accordance with the college due process procedure. Copies of the college due process procedure are available in the office of The Director of Student Life (CC104).”

For more information on your rights and responsibilities as a student at Odessa College, please refer to the following: *The 411 of OC: Student Handbook 2012-2013; Student Rights & Responsibilities* <http://www.odessa.edu/dept/studenthandbook/handbook.pdf>

Scholastic Dishonesty

Scholastic dishonesty shall constitute a violation of these rules and regulations and is punishable as prescribed by board policies. Scholastic dishonesty shall include, but not be limited to, cheating on a test, plagiarism and collusion.

"Cheating on a test" shall include:

- Copying from another student's test paper
- Using test materials not authorized by the person administering the test.
- Collaborating with or seeking aid from another student during a test without permission from the test administrator.
- Knowingly using, buying, selling, stealing or soliciting, in whole or in part, the contents of an unadministered test.
- The unauthorized transporting or removal, in whole or in part, of the contents of the unadministered test.
- Substituting for another student, or permitting another student to substitute for one's self, to take a test.
- Bribing another person to obtain an unadministered test or information about an unadministered test.
- "Plagiarism" shall be defined as the appropriating, buying, receiving as a gift, or obtaining by any means another's work and the unacknowledged submission or incorporation of it in one's own written work.
- "Collusion" shall be defined as the unauthorized collaboration with another person in preparing written work for fulfillment of course requirements. (Source: *Odessa College Student Handbook 2012-2013, page 29-30*)

Special Populations/Disability Services/Learning Assistance

Odessa College complies with Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. If you have any special needs or issues pertaining to your access to and participation in this or any other class at Odessa College, please feel free to contact me to discuss your concerns. You may also call the Office of Disability services at 432-335-6861 to request assistance and accommodations.

Odessa College affirms that it will provide access to programs, services and activities to qualified individuals with known disabilities as required by **Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990 (ADA)**, unless doing so poses an undue hardship or fundamentally alters the nature of the program or activity. Disabilities may include hearing, mobility or visual impairments as well as hidden disabilities such as chronic medical conditions (arthritis, cancer, diabetes, heart disease, kidney disorders, lupus, seizure disorders, etc.), learning disabilities or psychiatric or emotional disabilities. A student who comes to Odessa College with diagnosed disabilities which may interfere with learning may receive

accommodations when the student requests them and submits proper documentation of the diagnosis. A Request for Accommodations form and guidelines for beginning the request process are available in the OC Help Center or on the Odessa College web site at www.odessa.edu/dept/counseling/disabilities.htm. The college strives to provide a complete and appropriate range of services for students with disabilities such as assistance with testing, registration, information on adaptive and assistive equipment, tutoring, assistance with access and accommodations for the classroom where appropriate. For information regarding services, students with disabilities should contact the Office of Disability Services in the OC Help Center located in Room 204 of the Student Union Building or call 432-335-6433. (Source: *Odessa College Catalog of Courses 2012-2013*, page 52)

Dropping a Course or Withdrawing from College

Students wishing to drop a non-developmental course may do so online using WebAdvisor, at the Wrangler Express, or Registrar's Office. A student wishing to drop a developmental course or withdraw from college should obtain a drop or withdrawal form from the Wrangler Express or the Registrar's Office. Students are encouraged to consult with instructors prior to dropping a class. Students may not completely withdraw from the college by use of the Web. Students must drop a class or withdraw from college before the official withdrawal date stated in the class schedule. Students who are part of the Armed Forces Reserves may withdraw with a full refund if the withdrawal is due to their being ordered into active duty. A copy of the student's orders must be presented to the Registrar's Office at the time of the withdrawal. For details, please contact the Office of the Registrar. **No longer attending class does not automatically constitute withdrawal from that class, nor does a student's notification to an instructor that the student wishes to be dropped. Failure of a student to complete the drop/withdrawal process will result in a grade of "F."** (Source: *Odessa College Catalog of Courses 2012-2013*, page 36)

Learning Resource Center (LRC; Library)

The Library, known as the Learning Resources Center, provides research assistance via the LRC's catalog (print books, videos, e-books) and databases (journal and magazine articles). Research guides covering specific subject areas, tutorials, and the "Ask a Librarian " service provide additional help.

