

McLennan
C O M M U N I T Y
COLLEGE

WACO, TEXAS

COURSE SYLLABUS
AND
INSTRUCTOR PLAN

Principles of Radiographic Imaging I

RADR 1313_80

Michelle Morphis, MBA, R.T. (R) (ARRT)

NOTE: This is an 8-week course.

NOTE: This is a Blended/Hybrid course.

COVID 19 Notice:

McLennan Community College is committed to providing you with every resource you need to reach your academic goals. We are also concerned for your safety. We are working through COVID-19 guidelines to make sure we offer a safe environment for you and our faculty. This will include smaller class sizes to manage social distancing and proper cleaning techniques. You will have the advantage of a physical classroom experience but may also need to work part of the time online as we adjust to limited classroom capacity. This will also allow us the flexibility to move online if so directed by federal, state and/or local COVID 19 guidelines. Faculty and staff are preparing now to ensure that you have the best experience in the midst of these uncertain times.

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Course Description:

Analyzes radiographic image qualities and the effects of exposure variables upon these qualities.
Semester Hours 3 (3 lec/1 lab)

Prerequisites and/or Corequisites:

Concurrent enrollment in other first year radiologic technology courses. Success completion of RADR courses in Semester I, with a grade of C or better.

Course Notes and Instructor Recommendations:

Students are expected to read assigned chapters in the text prior to class to facilitate deep discussion and understanding of the concepts. Students should have at least a four-function calculator for math problems. The course may utilize images, presentations, lab presentations, group discussion, and other methods of teaching. Students will be expected to read and critically evaluate relevant journal articles. Students will use clinical experiences and apply to learning objectives. Electronic devices with Wi-Fi capability are encouraged for participation and access to Brightspace. Students will need a computer with a webcam to take exams using Respondus Lockdown. If a computer does not have a built-in webcam, students will need to acquire one prior to the first exam.

Instructor Information:

Instructor Name: Michelle Morphis

MCC E-mail: mmorphis@mclennan.edu

Office Phone Number: 254.299.8584

Office Location: CSC A-14

Office/Teacher Conference Hours: As posted on door.

Other Instruction Information: Due to Covide-19, students will not be allowed to meet with a professor for an in-person office conference. However, students may request a Zoom conference. Refer to Brightspace announcements for any changes to in-person meetings.

Required Text & Materials:

Title: Radiographic Imaging and Exposure

Author: Terri L. Fauber

Edition: 5th

Publisher: Elsevier

ISBN: 978-0-323-35624-4

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

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Methods of Teaching and Learning:

This course is taught by lecture using PowerPoint visuals, lab exercises, group activities, worksheets, labs, and journals. Students may read and critically assess relevant journal articles. Internet resources are used when appropriate. Students may be given assignments to complete in the clinical setting and report back to class. Small group lab activities may be scheduled throughout the semester and will be scheduled in advance. This course is taught via two-way interactive television with students at Temple College.

Course Objectives and/or Competencies:

Legend:

CO1- Resources. Allocating: 1.1 Time, 1.2 - Money, 1.3 - Materials & Facilities, 1.4 - Human Resources

CO2- Interpersonal Skills. Works with others: 2.1 - Working in teams, 2.2 - Teaching others, 2.3 - Serving customers, 2.4 - Leading, 2.5 - Negotiating, 2.6 - working with different cultures.

CO3- Information. Acquires and uses information. 3.1 - Acquiring & evaluating data, 3.2 - Organizing and maintaining files. 3.3 - Interpreting and communicating, 3.4 - Processing information with computers.

CO4- Systems. Understands complex interrelationships: 4.1 - Understands social, technological & organizational systems, 4.2 - Monitoring and correcting performances, 4.3 - Designing and/or improving systems.

CO5- Technology. Works with a variety of technologies: 5.1 - Selects equipment & tools, 5.2 - Applies technology to tasks, 5.3 - Maintains & troubleshoots technologies.

