Updated 07/18/2023

McLENNAN COMMUNITY COLLEGE

WACO, TEXAS

COURSE SYLLABUS

AND

INSTRUCTOR PLAN

Radiation Biology & Protection

RADR 2313_001

Meredith R. Brown MS, RT (R)

NOTE: This is a 16-week course.

NOTE: This is a Face-to-Face course.

Course Description:

RADR 2313 is a study of the effects of radiation exposure on biological systems, typical medical exposure levels, methods for measuring and monitoring radiation, and methods for protecting personnel and patients from excessive exposure.

Prerequisites and/or Corequisites:

Must be 2nd year Radiologic Technology program student.

Course Notes and Instructor Recommendations:

Must be accepted to the Radiologic Technology Program. We will use the textbook and online open educational resources (OERs). The schedule will indicate readings and assignments for each unit. Additional reading assignments will be provided on Brightspace or via internet readings.

Instructor Information:

Instructor Name: Meredith R. Brown
MCC Email: mbrown@mclennan.edu
Office Phone Number: 254-299-8342
Office Location: CSC C202
Office/Teacher Conference Hours: As post on office door
Other Instruction Information: Email is preferred method of contact. Please include name, student ID and telephone number in email content.

Required Text & Materials:

Title: Radiation Protection in Medical Radiography
Author: Statkiewicz-Sherer/Visconti/Ritenour
Edition: 9th Edition. , 2022
Publisher: Mosby Elsevier.
ISBN: 978-0-323-82503-0

MCC Bookstore Website: http://www.mclennan.edu/bookstore/

Methods of Teaching and Learning:

Lecture, quizzes, exams, reading assignments, practice worksheets, discussion boards, and OERs.

Brightspace Use and Activity

The instructor of this course intends to utilize Brightspace as both a communication tool as well as its features for announcements, assignments, and assessments. It is the student's responsibility to understand procedures and the importance of accessing Brightspace often, most likely daily, (as well as the MCC issued email), in order to stay on-track with the activities and requirements to complete this course.

E-mail correspondence

The instructor of this course intends to communicate with students using McLennan Community College email. Use of other email addresses could cause a breakdown in communication and important information missed. Email messages are to be formulated in a professional fashion with no use of text speaking or symbols. Email correspondence should open with an appropriate salutation/greeting to the person intended and close with an appropriate closing/sign off.

Course Objectives and/or Competencies:

The student will define, recognize, and evaluate essential information on the biologic effects of ionizing radiation and radiation safety to ensure the safe use of x-rays in diagnostic imaging. Students will disseminate pertinent information regarding radiation physics, cell structure, and effects of radiation on humans at the molecular, cellular, and systemic levels. Radiation quantities and units, regulatory and advisory limit for human exposure to radiation; equipment design for radiation protection; and implementation of radiation safety programs will be discussed in appropriate depth for the radiologic technology student.

I. Introduction to Radiation Protection
II. Interaction of X-radiation with Matter
III. Radiation Quantities and Units
IV. Radiation Monitoring
V. Overview of Cell Biology
VI. Molecular and Cellular Radiation Biology
VII. Early Radiation Effects on Organ Systems
VIII. Late Radiation Effects on Organ Systems

IX. Dose Limits for Radiation Exposure to Ionizing Radiation
X. Equipment Design for Radiation Protection
XI. Management of Patient Radiation Dose during Diagnostic X-ray Procedures
XII. Management of Imaging Personnel Radiation Dose during Diagnostic X-ray Procedures

COURSE COMPETENCIES:

After completion of all lectures, presentations, homework and reading assignments the student will be able to:

I. Introduction to Radiation Protection:

1. Define radiation protection and discuss reasons for employing it.
2. Explain the justification and responsibility for radiologic procedures.
3. Define ionizing radiation.
4. Describe the potential for ionizing radiation to cause biologic damage.
5. Define rem and explain its function.
6. Identify the various sources of natural background radiation and the different sources of manmade/artificial radiation.
7. Describe the magnitude of medical radiation exposure.
8. Determine the average annual radiation dose equivalent of Americans.
9. Determine the biological damage that can be caused by certain doses of ionizing radiation.
10. Determine the biological damage various sources of radiation can produce.
11. Determine permissible skin entrance exposures for various radiographic procedures.

II. Basic Interactions of X-Radiation with matter:

1. Define the terms primary radiation, exit/image forming radiation, and attenuation.
2. Discuss the way x-rays are produced and explain the range of energies present in the X-ray beam.
3. List the events that occur when x-radiation passes through matter.
4. Discuss the probability of photon interaction with matter.
5. Describe and illustrate by diagram the x-ray photon interaction with matter that are important in diagnostic radiology.

6. State the impact of contrast media with regard to photoelectric absorption and identify its effect on absorbed dose in the body structure that contains it.
7. Describe the effect of kilovoltage on radiographic image quality and patient absorbed dose.