Student Success Center (SCC)

Located in the LRC, the Student Success Center (SSC) provides assistance to students in meeting their academic and career goals. We strive to provide new and updated resources and services at no charge to OC students. Academic support services include tutoring, study skills training, workshops, and the mentoring program. Tutoring is available for a variety of subjects including college mathematics, English, government, history, speech, chemistry, biology, and all developmental coursework. Appointments are preferred, but walk-ins will be served as soon as possible. Smarthinking online tutoring is also available. All computers in the center have Internet access, Microsoft Office, and software resources to assist OC students in improving their reading, writing and mathematical skills. The center also offers special assistance to students preparing for the THEA/COMPASS test. Computer lab assistants are available to assist students with student email, Blackboard, OC portal, Course Compass and more. For more information or to make an appointment, please call 432-335-6673 or visit www.odessa.edu/dept/ssc/ (Source: *Odessa College Catalog of Courses 2012-2013*, page 54)

Student E-mail

Please access your Odessa College Student E-mail, by following the link to either set up or update your account: <http://www.odessa.edu/gmail/>. **Correspondence will be submitted**

using your Odessa College email as an alternative method to contact you with information regarding this course.

Technical Support

For Blackboard username and password help and for help accessing your online course availability and student email account contact the Student Success Center at 432-335-6878 or online at https://www.odessa.edu/dept/ssc/helpdesk_form.htm.

Expectations for Engagement – Face to Face Learning

To help make the learning experience fulfilling and rewarding, the following Expectations for Engagement provide the parameters for reasonable engagement between students and instructors for the learning environment. Students and instructors are welcome to exceed these requirements.

Reasonable Expectations of Engagement for Instructors

1. As an instructor, I understand the importance of clear, timely communication with my students. In order to maintain sufficient communication, I will
 - provided my contact information at the beginning of the syllabus;
 - respond to all messages in a timely manner through telephone, email, or next classroom contact; and,
 - notify students of any extended times that I will be unavailable and provide them with alternative contact information (for me or for my supervisor) in case of emergencies during the time I'm unavailable.
2. As an instructor, I understand that my students will work to the best of their abilities to fulfill the course requirements. In order to help them in this area, I will
 - provide clear information about grading policies and assignment requirements in the course syllabus, and
 - communicate any changes to assignments and/or to the course calendar to students as quickly as possible.
3. As an instructor, I understand that I need to provide regular, timely feedback to students about their performance in the course. To keep students informed about their progress, I will
 - return classroom activities and homework within one week of the due date and
 - provide grades for major assignments within 2 weeks of the due date or at least 3 days before the next major assignment is due, whichever comes first.

Reasonable Expectations of Engagement for Students

1. As a student, I understand that I am responsible for keeping up with the course. To help with this, I will
 - attend the course regularly and line up alternative transportation in case my primary means of transportation is unavailable;
 - recognize that the college provides free wi-fi, computer labs, and library resources during regular campus hours to help me with completing my assignments; and,
 - understand that my instructor does not have to accept my technical issues as a legitimate reason for late or missing work if my personal computer equipment or internet service is unreliable.

2. As a student, I understand that it is my responsibility to communicate quickly with the instructor any issue or emergency that will impact my involvement with or performance in the class. This includes, but is not limited to,
 - missing class when a major test is planned or a major assignment is due;
 - having trouble submitting assignments;
 - dealing with a traumatic personal event; and,
 - having my work or childcare schedule changed so that my classroom attendance is affected.
3. As a student, I understand that it is my responsibility to understand course material and requirements and to keep up with the course calendar. While my instructor is available for help and clarification, I will
 - seek out help from my instructor and/or from tutors;
 - ask questions if I don't understand; and,
 - attend class regularly to keep up with assignments and announcements.

As part of the Design for Completion initiative, your Odessa College Student Success Coach and faculty mentor will help you stay focused and on track to complete your educational goals. If an instructor sees that you might need additional help or success coaching, he or she may submit a Retention Alert. Your Student Success Coach or faculty mentor will contact you to work toward a solution.

Student Evaluation of Instruction (SEI)

Online class evaluations will be available on Blackboard from November 18th to November 22nd.

Institutional Calendar Fall 2013 (8/26-12/14)

<http://www.odessa.edu/college-calendar12-13.pdf>

Registration:

Registration:

On the Web (5 am to Midnight, 7 days a week)..... Apr 15-Aug 25
In Person (See Business Hours Above)..... Apr 15-Aug 23
FOR TUITION AND FEE SCHEDULES & PAYMENT INFORMATION, PLEASE CHECK ONLINE AT www.odessa.edu

Classes Begin.....Aug 26(Mon)

Late Registration & Schedule Changes (Add/Drop):

On the Web (5 am to Midnight, 7 days a week)..... Aug 26-27 (Mon-Tues)

In Person (See Business Hours Above)..... Aug 26-27 (Mon-Tues)

