**Western Technical College**

# 10526196 Modalities

## Course Outcome Summary

### Course Information

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| **Description** | Introduces radiography students to imaging modalities with an emphasis in computed tomography and cross-sectional anatomy. |
| **Career Cluster** | Health Science |
| **Instructional Level** | Associate Degree Courses |
| **Total Credits** | 3 |
| **Total Hours** | 54 |

#### Textbooks

No textbook required.

### Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Cultivate Passion: Increase Self-Awareness
3. Live Responsibly: Embrace Sustainability
4. Refine Professionalism: Improve Critical Thinking

### Program Outcomes

1. Model professional and ethical behavior consistent with the A.R.R.T. Code of Ethics.
2. Apply critical thinking and problem-solving skills in the practice of diagnostic radiography.

### Course Competencies

**1. Describe mobile imaging procedures**

**Assessment Strategies**

1.1. in an oral, written or graphic description

**Criteria**

*You will know you are successful when*

1.1. you describe the structure and function of mobile imaging equipment
1.2. you include limitations of mobile imaging in your description
1.3. you outline the steps in mobile imaging procedures in your description
1.4. you include safety measures in your description

**Learning Objectives**

1.a. Perform non-routine ER procedures
1.b. Select appropriate equipment and supplies for procedure
1.c. Demonstrate positioning for assigned procedure
1.d. Evaluate image for appropriate anatomical demonstration
1.e. Evaluate positioning of phantom and/or model
1.f. Evaluate proper radiographic demonstration of anatomy
1.g. Identify anatomical structures on radiographs
1.h. Demonstrate proper use of positioning aids
1.i. Explain pre and post procedure requirements
1.j. Apply anatomical nomenclature

## 2. Describe a C-arm procedure

**Assessment Strategies**

2.1. in an oral, writte, or graphic description

**Criteria**

*You will know you are successful when*

2.1. you describe the structure and function of equipment used to perform C-arm procedures
2.2. you outline the steps in the C-arm procedures in your description
2.3. you include safety measures in your description

**Learning Objectives**

2.a. Perform non-routine ER procedures
2.b. Select appropriate equipment and supplies for procedure
2.c. Demonstrate positioning for assigned procedure
2.d. Evaluate image for appropriate anatomical demonstration
2.e. Evaluate positioning of phantom and/or model
2.f. Evaluate proper radiographic demonstration of anatomy
2.g. Identify anatomical structures on radiographs
2.h. Demonstrate proper use of positioning aids
2.i. Explain pre and post procedure requirements
2.j. Apply anatomical nomenclature

## 3. Describe operative imaging procedures

**Assessment Strategies**

3.1. in an oral, written, or graphic description

**Criteria**

*You will know you are successful when*

3.1. you describe the structure and function of equipment used to perform operative imaging procedures
3.2. you outline the steps in the operative imaging procedures in your description
3.3. you describe the maintenance of a sterile environment
3.4. you include safety measures in your description

**Learning Objectives**

3.a. Perform non-routine ER procedures
3.b. Select appropriate equipment and supplies for procedure
3.c. Demonstrate positioning for assigned procedure
3.d. Evaluate image for appropriate anatomical demonstration
3.e. Evaluate positioning of phantom and/or model
3.f. Evaluate proper radiographic demonstration of anatomy
3.g. Identify anatomical structures on radiographs

3.h. Demonstrate proper use of positioning aids
3.i. Explain pre and post procedure requirements
3.j. Apply anatomical nomenclature

## 4. Describe basic principles of related imaging modalities

**Assessment Strategies**

4.1. in an oral, written, or graphic description

**Criteria**

*You will know you are successful when*

4.1. you describe nuclear medicine procedures
4.2. you describe MRI procedures
4.3. you describe ultrasound procedures
4.4. you describe radiation therapy procedures
4.5. you describe vascular imaging procedures
4.6. you describe mammography procedures
4.7. you describe bone density procedures

**Learning Objectives**

4.a. Describe nuclear medicine procedures
4.b. Describe MRI procedures
4.c. Describe ultrasound procedures
4.d. Describe radiation therapy procedures
4.e. Describe vascular imaging procedures
4.f. Describe mammography procedures
4.g. Describe bone density procedures

## 5. Describe components of the CT imaging system

**Assessment Strategies**

5.1. in an oral, written, or graphic assessment

**Criteria**

*You will know you are successful when*

5.1. you describe the structure and function of the equipment to perform CT procedures
5.2. you describe the structure and function the Gantry
5.3. you describe the structure and function of the computer
5.4. you describe the structure and function of the operator console

