



Western Technical College

10508103 Dental Radiography

Course Outcome Summary

Course Information

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| Description | Prepares dental auxiliary students to operate x-ray units and expose bitewing, periapical, extra oral, and occlusal images. Emphasis is placed on protection against x-ray hazards. Students also process, mount, and evaluate dental images for diagnostic value. In this course students demonstrate competency on a manikin. In addition, students expose bitewing and periapical images on a peer or patient. Students gain further experience in exposing images on patients in the clinical portion of their program. This course also provides the background in radiographic theory required for students to make informed decisions and adjustments. |
| Career Cluster | Health Science |
| Instructional Level | Technical Diploma Courses |
| Total Credits | 2 |
| Total Hours | 54 |

Pre/Corequisites

Prerequisite 10508101 Dental Health Safety

Textbooks

Dental Radiography: Principles and Techniques - with Access. 6th Edition. Copyright 2022. Iannucci, Joen and Laura Jansen Howerton. Publisher: Elsevier Science. **ISBN-13:** 978-0-323-69550-3. Required.

Dental Radiography: Principles and Techniques – Workbook and Laboratory Manual. 6th Edition. Copyright 2022. Iannucci, Joen M. Publisher: Elsevier Science. **ISBN-13:** 978-0-323-69587-9. Required.

508-103 Dental Radiography Course Manual. Western. Publisher: Western. **ISBN-13:** 979-8-822-73881-2. Required.

Learner Supplies

Uniform: Black lab jacket, black pants, tennis shoes. **Vendor:** To be discussed in class. Required.

Safety Glasses. **Vendor:** Campus Shop. Required.

Latex free exam gloves. **Vendor:** To be discussed in class. Required if clinic does not supply.

Dental Typodont (D95SDP-200-GUB). Kilgore International, Inc. **ISBN-13:** 878-0-003-18553-0. Required.

Success Abilities

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience
5. Live Responsibly: Embrace Sustainability
6. Live Responsibly: Foster Accountability
7. Refine Professionalism: Act Ethically
8. Refine Professionalism: Improve Critical Thinking
9. Refine Professionalism: Participate Collaboratively
10. Refine Professionalism: Practice Effective Communication

Program Outcomes

1. DA-1 year: Manage infection and hazard control
2. DA-1 year: Produce diagnostic intraoral and extraoral radiographs on a variety of patients
3. DA-1 year: Demonstrate professional behaviors, ethics, and appearance

Course Competencies

1. **Illustrate how dental imaging technology has progressed since its first use to the ways in which it is used in providing dental health care today.**

Assessment Strategies

- 1.1. in an oral, written or graphic assessment highlighting the history of dental imaging

Criteria

You will know you are successful when

- 1.1. you include uses, discovery, pioneers, and history of equipment and techniques.
- 1.2. you ensure information displayed is accurate.
- 1.3. you apply correct terminology.
- 1.4. you ensure assessment is neat, well organized, legible (if appropriate), and reflects correct use of Standard English.

Learning Objectives

- 1.a. Define the key words
- 1.b. Summarize the importance of dental radiographs
- 1.c. List the uses of the dental radiographs
- 1.d. Summarize the discovery of x-radiation
- 1.e. List the highlights in the history of x-ray equipment and film
- 1.f. List the highlights in the history of dental radiographic techniques

2. Explain how the process of exposing dental images works.

Assessment Strategies

- 2.1. by labeling a diagram or identifying parts of an x-ray tube using proper terminology
- 2.2. by presenting a written, oral, or graphic explanation of how the process of exposing images works
- 2.3. by responding to scenarios presenting clinical decisions related to the process of exposing images
- 2.4. 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

- 2.1. you identify the parts accurately.
- 2.2. you describe accurately the characteristics of x-rays.
- 2.3. you explain the basic physics of dental imaging.
- 2.4. you explain the biological effects of radiation that occurs during the process of exposing images in the dental healthcare environment.
- 2.5. you respond to questions about the process of exposing images accurately and completely.