III. Radiation Quantities and Units:

1. Describe the historical evolution of radiation quantities and units.
2. Define the radiation terms exposure, absorbed dose, and dose equivalent. Identify the appropriate symbol for each quantity.
3. List and explain the traditional units for radiation exposure, absorbed dose and dose equivalent.
4. State the purpose of the radiation quantities effective dose equivalent and collective effective dose equivalent.
5. Explain the importance of linear energy transfer (LET) as is applies to biologic damage resulting from irradiation of human tissue.
6. Define the term quality factor and identify this factor for each type of ionizing radiation.
7. State the formula for determining dose equivalent.
8. Determine the dose equivalent in terms of traditional units when given the quality factor and absorbed dose for different ionizing radiations.

IV. Radiation Monitoring

1. State the reason why a radiation worker should wear a personnel dosimeter, and explain the function and characteristics of such devices.
2. Identify the appropriate location on the body where the personnel dosimeter(s) should be worn during the following procedures or conditions: (1) routine computed radiography, digital radiography, or conventional radiographic procedures, (2) fluoroscopic procedures, (3) special radiographic procedures, (4) pregnancy.
3. Describe the various components of optically stimulated luminescence (OSL) dosimeter, pocket ionization chamber, and thermoluminescent dosimeter (TLD),etc., and explain the use of each of these devices as personnel monitors.
4. Explain the function of radiation survey instruments.
5. List three gas-filled radiation survey instruments.
6. Explain the requirements for radiation survey instruments.

7. Explain the purpose of the following instruments: (1) ionization chamber-type survey meter (cutie pie), (2) proportional counter, (3) Geiger-Müller (GM) detector.
8. Identify the radiation survey instrument that can be used to calibrate radiographic and fluoroscopic x-ray equipment.

V. Overview of Cell Biology

1. Explain the need for a basic knowledge of cell structure, composition and function as a foundation for radiation biology.
2. Identify and describe the major classes of some important functions fo organic and inorganic compounds that exist in the cell.
3. Describe the molecular structure of DNA and explain the way it functions in the cell.
4. List the various cellular components and identify their physical characteristics and functions.
5. Distinguish between the two types of cell division, mitosis and meiosis and describe each process.

VI. Molecular and Cellular Radiation Biology

1. Define radiation biology and explain its relevance to radiation protection.
2. Describe the way ionizing radiation damages living systems.
3. List the three radiation energy transfer determinants and explain their individual concepts.
4. Differentiate between the three levels of biologic damage that may occur in 1 living system as a result of exposure to ionizing radiation.
5. Describe the process of direct and indirect action of ionizing radiation of the molecular structure of living systems.
6. Draw a diagram to illustrate the various effects of ionizing radiation on a DNA macromolecule.
7. Describe the effects of ionizing radiation on chromosomes.
8. Explain the target theory.
9. Describe the effects of ionizing radiation on the cell.
10. Explain the purpose for and function of survival curves for mammalian cells.
11. List the factors that affect cell radiosensitivity.
12. State and describe the law of Bergonie and Tribondeau.)
13. Describe the effects of ionizing radiation on various types of cells.

14. Explain the significance of organic damage resulting from exposure of living systems to ionizing radiation.
15. Draw diagrams demonstrating the various dose-response relationships.
16. Identify the factors on which somatic and genetic damage depend.
17. List and describe the various early somatic effects of ionizing radiation on living systems.
18. Identify and describe the stages of acute radiation syndrome.
19. Recall the LD 50/30 for human adults and explain its significance.
20. Identify and describe the various late somatic effects of ionizing radiation on living systems.
21. Discuss the concept of radiation induced genetic effects.
22. Give examples of both stochastic and non-stochastic effects.
23. List historical examples of late somatic effects of ionizing radiation and discuss examples of each.
24. Discuss the somatic and genetic effects associated with low level ionizing radiation.

VII. Early Radiation Effects on Organ Systems

1. List four factors on which the amount of somatic and genetic biologic damage resulting from radiation exposure depend.
2. List and describe the various early nonstochastic somatic effects of ionizing radiation on living systems.
3. Describe acute radiation syndrome, and list three separate dose-related syndromes that occur as part of this total body syndrome.
4. Identify and describe the four major response stages of acute radiation syndrome.
5. Recall the LD 50/30 for human adults, explain its significance, and explain why LD 50/60 is more accurate for humans as a measure of lethality.
6. Explain why cells that are exposed to sublethal doses of ionizing radiation recover after irradiation, and discuss the cumulative effect that exists after repeated radiation injuries.
7. Describe local tissue damage that occurs when any part of the human body receives a high radiation exposure.