**Learning Objectives**

5.a. Decribe the structure and function of the equipment to perform CT procedures
5.b. Explain the structure and function the gantry
5.c. Explain the structure and function of the computer
5.d. Describe the structure and function of the operator console

## 6. Examine the CT image processing steps

**Assessment Strategies**

6.1. in an oral, written, or graphic assessment

**Criteria**

*You will know you are successful when*

6.1. you describe the image acquisition process in CT
6.2. you describe the steps in image processing
6.3. you identify the steps for image reformatting and reconstruction

**Learning Objectives**

6.a. Explain the steps for image reformatting and reconstruction
6.b. Identify the steps in image processing
6.c. Describe the image acquisition process in CT

## 7. Analyze CT images

**Assessment Strategies**

7.1. in an oral, written, or graphic assessment
7.2. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

**Criteria**

*You will know you are successful when*

7.1. you include positioning, centering and appropriate anatomy in your analysis
7.2. you include density and contrast in your analysis
7.3. you include image resolution
7.4. you include artifacts in your analysis

**Learning Objectives**

7.a. Analyze positioning, centering and appropriate anatomy of CT images
7.b. Evaluate density and contrast of CT images
7.c. Analyze image resolution of CT images
7.d. Identify CT image artifacts

## 8. Identify radiation protection for CT

**Assessment Strategies**

8.1. in an oral, written, or graphic assessment

**Criteria**

*You will know you are successful when*

8.1. you describe methods for reducing radiation dose to the patient
8.2. you describe methods for reducing the radiographer's and other health care workers exposure to scatter radiation
8.3. you explain technical adjustments for children

**Learning Objectives**

8.a. Describe methods for reducing radiation dose to the patient
8.b. Describe methods for reducing the radiographer's and other health care workers exposure to scatter radiation
8.c. Explain required technical adjustments for children

## 9. Identify anatomic planes and positions

**Assessment Strategies**

9.1. in a written, oral, or graphic assessment
9.2. using models, photos, diagrams or images
9.3. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

**Criteria**

*You will know you are successful when*

9.1. you include transverse, sagittal, and frontal planes in your identification
9.2. you include anatomical positions located throughout the body in your identification
9.3. you include directional terms used in anatomy, body cavities, and abdominal regions in your identification

**Learning Objectives**

9.a. Identify transverse, sagittal, midsagittal, parasagittal, and frontal planes.
9.b. Describe the anatomical position.
9.c. Use correct directional terms to describe the relative position of one body part to another.
9.d. Describe the location, subdivisions, and contents of the dorsal body cavity and the ventral body cavity.
9.e. Name the nine abdominopelvic regions.
9.f. Distinguish between the visceral and the parietal layers of serous membranes.
9.g. State the specific locations of the parietal and visceral layers of pleura, pericardium, and peritoneum.
9.h. Use correct regional terms to refer to specific areas of the body.

## 10. Identify selected neck and head anatomical structures in gross and cross - sectional views.

**Assessment Strategies**

10.1. in a written, oral, or graphic assessment
10.2. using models, photos, diagrams or images
10.3. you answer questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

**Criteria**

*Your performance will be successful when:*

10.1. you include bones, muscles, nerves, and vessels within the head in your identification
10.2. you include the arterial blood supply to the brain in your identification
10.3. identification includes relationships of the internal jugular vein, external jugular vein, internal carotid artery and external carotid artery to each other and to other surrounding structures

**Learning Objectives**

10.a. Name the bones of the cranium and face.
10.b. Identify the four paranasal sinuses.
10.c. Compare the location and relationships of the three salivary glands.
10.d. Identify the five lobes of the cerebrum.
10.e. Describe the location and structure of the diencephalon.
10.f. Locate the components of the brainstem.
10.g. Compare the cerebrum and cerebellus with respect to size, appearance, location and structure.
10.h. Trace the flow of cerebrospinal fluid through the ventricles in the brain.
10.i. Describe the three layers of meninges.
10.j. Identify six subarachnoid cisterns by describing their location and significance.
10.k. Describe the arterial blood supply to the brain.
10.l. Identify the major venous sinuses that return blood from the brain to the internal jugular vein.
10.m. Name the 12 cranial nerves and the foramen that serves as a passageway for each.
10.n. State the function of the 12 cranial nerves.
10.o. Describe the structure of the eye.
10.p. Discuss the relationships of the internal jugular vein, external jugular vein, internal carotid artery, and external carotid artery to each other and to other surrounding structures.

