



COURSE OUTLINE

DIVISION: Workforce Development

COURSE: DLA 1204- Dental Radiography I

Date: Fall 2019

Credit Hours: 2

Prerequisite(s): Admission to the Dental Assisting Program

Delivery Method: **Lecture** **1 Contact Hours** (1 contact = 1 credit hour)
 Seminar **0 Contact Hours** (1 contact = 1 credit hour)
 Lab **2 Contact Hours** (2-3 contact = 1 credit hour)
 Clinical **0 Contact Hours** (3 contact = 1 credit hour)
 Online
 Blended

Offered: **Fall** **Spring** **Summer**

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>:

CATALOG DESCRIPTION:

Introduction to radiation physics, radiation protection and the operation of radiographic equipment. Instruction in exposure, processing, mounting of dental radiographs, and study of safety and standard practices.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

- To apply analytical and problem-solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciate diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals. See last page for more information.]

Upon completion of the course, the student will be able to:

1. Explain the history of dental radiation
 - 1.1. Trace the progress of radiography from its discovery to the present
 - 1.2. Name the pioneers of radiography and identify their contributions
 - 1.3. Discuss x-rays as the basis for diagnostic procedures
 - 1.4. Discuss the 5 uses of dental radiographs
2. Demonstrate an understanding of radiation physics and identification of the x-ray unit
 - 2.1. Understand the difference between radiation and radioactivity
 - 2.2. Identify the electromagnetic spectrum
 - 2.3. Identify the 3 major components of the dental x-ray machine
 - 2.4. Identify the functions on the control panel
 - 2.5. Draw and label a typical dental x-ray tube
 - 2.6. Identify the functions of the electrical circuits and the control devices
 - 2.7. Identify factors involved in x-ray generation
3. Demonstrate a basic understanding of dental x-ray image characteristics
 - 3.1. Identify the 3 basic requirements of an acceptable diagnostic radiograph
 - 3.2. Differentiate between radiolucent and radiopaque areas on a dental radiograph
 - 3.3. List the factors and influence film density and contrast
 - 3.4. List the factors that influence sharpness, magnification, and distortion
 - 3.5. Differentiate between the effect of variations in millamperage, kilovoltage, distance, and exposure time on the resulting dental radiograph
4. Demonstrate a basic understanding of radiation protection for the radiographer
 - 4.1. Identify the terms used to measure radiation
 - 4.2. Identify the procedures for maintaining radiation safety for the operator and patient
 - 4.3. Discuss different types of filtration and collimator used in dental x-ray machines
 - 4.4. Differentiate among the various radiation monitoring devices

- 4.5. Identify the areas of professional responsibility and concern for radiation safety
5. Demonstrate a basic understanding of the different dental imaging examinations
 - 5.1. Identify the three basic intraoral procedures
 - 5.2. Compare the principles of the paralleling and bisecting techniques
 - 5.3. Discuss the 5 principles of shadow casting
 - 5.4. Differentiate between the methods used to obtain proper horizontal and vertical angulations
 - 5.5. Select the type and number of films/sensors required to make a complete periapical and bitewing survey
 - 5.6. Explain the basic design of image receptor positioners/holders
 - 5.7. Demonstrate a systematic and orderly sequence of the exposure procedure
6. Explain infection control involved with taking dental radiographs
 - 6.1. Identify the benefits and necessity of infection control during radiographic procedures
 - 6.2. Describe measures to be taken during radiographic procedures to avoid cross-contamination
 - 6.3. List the personal protective equipment recommended for the dental radiographer
 - 6.4. Describe and perform proper infection control procedures during exposure and processing of radiographs
7. Demonstrate a basic understanding of the bisecting technique
 - 7.1. Discuss the principles of the bisecting technique
 - 7.2. List the advantages and disadvantages of the bisecting technique
 - 7.3. Identify and be able to assemble and position image receptor holders for use with the bisecting technique and distinguish these holders from those used with the paralleling technique
 - 7.4. Explain the importance of achieving accurate horizontal and vertical angulations
 - 7.5. List the recommended predetermined vertical angulations settings
 - 7.6. Identify vertical angulation errors made when using the paralleling technique
 - 7.7. Locate facial landmarks used for determining the points of entry used with the bisecting technique
8. Demonstrate a basic understanding of mounting radiographs
 - 8.1. List 5 advantages of mounting radiographs
 - 8.2. Discuss the use and importance of the identification dot
 - 8.3. Compare labial and lingual methods of film mounting
 - 8.4. List 5 anatomic generalizations that aid in mounting radiographs
9. Demonstrate a basic understanding of the paralleling technique
 - 9.1. Discuss the principles of the paralleling technique
 - 9.2. List the advantages and disadvantages of the paralleling technique
 - 9.3. Identify and be able to assemble and position image receptor holders for use with the paralleling technique
 - 9.4. Explain the importance of achieving accurate horizontal and vertical angulations
 - 9.5. Identify vertical angulation errors made when using the paralleling technique
10. Demonstrate a basic understanding of the bitewing technique
 - 10.1. List the 2 ideal uses for bitewing examination
 - 10.2. Describe the bitewing technique
 - 10.3. Differentiate between horizontal and vertical bitewing radiographs