8. List three factors on which organ and tissue response to radiation exposure depend.
9. Describe radiation-induced skin damage from a historical perspective, and identify the person who became known as the first advocate of radiation protection.
10. Differentiate among the three layers of human skin, and identify other related accessory structures.
11. State the single absorbed dose of ionizing radiation that can cause a radiation-induced skin erythema within 24 to 48 hours after irradiation, and describe how this dose first manifests itself.
12. Explain the difference between moderate and large radiation doses with regards to epilation.
13. State the energy range of grenz rays, and give a historical example of their use in treating disease.
14. Discuss the concept of orthovoltage radiation therapy treatment, and identify how this radiation energy range affects human skin.
15. Discuss the impact on human skin when high-level fluoroscopy is used for extended periods of time during cardiovascular or therapeutic interventional procedures.
16. State the radiation dose that is capable of depressing the male sperm population and also has the potential to cause genetic mutations in future generations, and identify the radiation dose in females that may delay or suppress menstruation.
17. Explain the progression of both male and female germ cells from elementary stem cells to mature cells, and describe how this development affects cell radiosensitivity.
18. State the dose of ionizing radiation necessary to cause both temporary and permanent sterility in the human male and female.
19. Identify consequences other than impaired fertility for the human male and female, and discuss the benefit of gonadal shielding.
20. State the whole-body radiation dose that would produce a measurable hematologic depression, and identify the blood cells that are most sensitive to radiation exposure.
21. List the components of the hematopoietic system, and identify the cells of this system that develop from a single pluripotential cell.

22. Discuss the impact on the human body if radiation exposure causes a decrease in the cells that protect it against disease.
23. Define cytogenetics, and explain how cytogenetic analysis of chromosomes may be accomplished.
24. Explain the process of karyotyping, and identify the phase of cell division in which chromosome damage caused by radiation exposure can be evaluated.
25. List two types of aberrations that can be caused by exposure to ionizing radiation, and explain what determines the rate of production of chromosome aberrations.

VIII. Late Radiation Effects on Organ Systems

1. Explain how scientists use epidemiologic studies to predict the risk of cancer in human populations exposed to low doses of ionizing radiation.
2. Explain the purpose of a radiation dose-response curve.
3. Draw diagrams demonstrating the various dose-response relationships.
4. Explain why regulatory agencies continue to use the linear dose-response model for establishing radiation protection standards.
5. Differentiate between threshold and nonthreshold relationships.
6. List and describe the various late nonstochastic somatic effects and late stochastic somatic effects of ionizing radiation on living systems.
7. Describe the concept of risk for radiation-induced malignancies, and explain the models that are used to give risk estimates.
8. Identify ionizing radiation-exposed human populations or groups that prove radiation induces cancer.
9. Explain how spontaneous mutations occur, and discuss the concept of radiation-induced genetic effects; also explain how ionizing radiation causes these effects and how they can be passed on to future generations.
10. Differentiate between dominant and recessive gene mutations.
11. Explain the doubling dose concept, and give an example of how the number of mutations increases as dose increases.

IX. Dose Limits for Exposure to Ionizing Radiation

1. List and describe the function of the four major organizations that share the responsibility for evaluating the relationship between radiation equivalent dose

and induced biologic effects, and the five U.S. regulatory agencies responsible for enforcing established radiation effective dose limiting standards.

2. Explain the function of the radiation safety committee (RSC) in a medical facility, and describe the role of the radiation safety officer (RSO) by listing the various responsibilities he or she must fulfill.
3. Explain the purpose of the Radiation Control for Health and Safety Act of 1968 and the Consumer Patient Health and Safety Act of 1981.
4. List the important provisions of the code of standards for diagnostic x-ray equipment that began on August 1, 1974.
5. Explain the ALARA concept.
6. Describe current radiation protection philosophy, and state the goal and objectives of radiation protection.
7. Identify radiation-induced responses that warrant serious concern for radiation protection.
8. Explain the concept of risk as it relates to the medical imaging industry.
9. Describe effective dose limit and the effective dose-limiting system.
10. Identify the risk from exposure to ionizing radiation at low absorbed doses.
11. Discuss current National Council on Radiation Protection and Measurements recommendations.
12. Given appropriate data, calculate the cumulative effective dose for the whole body for a radiation worker.
13. Explain the function of collective effective dose, and list the unit used to express this quantity.
14. Discuss the significance of action limits in health care facilities.
15. Explain the concept of radiation hormesis.
16. State the following in terms of International System (SI) units and traditional units:
    a. Annual occupational effective dose limit and cumulative effective dose (CumEfD) limit for whole-body exposure, excluding medical and natural background exposure, which are based on stochastic effects
    b. Annual occupational equivalent dose limits for tissues and organs such as lens of the eye, skin, hands, and feet, which are based on deterministic effects
    c. Annual effective dose limits for continuous (or frequent) exposure and for infrequent exposure of the general public from manmade sources

other than medical and natural background, which are based on stochastic effects

d. Annual equivalent dose limits for tissues and organs such as lens of the eye, skin, hands, and feet of members of the general public, which are based on deterministic effects
e. Annual effect dose limit for an occupationally exposed student under the age of 18 years (excluding medical and natural background radiation exposure)
f. Occupational monthly equivalent dose limit to the embryo-fetus (excluding medical and natural background radiation) once the pregnancy is known