Holiday (Labor Day – Offices closed except for Wrangler Express – No Classes)..... Sep 2 (Mon)

Census Day..... Sep 11 (Wed)

Last Day to Drop or Withdraw with a “W” (1st eight week courses).....Oct 4 (Fri)

First Eight Weeks End.....Oct 18 (Fri)

Second Eight Weeks Begin.....Oct 21 (Mon)

Deadline for Fall Degree Application..... Nov 1 (Fri)

Last Day to Drop or Withdraw with a “W” (full semester length courses).....Nov 12 (Tues)

Last Day to Drop or Withdraw with a “W” (2nd eight week courses).....Nov 26 (Tues)

Student Evaluation of Instruction Survey Available Online..... Nov 18-22 (Mon-Fri)

Thanksgiving Holiday (begins 9 pm Tues, Nov 26).....Nov 27-30 (Thurs-Sat)

Last Class Day..... Dec 7 (Sat)

Final Exams.....Dec 9-12 (Mon-Thurs)

End of Semester.....Dec 12 (Thurs)

Fall Graduation..... Dec 14 (Sat)

College Offices Closed..... Dec 21-Jan 6 (Sat-Mon)

Course Policies

Disclaimer

This syllabus is tentative and subject to change in any part at the discretion of the instructor. Any changes will be in accordance with Odessa College policies. Students will be notified of changes, if any, in timely manner.

Original Effort

The work submitted for this course must be original work prepared by the student enrolled in this course. Efforts will be recognized and graded in terms of individual participation and in terms of ability to collaborate with other students in this course.

Description of students

Students enrolled in this course are seeking an Associate of Applied Science in Radiologic Technology. This course is required for degree completion.

Course prerequisites

RADR 1311(Source: *Odessa College Catalog of Courses 2012-2013, page 178*)

Course coerequisites

RADR 1266, RADR 1303, and RADR 2301

Course Alignment with Industry Standards

This program is accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). The course content is outlined in the American Society of Radiologic Technologist (ASRT) Curriculum Guide.

Digital Protocol

Cell phones must be placed on either *vibrate* or *silent* mode and are to be accessed in emergency cases only. The use of laptops or any other digital device is permitted in order to facilitate note-taking relative to instruction. Any written assignments will be submitted electronically on Blackboard. **The electronic recording of the time on Blackboard will be considered the time of assignment submission. Take necessary steps to ensure that your assignments are submitted on “Blackboard” time.** Back-up and/or additional copies of all assignments submitted is encouraged. **Computers/printers are available to OC students in the LRC (301-303); therefore, not having access to a computer due to technical issues (crash; corrupted files) will not be considered as an acceptable reason for not completing assignments.** If there is a loss of server connection with Odessa College due to maintenance, then an email will be sent to student with pertinent information and status reports. Assignments submitted electronically need to be **WORD documents (doc or docx).**

Attendance Policy

Students are expected to attend class regularly. Excessive absences will be grounds for disciplinary action, and will be determined on a case-by-case basis. If you are more than 15 minutes late to class or leave class early without notifying the instructor, this will count as an absence. Points will be deducted from a student's final course grade for absences (1-2abs. = .5 each, 3-5 abs. = .75 each, 6-7 abs. = 1 point each).

AVID

This course has been identified as a course by Career, Technical, and Workforce Education as one in which teaching and learning strategies adopted by AVID will be implemented. As a student in the legal program, you will be expected to develop an understanding of the strategies, to model the strategies, to maintain fidelity of implementation, and to examine how these strategies may impact your effectiveness as a professional in your chosen area of occupation, either through coursework or practicum experience as outlined by the course instructor.

Grading Policy

Please understand that this is a required course for the Radiologic Technology program in order to prepare you to become an entry-level radiologic technologist. Quality work and active participation is expected and not to be negotiated. As a general policy, grades will be taken in class. Any written assignments or tests will be graded outside of class. You can expect feedback on assignments within a week's time.

Grade Inquiry Policy

It is the responsibility of the individual taking this course to maintain accurate track of assignment submissions and grades. There will be opportunities during the semester to meet with the instructor to discuss your academic progress. Contact the instructor to schedule an appointment. Class time will not be used for grade inquiries. All grades are final.

Communication Plan

The best way to communicate with the course instructor is via email through Blackboard. Also, check in Blackboard regularly for announcements, including any changes in the course schedule due to instructor illness or conference attendance. Appointments with the instructor may also be scheduled.