Learning Objectives

- 2.a. Define key terms
- 2.b. Describe the general concepts and physical properties of radiation
- 2.c. Describe the biological effects of radiation exposure
- 2.d. Identify the component parts of the x-ray machine
- 2.e. Describe the effect of kilovoltage on the quality of the x-ray beam.
- 2.f. Describe how the milliamperage affects the quality of the x-ray beam
- 2.g. Explain how x-rays are produced

3. Apply principles of radiation safety to patient and operator.

Assessment Strategies

- 3.1. by preparing to expose images on a manikin in a laboratory setting
- 3.2. by responding to scenarios presenting clinical decisions related to image exposure
- 3.3. 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

- 3.1. you check the integrity of the lead apron.
- 3.2. you obtain the proper prescription for dental images for patient.
- 3.3. you select safe exposure factors for the patient.
- 3.4. you utilize techniques that will protect the patient from excess exposure.
- 3.5. precautions are implemented for pregnant patients or staff.
- 3.6. you place PID at safe distance from face.
- 3.7. you stand at least six feet away from the x-ray unit and perpendicular to the primary ray.
- 3.8. you incorporate ALARA for radiographic exposures.

Learning Objectives

- 3.a. Identify the methods of patient radiation protection.
- 3.b. Identify the methods of operator radiation protection.
- 3.c. Identify the integrity, handling, and storage of a lead apron.
- 3.d. Differentiate between a prescription and consent for radiographs.
- 3.e. State the contraindications for radiographs.

4. Operate the x-ray equipment.

Assessment Strategies

- 4.1. in the completion of a role-play on the operation of the x-ray unit and assembling various image receptor holding devices

Criteria

You will know you are successful when

- 4.1. you identify each step as you perform it as if you are explaining the process to a patient.
- 4.2. you position yourself and role-play partner correctly.
- 4.3. you perform all critical steps in the right order.
- 4.4. you anticipate procedural steps.
- 4.5. you employ safety precautions.
- 4.6. you utilize infection control protocol.
- 4.7. you wear personal protective equipment.

Learning Objectives

- 4.a. Identify the component parts of the x-ray unit
- 4.b. Differentiate between the x-ray machines used for intra-oral and extra-oral films
- 4.c. Describe the purpose and the use of film holders and devices
- 4.d. Identify commonly used dental x-rays film holders and devices

5. Select the image receptor for an image.

Assessment Strategies

- 5.1. by responding to scenarios that require you to select the appropriate image receptor for a variety of situations
- 5.2. 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

- 5.1. you identify the image receptor you would select for each of the scenarios.
- 5.2. you explain why the image receptor type and size is correct for the given situation.
- 5.3. you explain the possible consequences of selecting the wrong image receptor.

Learning Objectives

- 5.a. Identify the components and function of a film packet
- 5.b. Identify the composition of x-ray film
- 5.c. Explain how x-ray radiation energy is stored as a latent image
- 5.d. Explain the uses and handling techniques for the types of film used in dental radiography
- 5.e. Differentiate the need for bitewing, periapical, extra-oral and occlusal radiographs
- 5.f. Compare film size for bitewing, periapical, extra-oral and occlusal radiographs
- 5.g. Explain what determines the film speed
- 5.h. Explain the purpose of intensifying screens

6. Process images of diagnostic quality.

Assessment Strategies

- 6.1. in a laboratory setting using processing equipment to process images of diagnostic quality
- 6.2. by submitting processed images for evaluation

Criteria

You will know you are successful when

- 6.1. you check that equipment is prepared and ready for use.
- 6.2. you verbalize the processes you perform; identifying the parts, necessary materials, and functions of the processing equipment.
- 6.3. processing errors are corrected and recorded.
- 6.4. image meets standards of diagnostic quality.

Learning Objectives

- 6.a. Describe the characteristics of an ideal darkroom to include location, size, lighting and equipment
- 6.b. Describe the composition of the processing chemicals

- 6.c. Discuss the parts of the processing equipment and function
- 6.d. Check to ensure that equipment has met quality assurance standards
- 6.e. Outline the step by step procedure for manual processing
- 6.f. Outline the step by step procedure for automatic processing
- 6.g. Explain the process of film duplication used in dentistry
- 6.h. Describe film processing problems that result from time and temperature errors
- 6.i. Describe film processing problems that result from chemical contamination errors
- 6.j. Describe the care and maintenance if the process solutions, equipment, and equipment accessories used in film processing

7. Produce images of diagnostic quality.

Assessment Strategies

- 7.1. in a laboratory setting using dental imaging equipment to produce images of diagnostic quality
- 7.2. by submitting images for evaluation

Criteria

You will know you are successful when

- 7.1. you check that equipment is prepared and ready for use
- 7.2. you verbalize the processes you perform; identifying the parts, necessary materials, and functions of the dental imaging equipment
- 7.3. you correct and record errors.
- 7.4. you verify image meets standards of diagnostic quality.