X. Equipment Design for Radiation Protection

1. Explain the requirements for a diagnostic-type protective tube housing, x-ray control panel, radiographic examination table, and source-to-image distance indicator, and discuss their purpose.
2. List the various x-ray beam–limiting devices, and describe each.
3. Explain the importance of luminance of the collimator light source, state the requirements for good coincidence between the radiographic beam and the localizing light beam when a variable rectangular collimator is used, and explain the function of the collimator's positive beam limitation (PBL) feature.
4. Explain the function of x-ray beam filtration in diagnostic radiology, list two types of filtration used to adequately filter the beam, describe half-value layer (HVL), and give examples of HVLs required for selective peak kilovoltages.
5. Explain the function of a compensating filter in radiography of a body part that varies in thickness, and list two types of such filters.
6. Explain the significance of exposure reproducibility and exposure linearity.
7. Explain how the use of high-speed screen-film combinations reduces radiographic exposure for the patient when film is the image receptor of choice.
8. Explain how radiographic grids increase patient dose.
9. Identify the minimal source-skin distance (SSD) that must be used for mobile radiography to ensure patient safety, and state the reason for this minimal SSD requirement.

10. Explain the process of digital radiography and computed radiography, and discuss why it is imperative that patients undergoing digital imaging procedures not be overexposed initially.
11. Explain how patient exposure may be reduced during routine fluoroscopic procedures, C-arm fluoroscopic procedures, high-dose (high-level-control [HLC]) fluoroscopy interventional procedures, cineradiographic procedures, and digital fluoroscopic procedures.
12. Discuss the use of fluoroscopic equipment by nonradiologist physicians who perform interventional procedures or other potentially lengthy tasks, and identify the responsibilities of the radiographer during such procedures.

XI. Management of Patient Radiation Dose during Diagnostic X-ray Procedures

1. Explain the meaning of a holistic approach to patient care, and recognize the need for effective communication between imaging department personnel and the patient. .
2. Explain how voluntary motion can be eliminated or at least minimized and how involuntary motion can be compensated for during a diagnostic radiographic procedure. .
3. Explain the need for protective shielding during diagnostic imaging procedures, state the reason for using gonadal shielding or other specific area shielding, and compare the various types of shields available for use.
4. Discuss the need to use appropriate radiographic technical exposure factors for all radiologic procedures, and explain how these factors may be adjusted to reduce patient dose.
5. Explain how a radiographer can achieve a balance in technical radiographic exposure factors to ensure the presence of adequate information in the recorded image and also minimize patient dose.
6. Explain how adequate immobilization and correct image processing techniques reduce radiographic exposure for the patient. .
7. Compare the use of an air gap technique for certain examinations such as a cross-table lateral projection of the cervical spine with the use of a mid-ratio grid (8:1).
8. State the reason for reducing the number of repeat images, and describe the benefits of repeat analysis programs.

9. List six nonessential radiologic examinations, and explain the reason why each is considered unnecessary.
10. List four ways to indicate the amount of radiation received by a patient from diagnostic imaging procedures, and explain each.
11. Explain the concept of genetically significant dose (GSD).
12. Discuss the protocol to be followed when irradiation of an unknown pregnancy occurs, and explain how the absorbed dose to the patient's embryo-fetus is determined.
13. Discuss the value of mammography for the detection of breast cancer, state the maximum dose to glandular tissue of a 4.5-cm compressed breast using a screen-film system, identify the value of digital mammography for imaging of patients with dense breasts, and describe how to achieve dose reduction. .
14. Compare the patient dose received from a succession of adjacent computed tomography (CT) scans with patient dose received from a conventional series of diagnostic images of the adult cranium. .
15. State the goal of computed tomography (CT) imaging from a radiation protection point of view. .
16. Discuss the Alliance for Radiation Safety in Pediatric Radiology and the Image Gently Campaign.

13. Explain the reason children require special radiation protection when undergoing conventional diagnostic imaging procedures.
14. Describe special precautions employed in radiography to protect the pregnant or potentially pregnant patient during an x-ray examination.

XII. Management of Imaging Personnel Radiation Dose

1. State the annual occupational effective dose limit for whole-body exposure of diagnostic imaging personnel during routine operations, and explain the significance of the ALARA (as low as reasonably achievable) concept for these individuals.
2. Explain the reason that occupational exposure of diagnostic imaging personnel must be limited, and state the most important reason for allowing a larger equivalent dose for radiation workers than for the population as a whole.