- 10.4. Compare methods used for holding the bitewing image receptor in position
- 10.5. Identify the positions of the film placement and the vertical and horizontal angulations normally used for bitewing radiographs
- 10.6. Demonstrate mounting bitewing films
- 11. Explain an understanding for exposure and technique errors in dental images
 - 11.1. Identify and correct the types of radiographic errors caused by incorrect radiographic techniques
 - 11.2. Identify and correct the types of radiographic errors caused by incorrect film positioning and angulations of the central ray
 - 11.3. Identify and correct the types of radiographic errors caused by incorrect processing procedures
 - 11.4. Identify the conditions that cause radiographs to be fogged
- 12. Demonstrate a basic understanding of dental film
 - 12.1. Discuss the composition of dental x-ray films
 - 12.2. Identify and compare the various intraoral films according to size, customary usage, and film speed
 - 12.3. Differentiate between direct and indirect exposure films, as well as intraoral and extra oral films
 - 12.4. Identify correct methods of film handling, duplicating, and storage
- 13. Demonstrate a basic understanding of dental film processing
 - 13.1. Identify and list the major ingredients in processing solutions and explain the functions of each ingredient
 - 13.2. Discuss the concept of a latent image and how it becomes visible
 - 13.3. Identify, in sequence, the steps in processing radiographs
 - 13.4. Identify all items of darkroom equipment, the compartments of processing tanks, and the types of safelights
 - 13.5. Differentiate among manual, rapid, and automatic processing
- 14. Demonstrate a basic understanding of digital imaging
 - 14.1. Explain the fundamental concept of digital radiography
 - 14.2. Differentiate between direct and indirect digital imaging
 - 14.3. Select the type and number of sensors required to make a complete periapical and bitewing survey for each digital system
 - 14.4. Describe 3 types of digital image receptors
 - 14.5. Discuss digital radiography's effect on radiation exposure
 - 14.6. Identify advantages and limitations of digital radiography
- 15. Demonstrate a basic understanding of occlusal and localization techniques
 - 15.1. Identify the reasons for making an occlusal survey.
 - 15.2. Compare the topographical with the cross-sectional exposure method.
 - 15.3. Position the film packet and establish horizontal and vertical angulation for maxillary and mandibular areas on an occlusal film.
 - 15.4. Identify the purpose of the localization techniques and their uses
- 16. Explain the relations of dental radiography and radiation biology
 - 16.1. Compare the theories of biological damage and the possible effects of radiation on cells
 - 16.2. Identify the body cells in order of their radio sensitivity
 - 16.3. Identify the factors that determine radiation injuries