General Course Requirements

1. Attend class and participate.
2. Contribute and cooperate with civility.
3. **Submit assignments on time. Late work will not be accepted. Medical and/or family circumstances that warrant an extension on assignments need to be presented to the instructor. Extensions will be allowed at the instructor's discretion.**
4. The final exam is comprehensive and based on the ARRT format.

Grading Scale:

- “A” = 93-100
“B” = 84-92
“C” = 75-83
“F” = below 75

Incomplete Policy

An ‘Incomplete’ grade may be given only if:

1. The student has passed all completed work
2. If he/she has completed a minimum of 75% of the required coursework. A grade of an “I” will only be assigned when the conditions for completions have been discussed and agreed upon by the instructor and the student.

Overview of assignments

<u>Type of Assignment</u>	<u>Percentage</u>
1. Unit Exams	40%
2. Daily Grades	20%
3. Final Exam	40%

Schedule (Tentative and Subject to Change)

<u>Item (Name)</u>	<u>Type</u>	<u>Description</u>
Chapter 1 – Essential Concepts of Radiologic Science, pp 2-25	Lecture/Discussion of Key Points	Complete Worksheets & Review Questions
Explores the basic concepts of the science and technology of x-ray imaging to include the study of matter, energy, the electromagnetic spectrum, and ionizing radiation.		
Chapter 2 – The Structure of Matter, pp 26-43	Lecture/Discussion of Key Points	Complete Worksheets & Review Questions
Delves into the study of matter, the atom to include all characteristics of the atom important in radiology such as binding energy, individual electron energy, valence, covalent and ionic bonds, etc.		
Chapters 1 & 2 Examination		Quiz

Chapter 3 – Electromagnetic Energy, pp 44-59

**Lecture/Discussion
of Key Points**

**Complete Worksheets
& Review Questions**

Discusses the electromagnetic spectrum, identifies the properties of photons, explains and allows for work with inverse square law; and defines wave and quantum theory.

Chapter 4 – Electricity, Magnetism, and Electromagnetism, pp 60-81

**Lecture/Discussion
of Key Points**

**Complete Worksheets
& Review Questions**

Briefly introduces the basic concepts of electricity and magnetism needed for further study of the x-ray imaging system and its various components to include electrostatics and electrodynamics and electromagnetic induction and describes the nature of magnetism by discussing the laws that govern magnetic fields which is essential to understanding the function of several components of the x-ray imaging system.

Chapters 3 & 4 Examination

Quiz

Chapter 5 – The X-ray Imaging System, pp 84-103

**Lecture/Discussion
of Key Points**

**Complete Worksheets
& Review Questions**

Describes the components of the operating console of an x-ray machine that is used to control the voltage applied to the x-ray tube, the current through the x-ray tube and the exposure time, discusses the high-voltage generator which contains the high-voltage step-up transformer and the rectification circuit in its many forms, the low-voltage step-down transformer, and finally, combines all components into a single complete circuit diagram.

Chapter 6 – The X-ray Tube, pp 104-122

**Lecture/Discussion
of Key Points**

**Complete Worksheets
& Review Questions**

Explanation of the external components of the x-ray tube and the internal structure of the x-ray tube to include line focus principle, anode heel effect, and causes and prevention of x-ray tube failure with calculation of heat units and the use of tube rating charts, anode cooling curve charts and housing cooling curve charts.

Chapter 5 & 6 Examination

Quiz

Chapter 7 – X-ray Production, pp 123-135

Lecture/Discussion
of Key Points

Complete Worksheets
& Review Questions

Explain the interactions of the projectile electrons that are accelerated from the cathode to the anode within the x-ray tube resulting in the production of heat and x-rays, the interactions that produce two types of x-rays, Bremsstrahlung and Characteristic, the x-ray emission spectrum and factors that affect it, and a review of two types of mechanical energy, potential and kinetic, and their involvement in x-ray production.

Chapters 7 Examination

Quiz

Chapter 25 – Fluoroscopy, pp 401-416

Lecture/Discussion
of Key Points

Complete Worksheets
& Review Questions

Identifies the components to include the input phosphor, photocathode, electrostatic focusing lenses, anode, and output phosphor of an image intensifier tube, learn to calculate flux gain, brightness gain, minification gain and the conversion factor, an explanation of scotopic (rod) and photopic (cone) vision, fluoroscopic technique, veiling glare, contrast resolution, vignetting, spatial resolution and multiframe image intensification to include field of view, magnification factor, automatic brightness control (ABC), and the possible modes of operation with an image-intensifier tube such as spot-film camera, television monitor and cine camera.

Chapter 21 Examination

Quiz

Final Examination – Comprehensive Final Examination

Quiz

Multiple Choice Questions