3. Identify the type of x-radiation that poses the greatest occupational hazard in diagnostic radiology, and explain the various ways this hazard can be reduced or eliminated.
4. Explain how the various methods and techniques that reduce patient exposure during a diagnostic examination also reduce exposure for the radiographer and other diagnostic personnel.
5. Discuss the responsibilities of the employer for protecting declared pregnant diagnostic imaging personnel from radiation exposure.
6. List and explain the three basic principles of radiation protection that can be used for personnel exposure reduction.
7. State and explain the inverse square law by solving mathematical problems applying its concept.
8. Explain the purpose of a diagnostic-type protective tube housing, differentiate between a primary and secondary protective barrier, and list examples of each.
9. Describe the construction of protective structural shielding, and list the factors that govern the selection of appropriate construction materials.
10. List and describe the protective garments that may be worn to reduce whole- or partial-body exposure, and discuss the circumstances in which such garments are worn.
11. Explain the various methods and devices that may be used to reduce exposure for personnel during routine fluoroscopic examinations and during interventional procedures that use high-level-control fluoroscopy.
12. Explain the various methods and devices that may be used to reduce the radiographer's exposure during a mobile radiographic examination.
13. Explain the variation in dose rate caused by scatter radiation near the entrance and exit surfaces of the patient during C-arm fluoroscopy, and discuss methods of dose reduction for C-arm operators.
14. Describe methods used to provide patient restraint during a diagnostic x-ray procedure, and identify individuals who might use them.
15. List the three categories of radiation sources that may be generated in an x-ray room; list the considerations on which the design of radiation-absorbent barriers should be based; and explain the importance of each.
16. Differentiate between a controlled area and an uncontrolled area.
17. Discuss new approaches to shielding design.

18. Discuss the requirements for posting caution signs for radioactive materials and radiation areas.
19. Discuss the medical management of persons experiencing radiation bioeffects.
20. Describe various strategies used to treat internal radiation contamination.

Course Attendance/Participation Guidelines:

As outlined by both the MCC and Health Profession Division policies, regular and punctual attendance is expected of all students, and a complete record of attendance will be kept by each instructor for the entire length of each course. Students will be counted absent from class meetings missed, beginning with the first official day of classes. Students, whether present or absent, are responsible for all material presented or assigned for a course and will be held accountable for such materials in the determination of course grades.

In addition, as specifically stated in the MCC Health Professions policy on attendance in didactic courses, a student will be dropped if a cumulative of 15% of class meetings are missed due to unexcused reasons.

Please refer to the full MCC Attendance policy and the MCC Health Professions Division policy for full details.

If a student is not in attendance in accordance with the policies/guidelines of the class as outlined in the course syllabus as of the course census date, faculty are required to drop students from their class roster prior to certifying the respective class roster. A student's financial aid will be re-evaluated accordingly and the student will only receive funding for those courses attended as of the course census date.

Course Outline or Schedule:

RADR 2313 **Radiation Biology/Protection** **Fall 2023**

This schedule is subject to change at any time; students will be notified.

RADR 2313 Radiation Biology/Protection Fall 2023

This schedule is subject to change at any time; students will be notified.

Date	Topic	Reading, Due Dates, etc.
Week 1 Tues, Aug 22	Syllabus, Schedule Intro to Rad Protection	Chapter 1
Thurs, Aug 24	Intro to Radiation Protection	Chapter 1
Week 2 Tues, Aug 29	Radiation: Types, Sources, etc...	Chapter 2
Thurs, Aug 31	Ch 2 Continued	Exam 1 due by Sun, 9/3
	Refer to Brightspace for Online Activities	Chapter 1 & 2
Week 3 Tues, Sept 5	Interaction of X-radiation with Matter	Chapter 3
Thurs, Sept 7	Cont Ch 3	
	Refer to Brightspace for Online Activities	
Week 4 Tues, Sept 12	Radiation Quantities & Units	Chapter 4
Thurs, Sept 13	Cont Ch 4	
	Refer to Brightspace for Online Activities	
Week 5 Tues, Sept 19	Radiation Monitoring	Chapter 5
Thurs, Sept 21	Cont Ch 5	Exam 2 due by Sun, 9/24
	Refer to Brightspace for Online Activitie	Chapter 3,4, & 5
Week 6 Tues, Sept 26	Overview of Cell Biology	Chapter 6
Thurs, Sept 28	Con't Ch 6	
	Refer to Brightspace for Online Activities	
Week 7 Tues, Oct 3	Molecular & Cellular Radiation Biology	Chapter 7
Thurs, Oct 5	Con't Ch 7	Exam 3 due by Sun, 10/8
	Refer to Brightspace for Online Activities	Chapter 6 & 7
Week 8 Tues, Oct 10	Early Tissue Effects on Organ Systems	Chapter 8
Thurs, Oct 12	Con't Ch 8	