8. Manage patients during the imaging process.

Assessment Strategies

- 8.1. working with a peer or patient
- 8.2. using the patient management forms provided in the laboratory/clinical setting

Criteria

You will know you are successful when

- 8.1. you review health history, checking for contraindications.
- 8.2. you are courteous, positive, and gentle.
- 8.3. you explain the procedure to the patient, accurately answering questions.
- 8.4. you answer patient's safety questions or concerns based on factual, scientific data.
- 8.5. you modify procedure to ensure patient comfort throughout the imaging process.
- 8.6. you compensate for gag reflexes.
- 8.7. you expose image.
- 8.8. you verify image is of diagnostic quality.

Learning Objectives

- 8.a. Identify some important patient management skills for various film exposures
- 8.b. List examples of special need patients
- 8.c. Identify physical oral discrepancies
- 8.d. Identify some important patient management skills for the anxious patient
- 8.e. Identify some important patient management skills for the special need patient
- 8.f. Identify some important patient management skills for the patient who gags
- 8.g. Identify some important patient management skills for uncooperative patients

9. Use proper infection control procedures while producing images.

Assessment Strategies

- 9.1. by using infection control techniques prior to exposure, during exposure, and following exposure on a manikin, peer or patient in a laboratory setting
- 9.2. by using infection control techniques processing images

Criteria

You will know you are successful when

- 9.1. you employ proper infection control techniques prior to exposure.
- 9.2. you employ proper infection control techniques during image receptor exposure.
- 9.3. you employ proper infection control techniques following exposure.

- 9.4. you employ proper infection control techniques during processing.
- 9.5. you apply procedures without use of reference.

Learning Objectives

- 9.a. Detail infection control procedures necessary prior to, during, and following film exposure
- 9.b. Detail infection control procedures necessary for film processing
- 9.c. Describe the infection control procedure for using a daylight loader of an automatic processor

10. Expose bitewing images.

Assessment Strategies

- 10.1. by exposing images on a manikin, a peer, or patient in a laboratory setting
- 10.2. by submitting images

Criteria

You will know you are successful when

- 10.1. you check the prescription before exposure.
- 10.2. you record exposure accurately.
- 10.3. you select the correct armamentarium.
- 10.4. you position yourself and your patient correctly.
- 10.5. you perform all critical steps in the correct order.
- 10.6. you employ radiation safety precautions.
- 10.7. you utilize infection control protocol.
- 10.8. you wear personal protective equipment.

Learning Objectives

- 10.a. you identify the purposes of exposing a bite-wing radiograph.
- 10.b. Show how bitewing radiographs are helpful in achieving the goals of preventative dentistry
- 10.c. Demonstrate correct patient position and film placement
- 10.d. Describe the steps for exposing a bitewing x-ray
- 10.e. Compare the bitewing radiograph with the periapical technique

11. Expose periapicals using the paralleling technique.

Assessment Strategies

- 11.1. by exposing images on a manikin, a peer, or a patient in a laboratory setting
- 11.2. by submitting images

Criteria

You will know you are successful when

- 11.1. you check the prescription before exposure.
- 11.2. you record exposure accurately.
- 11.3. you select the correct armamentarium.
- 11.4. you position yourself and your patient correctly.
- 11.5. you perform all critical steps in the correct order.
- 11.6. you employ safety precautions.
- 11.7. you utilize infection control protocol.
- 11.8. you wear personal protective equipment.

Learning Objectives

- 11.a. State basic principles of paralleling technique
- 11.b. Discuss placement of film
- 11.c. Discuss placement of film holders
- 11.d. Describe placement of PID and angulation
- 11.e. Identify parts of film holding devices
- 11.f. Demonstrate proper patient positioning for film exposure

12. Expose periapicals and occlusals using the bisecting angle technique.

Assessment Strategies

- 12.1. by exposing images on a manikin, a peer, or a patient in a laboratory setting
- 12.2. by exposing an occlusal image on a manikin or role-play patient in a laboratory setting
- 12.3. by submitting images

Criteria

You will know you are successful when

- 12.1. you check the prescription before exposure.
- 12.2. you record exposure accurately.
- 12.3. you select the correct armamentarium.
- 12.4. you position yourself and your patient correctly.
- 12.5. you perform all critical steps in the correct order.
- 12.6. you employ safety precautions.
- 12.7. you utilize infection control protocol.
- 12.8. you wear personal protective equipment.