FO1- Basic skills. Reads, writes, performs mathematical operations, listens and speaks: 1.1 - Reading, 1.2 - Reading, 1.3 - Arithmetic/Mathematics, 1.4 - Speaking, 1.5 - Listening.

FO2- Thinking Skills. Think creatively, makes decisions, solves problems, visualizes, knows how to learn and reason: 2.1 - Creative thinking, 2.2 - Decision making, 2.3 - Problem solving, 2.4 - Seeing with the mind's eye, 2.5 - Knowing how to learn, 2.6 Reasoning.

FO3 -Personal Qualities. Displays responsibility, self-esteem, sociability, self-management, and integrity and honesty: 3.1 - Responsibility, 3.2- Self-esteem, 3.3 - Sociability, 3.4 - Self-management, 3.5 - Integrity/Honesty.

Radiation and Its Discovery (C03, C05, F01, F02)

1. Describe the events surrounding the discovery of x-rays.
2. Describe dual nature of x-ray energy.
3. State the characteristics of electromagnetic radiation
4. Differentiate among the units of measurement for radiation
5. List the properties of x-rays.
6. Recognize the fundamentals of radiation protection

The X-ray Beam (C03, C05, F01, F02)

1. Describe the construction of the x-ray tube.

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2. State the function of the components of the x-ray tube.
3. Describe how x-rays are produced in the x-ray tube.
4. Explain the role of the primary exposure factors in determining quality and quantity of x-rays.
5. Explain the line focus principle.
6. State how the anode heel effect could be used in diagnostic imaging.
7. Differentiate between types of filtration and explain their purpose
8. Calculate heat units
9. Recognize how changing generator output, kVp, mA, and filtration affect the x-ray
10. List guidelines to extend the life of an x-ray tube.

Radiographic Image Formation and Radiographic Quality (C03, C05, F01, F02)

1. Describe the process of radiographic image formation.
2. Explain the process of beam attenuation.
3. Describe x-ray interactions with tissue (photoelectric, Compton).
4. Define ionization.
5. State the composition of exit radiation.
6. Explain the process of creating the various shades of image brightness.
7. Describe the necessary components of radiographic quality.
8. Explain the importance of brightness and contrast to image quality.
9. Differentiate between high-contrast and low-contrast images.
10. Explain the importance of spatial resolution and both size and shape distortion to image quality.
11. State the effects of quantum noise, scatter, and image artifacts of image quality.
12. Recognize the advantages of digital imaging and the limitations of film-screen imaging.

Digital Imaging (C03, C05, F01, F02)

1. State important relationships in digital imaging.
2. Compare and contrast the attributes of a digital image.
3. Explain the digital characteristics of matrix and pixels.
4. Recognize the relationship among pixels size, field of view, and matrix size.
5. Define signal-to-noise ratio (SNR) and explain its importance to digital image quality.
6. Differentiate among the vendor-specific types of exposure indicators and recall the purpose of exposure indicators.

Exposure Technique Factors (C03, C05, F01, F02)

1. Explain relationship between mA and exposure time with radiation production and IR exposure.
2. Calculate changes in mA and exposure time to change or maintain exposure to the IR.
3. Compare the effect of changes in mA and exposure time on digital images.
4. Recognize how to correct exposure factors for a density error.
5. Explain how kVp affects radiation production and IR exposure.
6. Calculate changes in kVp to change or maintain exposure to the IR.