	Refer to Brightspace for Online Activities	
Week 9 Tues, Oct 17	Stochastic Effects & Late Tissue Reactions in Organ Systems	Chapter 9
Thurs, Oct 19 (Poss Online Class)	Con't Ch 9 Refer to Brightspace for Online Activities	Exam 4 due by Sun, 10/22 Chapter 8 & 9
Week 10 Tues, Oct 23	Dose Limits for for Exposure to	Chapter 10
Thurs, Oct 25	Con't Ch 10 Refer to Brightspace for Online Activities	
Week 11 Tues, Oct 31	Equipment Design for Rad. Prot. Halloween	Chapter 11
Thurs, Nov 2	Con't Ch 11 Refer to Brightspace for Online Activities	Exam 5 due by Sun, 11/5 Chapter 10 & 11
Week 12 Tues, Nov 7	Mgmt. of Patient Radiation Dose During Dx X-ray Procedures	Chapter 12
Thurs, Nov 9	 Refer to Brightspace for Online Activities	
Week 13 Tues, Nov 14	Mgmt. of Patient Radiation Dose During Dx X-ray Procedures	Chapter 14
Thurs, Nov 16	Refer to Brightspace for Online Activities 	Exam 6 due by Sun, 11/19 Chapter 12 & 14
Week 14 Tues, Nov 21	Catch up/Flex Day TBD	
	Happy Thanksgiving!	
Week 15 Tues, Nov 29th	Exam Review Day Study for final	
Tues, Dec 6th	Final Exam 9a-11am	Comprehensive

Course Grading Information:

Your grade in this course will be based upon your performance in the following areas:

Grading Area	Percentage of Course Grade
Quizzes & assignments	30%
Unit exams	40%
Comprehensive final exam	30%
Total Course Grade	100%

The course grade will be applied to the following scale:

90-100%	A
80-89%	B
75-79%	C
60-74 %	D
59% or less	F

All final course grades will be applied to the following scale and will be rounded up to the nearest whole number when greater than or equal to .5 or above.

Examples: 93.4 = 93, 93.5 = 94, or 93.6 = 94 and so on.

Should you have any questions regarding the rounding of grades please contact your instructor.

Late Work and Make Up Work Policies:

Make Up Work

Student will be permitted to make up assignments with no penalty due to absence, caused by:

1. Personal illness WITH VERIFICATION FROM YOU DOCTOR
2. Death in the immediate family (mother, father, brother, sister, or a child of oneself).

All other late assignments will receive 10 point deduction on the first day missed and five points everyday thereafter. This is only accountable on business days.

Grading

Grades for each exam are posted on Brightspace for students to view. Students are required to report to the instructor any incorrect posting within two days of taking an exam. Failure of students to check their grades in order to report any incorrect posting

and failure to report this to the instructor will result in grades remaining as posted on Brightspace.

Performance Goal, Expectation, and Requirements

The Radiologic Technology program coursework is designed to provide students with a structured comprehensive curriculum that prepares them for a career as a professional health care provider. It is imperative that students develop and maintain a strong knowledge base of all course material and competencies to be successful.

Therefore, the program has established a performance goal for all coursework and assessments in all RADR courses of an 80% or higher. Students that do not achieve the minimum grade of 80% will be required to complete an activity of remediation assigned by the instructor of the course immediately following. The activity requirements will vary as they will be customized according to factors such as the students' needs, the purpose of the assignment, its content, etc., and the instructor will maintain all records of completion. Students that fail to complete the required remediation activities will receive an "Incomplete" ("I") grade for the course, regardless of overall passing grade point average, until all work is submitted. An "Incomplete" ("I") in any course must be resolved prior to the start of the following semester or the resulting grade will convert to an "F" and the student will not pass the course.

Online Quizzes and Testing Policy

Some chapter tests and/or quizzes may be posted on Brightspace and will be timed according to length and content. Adequate time will be provided to complete the test provided the student has studied the material prior to taking the test. There will not be sufficient time to "look up" each test question searching for the answer. 5 points will be deducted for every minute that a student goes over the allotted testing time.

If a student fails to take the Brightspace test or quiz during the allotted time frame, a zero will be given with no opportunity to re-take the test. This only applies to tests or quizzes that are not begun and completed during the time frame. If a technology glitch occurs, the student is to contact the instructor immediately to report the issue. The instructor will investigate the issue and has the option to re-set the test or quiz. If "glitches" continue to be a recurring problem, the student will be required to test at the Testing Center.

Tardiness/Absence Policy

Tardiness is defined by the instructor of this class as any time past the originally scheduled time class is to begin.

At 9:00 am, class has officially begun and a student is considered late if arrival is any time after that. Habitual tardiness indicates a lack of discipline and will be dealt with on an individual basis. **The doors to the classroom will be locked at 9:00am and the student will be denied access until the first break of the class which is usually at 50 minutes after the beginning of class.**

Students will be allowed to take a brief break at approximately 50 minute intervals. A break is designed to allow the student restroom facility time as well as technology breaks to check cell phones/messages, etc. Leaving while class is in session can be disruptive to others. Students may leave but need to understand that the classroom doors are locked and will remain locked and no re-entry will be allowed until the next break or class has officially ended. Should you have an emergent situation and need to leave during class, please gather your belongings quietly and leave since you will not be allowed class access until the next break or until class is over.

Special considerations need to be discussed with the instructor.

Missing any portion of class at any time is considered an absence for the entire class period.