## 11. Identify selected thoracic anatomical structures in gross and cross - sectional views.

**Assessment Strategies**

11.1. in a written, oral, or graphic assessment
11.2. using models, photos, diagrams or images
11.3. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

**Criteria**

*You will know you are successful when*

11.1. you include the bones and boundaries in the thoracic region in your identification
11.2. you include the pericardial sac, pericardium, and the pericardial cavity in your identification
11.3. you include the skeletal components, muscles, blood vessels, and viscera of the thorax in transverse, sagittal, and coronal sections in your identification

**Learning Objectives**

11.a. Identify and describe the bones that form the thoracic cage.
11.b. State the boundaries of the superior and inferior thoracic aperatures.
11.c. List three muscles associated with the pectoral, back, and shoulder regions.
11.d. State the origin and location of the brachial plexus and name five nerves that emerge from the plexus.
11.e. Describe the structure and hormonal control of the female breast.
11.f. Name the four groups of lymph nodes involved in lymphatic drainage of the breast.
11.g. Describe the pleura and pleural cavities.
11.h. Compare the features of the right and left lungs.
11.i. List the divisions of the mediastinum and the contents of each region.
11.j. Describe the pericardial sac, pericardium, and the pericardial cavity.
11.k. Describe the three layers of the heart wall.
11.l. Define and state the location of the apex, base, surfaces, and borders of the heart.

11.m. Discuss the features and relationships of the chambers and valves of the heart.
11.n. Compare the right and left coronary arteries with respect to origin, branches, location, and regions they supply.
11.o. Describe the venous drainage of the heart.
11.p. Trace the pathway of a stimulus through the conduction of the heart.
11.q. Identify the great vessels associated with the heart by describing the location and relationships of each vessel.
11.r. Trace the flow of blood through the heart from the right atrium to the ascending aorta.
11.s. Identify the skeletal components, muscles, blood vessels, and viscera of the thorax in transverse, sagittal, and coronal sections.

## 12. Identify selected abdominal and pelvic anatomical structures in gross and cross - sectional views.

**Assessment Strategies**

12.1. in a written, oral, or graphic assessment
12.2. using models, photos, diagrams or images
12.3. by answering questions that require you to apply knowledge about this competency (Your instructor may require several written exams as a part of this course. You will be notified in advance.)

**Criteria**

*You will know you are successful when*

12.1. you include the boundaries and regions of the abdomen in your identification
12.2. you include tracing the pathway of blood through the abdominal region in your identification
12.3. you include the location and relationships of structures in relationship to organs in the abdominal area in your identification

**Learning Objectives**

12.a. State the boundaries of the abdomen.
12.b. Define the transpyloric, subcostal, transumbilical, interiliac median, and midclavicular planes and then use these planes to divide the abdomen into four quadrants and nine regions.
12.c. Describe the features of the lumbar vertebrae.
12.d. Describe the structure of the diaphragm, name and give the vertebral levels of the three major openings in the diaphragm, and identify the structures that pass through each opening.
12.e. Name the four muscles that form the anterolateral abdominal wall and the three muscles associated with the posterior abdominal wall.
12.f. State the level of origin of the visceral branches of the abdominal aorta and identify the regions each one each one supplies.
12.g. Identify and trace the pathway of the tributaries of the inferior vena cava.
12.h. Trace the pathway of blood through the hepatic portal system of veins.
12.i. Discuss the peritoneum and its extension, including mesentery, omenta, ligaments, and cul - de - sacs.
12.j. Discuss the structure and relationships of the liver.
12.k. Discuss the visceral relationships of the gallbladder.
12.l. Describe the external features of the stomach, its relationships and its blood supply.
12.m. Name the regions of the small intestine and discuss the relationships of each region.
12.n. Identify the regions of the large intestine and discuss the relationships of each region.
12.o. Describe the location of the spleen and its relationship to other organs.
12.p. Discuss the location and relationships of the head, neck, body and tail of the pancreas.
12.q. Describe the location and relationships of the kidneys, ureters, suprarenal glands.
12.r. Identify the abdominal viscera, muscles, and blood vessels on transverse, sagittal, and coronal sections.