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7. Compare the effects of changes in kVP on digital images.
8. Recognize factors that affect spatial resolution and distortion.
9. Calculate changes in mAs for changes in source-to-image-receptor distance.
10. Calculate the magnification factor, and determine image and object size.
11. Describe the use of grids and beam restriction and their effect on IR exposure and image quality.
12. Calculate changes in mAs when adding or removing a grid.
13. Recognize patient factors that may affect IR exposure.
14. Identify exposure factors that can affect patient radiation exposure.
15. State exposure technique modifications for the following considerations: body habitus and patient thickness

Scatter Control (C03, C05, F01, F02)

1. State the purpose of beam restricting devices.
2. Describe each of the types of beam restricting devices.
3. State the purposes of automatic collimators or positive beam limiting devices.
4. Describe the purpose of a grid.
5. Describe the construction of grids, including the different types of grids, including grid pattern, grid focus.
6. Calculate grid ratio.
7. List various types of stationary grids.
8. Describe the function and purpose of a moving grid.
9. Demonstrate use of grid conversion formula.
10. Describe different types of grid cutoff
11. Recognize how beam restriction and the use of grids affect patient radiation exposure
12. Explain the air gap technique and describe its use.

Exposure Technique Selection (C03, C05, F01, F02)

1. State the purpose of AEC
2. Differentiate among the types of radiation detectors used in AEC systems.
3. Recognize how detector size and configuration will affect the response of an AEC device.
4. Explain how alignment and positioning affect the response of an AEC device.
5. Discuss patient and exposure technique factors and their effects on the response of an AEC device.
6. Analyze unacceptable images produced using AEC and possible causes.
7. Describe patient radiation protection issues associated with AEC.
8. State the importance of calibration of the AEC to the type of IR used.
9. Define anatomically programmed techniques.
10. State exposure technique modifications for pediatric, geriatric, and bariatric patients and varying projections and positions, soft tissue, casts and splints, contrast media, and pathological conditions.

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Image Evaluation (C03, C05, F01, F02)

1. Define attributes of a good-quality radiographic image.
2. Identify exposure factors and their radiographic effects.
3. Identify factors that contribute to a poor image.
4. Recognize exposure factor errors and their effect on the exposure indicator.
5. Identify factors that could contribute to quantum noise and artifacts.
6. Given a poor-quality image, identify the factors contributing to its effect.
7. Given exposure factors, explain their contribution to poor image quality.
8. Calculate exposure technique factors to improve image quality.

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Course Outline or Schedule:

Spring 20	Content	Reading Prep	Exam
1	Radiation & Its Discovery / The X-ray Beam	CH 1 & 2	
2	The X-ray Beam Image Formation & Radiographic Quality	CH 3	Unit 1 (CH 1 & 2) 1/25
3	Image Formation & Radiographic Quality/ Digital Imaging (will not cover entire chapter)	CH 4	
4	Exposure Technique Factors/ Scatter Control	CH 6	Unit 2 (CH 3 & 4) 2/01
5	Scatter Control	CH 7	
6	Exposure Technique Selection/Image Evaluation	CH 8	Unit 3 (CH 6 & 7) 02/15
7	Image Evaluation	CH 9	Unit 4 (CH 8 &9) Respondus: 02/27
8	Journal Sharing/Review for Final	Review for final	Final 3/01 @ 1:00 pm Respondus or E111

Additional due dates can be found on Brightspace.

If changes to content or dates should be necessary, the students will be notified via Brightspace announcements.

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Course Grading Information:

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

<u>Grading Area</u>	<u>Percentage of Course Grade</u>
Assignments	15%
Quizzes	20%
Journal	10%
Unit exams	35%
<u>Comprehensive final exam</u>	<u>20%</u>
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

***This is an RT course—C is the minimum acceptable grade. Any grade below 75 is considered a failing grade for this program. In order to progress through the program, you must meet the minimum acceptable grade requirement.**

Throughout the semester, Brightspace will display grades with decimals. These grades will not round until after the final exam has been taken. The final grade will be rounded when viewing the tenth place only. An example of rounding the final grade in this course:

89.5 to 89.9 will round to a 90% (A)

89.0 to 89.4 will round to an 89 % (B)

Respondus Lockdown Browser:

The browser must be downloaded prior to taking an exam

[Download Respondus Browser \(Click Here\)](#)

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When using Respondus Lockdown Browser to complete exams, the student must follow these rules:

- Student will read and follow all instructions of Respondus prior to beginning the exam.
- The student will use a flat surface such as a desk or table and a chair. The student must remain seated throughout the length of the exam.
- When performing the environment scan, it must be done slowly to include a 360 degree view of the room and the entire surface where the computer is located.
- The student will be in view of the camera throughout the exam and allow recording of sound throughout the exam.
- All problems will be communicated to the instructor during the exam and an email with explanation should follow after the completion of the exam.
- Students should always strive to look at the monitor. Any eye movement that indicates cheating may result in the student retaking the exam in person. Should cheating be found, the student will receive a zero and risk being removed from the program.
- Do not wear caps, hats or other head coverings that will cast a shadow onto your face
- Do not take exam in a dark room. Avoid backlighting situations, such as sitting with your back to a window. Always have light in front of your face, not behind your head.
- Choose an environment that is distraction-free. This includes people, television, animals, or any other item that will draw your eyes away from the monitor.
- Do not take exam with laptop computer in your lap. Instead, place it on a flat surface. Be careful not to move the laptop during the exam. This may result in lack of face detection.

The instructor may remove Respondus testing privileges if the student does not comply with the rules or experiences more than one problem with testing away from campus.

If a student fails to take the exam during the allotted time frame, a zero will be given with no opportunity to re-take the test. This only applies to tests that are not begun and completed during the time frame. If a technology glitch occurs when taking the exam at the Testing Center, the student must report the issue to a designated staff member. If the Testing Center is not used and the student is taking an exam via Brightspace, a technology glitch must be reported to the instructor immediately through email or phone. The instructor may test you over any material covered in lecture, power point presentations, assigned reading, or class discussions. Attendance is very important to assure that you are well prepared for testing.

A comprehensive final will be given at the end of the semester. It is important to start the exam as instructed by the instructor. If a student experiences a delay in starting the exam and fails to notify the instructor, a zero will be given. If the comprehensive exam is given in the classroom and the student is late and does not notify the instructor prior the start time of the exam, a zero will be given. Unless the instructor approves reason for delay, all comprehensive final exams will include a 10 point deduction if exam is not started on time. All final exams must be completed by the deadline. Otherwise, the student will submit the exam without the opportunity

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to complete the remainder of the exam. Medical emergencies are situations in which the instructor will work with the student to make up the exam without any penalty.

Late Work, Attendance, and Make Up Work Policies:

Math Worksheets will be given during class or uploaded to Brightspace. The student will be expected to complete each worksheet and may have guidance by the instructor. Each worksheet is worth 10 points. Only one final worksheet average will be entered around the last day of February into the assignment category. Announcements will be made for worksheets in class and/or using Brightspace announcements. If a student does complete the worksheet by the due date, it may be made up and turned in within 2 days, resulting in a 2 point deduction. No points will be awarded if the worksheet is turned in after the 2nd day of the missed assignment.

Absenteeism will result in the student having less information and will usually result in a lower grade. When absences accumulate to 25% in the course, the student may have a low probability of success and will be at risk for being dropped for unsatisfactory performance. A roll sheet will be passed around the classroom for your initials to attest to your presence in class. If a student is tardy and/or leaves early three times during the eight-week course, then one absence will be counted. Students whether present or absent, are responsible for all material presented or assigned for the course and will be held accountable for that material in the determination of grades in the course.

Late assignments will be given a 10 point deduction on the first day missed and five points on the 2nd day missed. On the 3rd day, the student will not be allowed to submit assignments and will be given zero (0) points for the missed assignment. If worksheets are missed, see the make-up instructions below the calendar due dates in the syllabus.

Make-up tests will only be allowed under certain circumstances and is up to the discretion of the instructor. There will not be any make-up quizzes or in-class assignments (worksheets are an exception). If a missed test occurs due to illness, military, or funeral reason, documentation will be necessary for consideration to take the test. Considering the nature of a missed exam, the instructor may decide to replace the missed unit exam with the grade of the final exam.