***Only extreme circumstances will be considered for an excused absence and is at the discretion of the course instructor.**

Regular and punctual attendance is expected of all students, and a complete record of attendance will be kept by each instructor for the entire length of each course. Students will be counted absent from class meetings missed, beginning with the first official day of classes.

Students, whether present or absent, are responsible for all material presented or assigned for a course and will be held accountable for such materials in the determination of course grades.

Student Behavioral Expectations or Conduct Policy:

Classroom Behavior

Students in this program are adults and are expected to act appropriately. Behavior that is disrespectful or disruptive will not be tolerated; the student will be asked to leave the class. Each occurrence will be documented and may result in counseling from the instructor and program director.

Students are expected to maintain classroom decorum that includes respect for other students and the instructor, prompt and regular attendance, and an attitude that seeks to take full advantage of the education opportunity.

Academic Honesty and Ethical Conduct

Academic honesty and professional conduct is expected and will be enforced by the instructor. Individuals who cannot conduct themselves in a respectful manner will be asked to leave the classroom on the first occurrence. If continued behavioral incidents occur, the student will be removed from the classroom and referred to the Disciplinary Officer in the Career Development Office. If this occurs, the student may be expelled from the program and possibly the college. Likewise, if a student copies someone else's work, (plagiarism), cheats, or

lies about assignments, the student will be required to attend a conference with the instructor, and will receive a grade of zero for the assignment in question. If a student is caught cheating in any form, the student will receive a grade of "F" for the course and may risk being expelled from the college.

Smoking Cessation – Electronic Vapor Products

Use of electronic smoking cessation devices are prohibited in the classroom or the building. E-Cig/Vapor devices can only be used outside the building. Likewise, these products cannot be used inside any clinical site building.

Electronic Devices

All cell phones, pagers, or other electronic devices must be turned off during class. You may check your messages during breaks or between classes. Laptop computers may be used to facilitate note taking or to view classroom visuals that are posted on

Brightspace, but must be turned off or put in sleep mode during tests. No other use of the lap top will be tolerated during class. If at any time during class you create a distraction to the Instructor or your classmates, you will be asked to leave the class.

Due Process

If a student has a grievance or complaint, it is expected that the student would start by discussing the issue with the specific instructor first. For more information regarding the due process policies of the College, please refer to the Highlander's Guide.

MCC Academic Integrity Statement:

The Center for Academic Integrity, of which McLennan Community College is a member, defines academic integrity as "a commitment, even in the face of adversity, to five fundamental values: honesty, trust, fairness, respect, and responsibility. From these values flow principles of behavior that enable academic communities to translate ideals into action." Individual faculty members determine their class policies and behavioral expectations for students. Students who commit violations of academic integrity should expect serious consequences. For further information about student responsibilities and rights, please consult the McLennan website and your Highlander Student Guide.

* **Click Here for the MCC Academic Integrity Statement**

(**www.mclennan.edu/academic-integrity**)

The link above will provide you with information about academic integrity, dishonesty, and cheating.

Cheating

Cheating is a serious offense. A student found cheating will receive a zero for the exam grade and will be required to attend a conference with the instructor and the program director.

Click Here for the MCC Attendance/Absences Policy
(https://www.mclennan.edu/highlander-guide/policies.html)
Click on the link above for the college policies on attendance and absences. Your instructor may have additional guidelines specific to this course.

Updated 07/18/2023

MCLENNAN COMMUNITY COLLEGE

ACADEMIC RESOURCES/POLICIES

Accommodations/ADA Statement:

Any student who is a qualified individual with a disability may request reasonable accommodations to assist with providing equal access to educational opportunities. Students should contact the Accommodations Coordinator as soon as possible to provide documentation and make necessary arrangements. Once that process is completed, appropriate verification will be provided to the student and instructor. Please note that instructors are not required to provide classroom accommodations to students until appropriate verification has been provided by the Accommodations Coordinator. For additional information, please visit www.mclennan.edu/disability.

Students with questions or who require assistance with disabilities involving physical, classroom, or testing accommodations should contact:

disabilities@mclennan.edu 2542998122 Room 319, Student Services Center

Title IX:

We care about your safety, and value an environment where students and instructors can successfully teach and learn together. If you or someone you know experiences unwelcomed behavior, we are here to help. Individuals who would like to report an incident of sexual misconduct are encouraged to immediately contact the acting Title IX Coordinator at titleix@mclennan.edu or by calling, Dr. Claudette Jackson, (Accommodations/Title IX) at (254) 299-8465. MCC employees are mandatory reporters and must report incidents immediately to the Title IX Coordinator. Individuals may also contact the MCC Police Department at (254) 299-8911 or the MCC Student Counseling Center at (254) 299-8210. The MCC Student Counseling Center is a

confidential resource for students. Any student or employee may report sexual harassment anonymously by visiting http://www.lighthouse-services.com/mclennan/. Go to McLennan's Title IX webpage at www.mclennan.edu/titleix/. It contains more information about definitions, reporting, confidentiality, resources, and what to do if you or someone you know is a victim of sexual misconduct, gender-based violence or the crimes of rape, acquaintance rape, sexual assault, sexual harassment, stalking, dating violence, or domestic violence.