- 16.4. List the possible short- and long-term effects of irradiation
- 16.5. Identify the effects of oral radiation therapy
- 16.6. Define the units of measurement used in radiation exposure
- 16.7. Discuss the risk versus benefit of dental radiographs.
- 17. Demonstrate a basic understanding of quality assurance in the dental office
 - 17.1. Discuss purpose and frequency of testing dental x-ray machines
 - 17.2. Discuss quality control tests needed for digital imaging procedures
 - 17.3. Detail the importance of operator competence in dental radiographic procedures

MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
To understand and use technology effectively and to understand its impact on the individual and society.	13.1, 13.2, 13.3, 13.4, 13.5 13.1 Explain the fundamental concept of digital radiography, Differentiate between direct and indirect digital imaging 13.2 Select the type and number of sensors required to make a complete periapical and bitewing survey for each digital system. 13.3 Describe 3 types of digital image receptors 13.4 Discuss digital radiography's effect on radiation exposure 13.5 Identify advantages and limitations of digital radiography

COURSE TOPICS AND CONTENT REQUIREMENTS:

- I. Explain the history of dental radiation
 - a. Progression of Dental Radiography
 - b. Pioneers and contributions
 - c. Diagnosis
 - d. 5 uses of dental radiographs
- II. Radiation physics and identification of the x-ray unit
 - a. Ionization
 - b. Radiation vs. Radioactivity
 - c. Electromagnetic spectrum
 - d. Characteristics of radiation
 - e. Interactions with matter
 - f. 3 major components of the xray machine
 - g. Control panel
 - h. X-ray tube
 - i. Electrical circuits
 - j. X-ray generation
- III. Dental X-ray Image characteristics
 - a. 3 basic requirements of an acceptable diagnostic radiograph
 - b. radiolucent and radiopaque
 - c. film density and contrast
 - d. sharpness, magnification, and distortion
 - e. millamperage, kilovoltage, distance, and exposure time
 - f. manual, rapid, and automatic processing
- IV. Radiation protection for the radiographer
 - a. Terms to measure radiation
 - b. maintaining radiation safety for the operator and patient
 - c. filtration and collimator used
 - d. radiation monitoring devices
 - e. professional responsibility and concern for radiation safety
- V. dental imaging examinations
 - a. basic intraoral procedures
 - i. three basics
 - b. paralleling and bisecting techniques
 - c. shadow casting
 - i. 5 principals
 - d. proper horizontal and vertical angulations
 - e. type and number of films/sensors required to make a complete periapical and bitewing survey
 - f. design of image receptor positioners/holders
 - g. systematic and orderly sequence of the exposure procedure
- VI. Infection control in radiography
 - a. benefits and necessity
 - b. cross-contamination
 - c. personal protective equipment

- d. infection control procedures during exposure and processing of radiograph
- VII. Bisecting technique
 - a. principles
 - b. advantages and disadvantages
 - c. assemble and position image receptor holders
 - d. accurate horizontal and vertical angulations
 - e. vertical angulations settings
 - f. facial landmarks used as points of entry used with the bisecting technique
- VIII. Mounting radiographs
 - a. advantages
 - b. identification dot
 - c. labial and lingual methods
 - d. anatomic generalizations
- IX. Paralleling technique
 - a. Principals
 - b. advantages and disadvantages
 - c. assemble and position image receptor holders
 - d. technique
 - e. horizontal and vertical angulations
 - f. vertical angulation errors
- X. Bitewing technique
 - a. List the 2 ideal uses for bitewing examination
 - b. Describe the bitewing technique
 - c. Differentiate between horizontal and vertical bitewing radiographs
 - d. Compare methods used for holding the bitewing image receptor in position
 - e. Identify the positions of the film placement and the vertical and horizontal angulations normally used for bitewing radiographs
 - f. Demonstrate mounting bitewing films
- XI. Exposure and technique errors in dental images
 - a. Identify and correct the types of radiographic errors caused by incorrect radiographic techniques
 - b. Identify and correct the types of radiographic errors caused by incorrect film positioning and angulations of the central ray
 - c. Identify and correct the types of radiographic errors caused by incorrect processing procedures
 - d. Identify the conditions that cause radiographs to be fogged
- XII. Dental film
 - a. composition of dental x-ray films
 - b. intraoral films according to size, customary usage, and film speed
 - c. direct and indirect exposure films
 - d. intraoral and extra oral films
 - e. film handling, duplicating, and storage
- XIII. Dental film processing