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

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provider. It is imperative that students develop and maintain a strong knowledge base of course material and competencies to be successful.

Therefore, the minimum grade expectation of all coursework and assessments in this course is to achieve 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 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.

All remediation for exams must be submitted through Brightspace 1 week from the due date of the exam. Any late remediation will result in a 5 point deduction of the respective exam.

Student Behavioral Expectations or Conduct Policy:

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. Students in this program are seeking a career in the healthcare profession and are expected to exhibit professional behavior that is conducive to learning among peers and the instructor. 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.

Regular and punctual attendance is expected of all students, and each instructor should maintain a complete record of attendance 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 the case of online or hybrid courses, attendance will be determined in terms of participation, as described in the syllabus

Cheating:

If a student is caught in the act of cheating, a zero will be given and may result in potential expulsion from the college. This includes offering students verbal or written information when any assignment, quiz, or exam is measuring the performance of an individual; students viewing another student's work or answers; students submitting work that is not their own; any act of

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plagiarism; using any mechanism to obtain answers or information that is not approved by instructor prior to assignment, quiz, or exam.

Instructional Uses of E-mail

It is expected for students to check college e-mail on a regular basis as this will be the preferred method of communication.

Instructor Guidelines:

Class Tardy/Late/Early Dismissal:

Is defined by the instructor of this class as any time past the scheduled time for class to begin. **The doors to the classroom will be locked at the start of class and the student will be denied access until the first break of the class.**

Class breaks:

Students will be allowed to take a brief break at approximately 45- 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. Please remember that any tardy or early dismissal by the student will be documented. **If a student is tardy and/or leaves early three times during the eight-week course, one absence will be counted.**

[* 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.

[* 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.

**** You will need to access each link separately through your Web browser (for example: Mozilla Firefox, Chrome, Microsoft Edge or Safari) to print each link's information.***

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ACADEMIC RESOURCES/POLICIES

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/>

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 a success coach by calling (254) 299-8226. Students can visit the Completion Center Monday-Friday from 8 a.m.-5 p.m. to schedule a meeting with a success coach and receive additional resources and support to help reach academic and personal goals. Paulanne's Pantry (MCC's food pantry) provides free food by appointment to students, faculty and staff based on household size. Text (254) 870-7573 to schedule a pantry appointment. The Completion Center and 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.

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 contacted/notified through 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.

* [Click Here for the Minimum System Requirements to Utilize MCC's D2L|Brightspace](https://www.mclennan.edu/center-for-teaching-and-learning/Faculty%20and%20Staff%20Commons/requirements.html)
(<https://www.mclennan.edu/center-for-teaching-and-learning/Faculty%20and%20Staff%20Commons/requirements.html>)

Click on the link above for information on the minimum system requirements needed to reliably access your courses in MCC's D2L|Brightspace learning management system.

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.

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 her/his 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.

Forwarding Emails:

You may forward the 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 become lost or placed in junk or spam filters.

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. Instructors should not provide accommodations unless approved by the Accommodations Coordinator. For additional information, please visit mclennan.edu/disability.

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

disabilities@mclennan.edu

254-299-8122

Room 319, Student Services Center

* [Click Here for more information about Title IX](http://www.mclennan.edu/titleix)
(www.mclennan.edu/titleix)

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 Title IX Coordinator at

titleix@mclennan.edu or by calling Dr. Drew Canham (Chief of Staff for Equity & Inclusion/Title IX) at 299-8645. Individuals also may contact the MCC Police Department at 299-8911 or the MCC Student Counseling Center at MCC by calling 299-8210. The MCC Student Counseling Center is a confidential resource for students. Any student or employee may report sexual harassment anonymously by visiting the following website: <http://www.lighthouse-services.com/mclennan/>.

McLennan's Title IX webpage (<http://www.mclennan.edu/titleix/>) 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.

* *You will need to access each link separately through your web browser (for example Mozilla Firefox, Chrome, Microsoft Edge, or Safari) to print each link's information.*