Student Support/Resources:

MCC provides a variety of services to support student success in the classroom and in your academic pursuits to include counseling, tutors, technology help desk, advising, financial aid, etc. A listing of these and the many other services available to our students is available at http://www.mclennan.edu/campus-resource-guide/

Academic Support and Tutoring is here to help students with all their course-related needs. Specializing in one-on-one tutoring, developing study skills, and effectively writing essays. Academic Support and Tutoring can be found in the Library and main floor of the Learning Commons. This service is available to students in person or through Zoom. You can contact the Academic Support and Tutoring team via Zoom or email (ast@mclennan.edu) by going to our website (https://www.mclennan.edu/academic-support-and-tutoring/).

College personnel recognize that food, housing, and transportation are essential for student success. If you are having trouble securing these resources or want to explore strategies for balancing life and school, we encourage you to contact either MCC CREW – Campus Resources Education Web by calling (254) 299-8561 or by emailing crew@mclennan.edu or a Success Coach by calling (254) 299-8226 or emailing SuccessCoach@mclennan.edu. Both are located in the Completion Center located on the second floor of the Student Services Center (SSC) which is open Monday-Friday from 8 a.m.-5 p.m.

Paulanne's Pantry (MCC's food pantry) provides free food by appointment to students, faculty and staff. To schedule an appointment, go to https://mclennan.co1.qualtrics.com/jfe/form/SV_07byXd7eB8iTqJg. Both the Completion Center and Paulanne's Pantry are located on the second floor of the Student Services Center (SSC).

MCC Foundation Emergency Grant Fund:

Unanticipated expenses, such as car repairs, medical bills, housing, or job loss can affect us all. Should an unexpected expense arise, the MCC Foundation has an emergency grant fund that may be able to assist you. Please go to https://www.mclennan.edu/foundation/scholarships-and-resources/emergencygrant.html to find out more about the emergency grant. The application can be found at https://www.mclennan.edu/foundation/docs/Emergency_Grant_Application.pdf.

MCC Academic Integrity Statement:

Go to www.mclennan.edu/academic-integrity for information about academic integrity, dishonesty, and cheating. The unauthorized use of artificial intelligence (AI) for classwork can be a violation of the College's General Conduct Policy. Whether AI is authorized in a course and the parameters in which AI can be used in a course will be outlined by each instructor.

Minimum System Requirements to Utilize MCC's D2L|Brightspace:

Go to https://www.mclennan.edu/center-for-teachingandlearning/FacultyandStaffCommons/requirements.html for information on the minimum system requirements needed to reliably access your courses in MCC's D2L|Brightspace learning management system.

Minimum Technical Skills:

Students should have basic computer skills, knowledge of word processing software, and a basic understanding of how to use search engines and common web browsers.

Backup Plan for Technology:

In the event MCC's technology systems are down, you will be notified via your MCC student email address. Please note that all assignments and activities will be due on the date specified in the Instructor Plan, unless otherwise noted by the instructor.

Email Policy:

McLennan Community College would like to remind you of the policy (http://www.mclennan.edu/employees/policy-manual/docs/E-XXXI-B.pdf) regarding college email. All students, faculty, and staff are encouraged to use their McLennan email addresses when conducting college business.

A student's McLennan email address is the preferred email address that college employees should use for official college information or business. Students are

expected to read and, if needed, respond in a timely manner to college emails. For more information about your student email account, go to www.mclennan.edu/studentemail.

Instructional Uses of Email:

Faculty members can determine classroom use of email or electronic communications. Faculty should expect and encourage students to check the college email on a regular basis. Faculty should inform students in the course syllabus if another communication method is to be used and of any special or unusual expectations for electronic communications.

If a faculty member prefers not to communicate by email with their students, it should be reflected in the course syllabus and information should be provided for the preferred form of communication.

Email on Mobile Devices:

The College recommends that you set up your mobile device to receive McLennan emails. If you need assistance with set-up, you may email Helpdesk@mclennan.edu for help.

You can find help on the McLennan website about connecting your McLennan email account to your mobile device:

- Email Setup for iPhones and iPads
- Email Setup for Androids

Forwarding Emails:

You may forward emails that come to your McLennan address to alternate email addresses; however, the College will not be held responsible for emails forwarded to an alternate address that may be lost or placed in junk or spam filters.

For more helpful information about technology at MCC, go to MCC's Tech Support Cheat Sheet or email helpdesk@mclennan.edu.

Disclaimer:

The resources and policies listed above are merely for informational purposes and are subject to change without notice or obligation. The College reserves the right to change policies and other requirements in compliance with State and Federal laws. The provisions of this document do not constitute a contract.