Learning Objectives

- 12.a. State basic principles of bisecting technique
- 12.b. Compare the essential characteristics between paralleling and bisecting techniques
- 12.c. Discuss placement of film
- 12.d. Discuss placement of film holders
- 12.e. Describe placement of PID and angulation
- 12.f. Identify parts of film holding devices
- 12.g. Demonstrate proper patient positioning for film exposure
- 12.h. List the uses of the occlusal exam.
- 12.i. State the purpose of localization techniques

13. Illustrate how extraoral images integrate with the use of intraoral images in dentistry.

Assessment Strategies

- 13.1. by comparing panoramic, extraoral and three-dimensional digital imaging
- 13.2. working with a group of your peers
- 13.3. in an oral, written, or graphic assessment

Criteria

You will know you are successful when

- 13.1. you identify all types of extraoral images.
- 13.2. you compare similarities and differences of each technique.
- 13.3. you compare equipment needed for each technique.
- 13.4. you compare the advantages and disadvantages for each technique.
- 13.5. you ensure presentation is neat, well organized and reflects correct use of Standard English language.

Learning Objectives

- 13.a. Describe the uses and purpose of panoramic radiography
- 13.b. Describe the equipment used in panoramic radiography
- 13.c. Discuss the advantages and disadvantage panoramic radiography
- 13.d. Describe the uses and purpose of extraoral radiography
- 13.e. Describe the equipment used of extraoral radiography
- 13.f. Describe the uses and purpose of digital radiography
- 13.g. List and describe the equipment used in digital radiography
- 13.h. List and describe the three types digital radiography
- 13.i. List and discuss the advantages and disadvantage digital radiography

14. Mount images using anatomical landmarks.

Assessment Strategies

- 14.1. by submitting correctly mounted images
- 14.2. by demonstrating optimal viewing conditions
- 14.3. in the lab using given materials and equipment

Criteria

You will know you are successful when

- 14.1. you demonstrate methods for mounting.
- 14.2. you mount images at the appropriate point in the process.
- 14.3. you mount images using the recommended method.

- 14.4. you maintain image integrity throughout this process.
- 14.5. you label images accurately and according to required standards.
- 14.6. you demonstrate optimal viewing conditions and explain the importance of these conditions

Learning Objectives

- 14.a. List reasons to use a film mount
- 14.b. Describe the labeling information used on the film mount
- 14.c. Identify the equipment necessary for viewing the mounted x-ray
- 14.d. Identify the anatomic landmarks used in film mounting
- 14.e. Describe the step by step procedures for film mounting
- 14.f. List the methods of film mounting

15. Evaluate images for diagnostic value.

Assessment Strategies

- 15.1. by completing a checklist of dental imaging evaluation on a manikin or patient
- 15.2. in a skill demonstration in a clinical/laboratory setting

Criteria

You will know you are successful when

- 15.1. checklist includes all critical errors in the information or process.
- 15.2. checklist includes positioning, exposure errors, processing errors.
- 15.3. checklist includes recommendations for correcting the identified errors.
- 15.4. checklist includes an analysis of the effect of the errors on the diagnostic value.

Learning Objectives

- 15.a. List the visual characteristics of an acceptable radiograph.
- 15.b. Define radiographic characteristics of density and contrast.
- 15.c. Explain the quality control procedures necessary in dental radiographs.
- 15.d. Given a radiograph of poor quality, identify the cause of errors.
- 15.e. Recognize radiograph errors and explain how to correct.

16. Interpret dental imaging findings.

Assessment Strategies

- 16.1. by interpreting images
- 16.2. without the use of references

Criteria

You will know you are successful when

- 16.1. you accurately identify normal anatomy.
- 16.2. you accurately identify dental caries.
- 16.3. you accurately identify periodontal disease.
- 16.4. you accurately identify traumatic injuries.
- 16.5. you accurately identify periodontal lesions.

Learning Objectives

- 16.a. Explain the differences between interpretation and diagnosis of radiographs and who performs these functions.
- 16.b. Describe dental caries.
- 16.c. Explain why caries appear radiolucent on a dental radiograph.
- 16.d. Identify specific radiographic finding - i.e. abscess, resorption, fractures.