- a. major ingredients/function in processing solutions
- b. latent image and how it becomes visible
- c. Identify, in sequence, the steps in processing radiographs
- d. darkroom equipment, the compartments of processing tanks, and the types of safelights
- e. manual, rapid, and automatic processing
- XIV. Digital imaging
 - a. fundamentals
 - b. direct and indirect digital imaging
 - c. sensors required to make a complete periapical and bitewing survey for each digital system
 - d. digital image receptors
 - e. digital radiography's effect on radiation exposure
 - f. advantages and limitations
- XV. Quality assurance
 - a. quality assurance and quality control
 - b. quality control tests
 - c. quality control tests for radiographic viewing equipment
- XVI. occlusal and localization techniques
 - a. Occlusal survey.
 - b. topographical with the cross-sectional exposure
 - c. Position the film packet and establish horizontal and vertical angulation for maxillary and mandibular areas on an occlusal film.
 - d. purpose of the localization techniques
- XVII. Dental radiography and radiation biology
 - a. biological damage and the possible effects of radiation on cells
 - b. body cells in order of their radio sensitivity
 - c. factors that determine radiation injuries
 - d. short- and long-term effects of irradiation
 - e. effects of oral radiation therapy
 - f. units of measurement used in radiation exposure
 - g. risk versus benefit of dental radiographs

INSTRUCTIONAL METHODS:

- Lecture
- Power Points
- Class discussion
- Demonstration
- Visual aids - videos, models, slides
- Exams and quizzes
- Lab
- Laboratory practice of skills
- Laboratory practical exams
- Problem solving exercises

INSTRUCTIONAL MATERIALS:

Text: Dental Radiography: Principles and Techniques. Fifth Edition, Iannucci/Howerton.

Dental Radiography Manual, Henkel/Seghi

Demonstration models, mannequins, miscellaneous equipment and supplies.

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

Lecture: Reading assigned materials, note taking, and participation in classroom discussion, completion of homework and project assignments is expected of students.

Written tests and quizzes are used to evaluate student progress. A minimum of 5 tests and a comprehensive final exam will be given. To determine the lecture grade, use the formula provided in the syllabus. Class material is weighted according to the assessment value.

A comprehensive final exam comprises 35% of the lecture grade. Unit tests make-up 35%, quizzes comprise 15% and homework is 15% of your lecture grade. Homework includes participation and attendance.

The following grading scale will be used as a guide in determining the final lecture grade for this course:

A=	90 - 100%
B=	80 - 89%
C=	70 - 79%
D=	60 - 69%
F=	0 - 59%

Laboratory: Quizzes, practice exercises, and radiographic surveys are used to assess student progress. The grading scale above will be used for quizzes and practice exercises and will be 25% of the Laboratory grade.

Radiographic projects are graded on the scale below and must be completed at 80% to be accepted. These make up 75% of the Laboratory grade.

A= 90-100%

B=80-89%

Radiographic projects below 80% are unacceptable and must be redone.

Laboratory: Quizzes, practice exercises, written exercises, roll play and radiographs are used to evaluate student progress. The grading scale above will be used for quizzes, practice exercises, written exercises and roll play.

*Laboratory: The student is required to attend open lab if they have not successfully completed the requirements of the day. In this open lab they must show proficiency by producing the radiographs that were not completed at the prior session. These will be turned into the open lab instructor to be viewed by me prior to your next lab. If acceptable radiographs are not produced the open lab practice radiographs will be done during your lab time. **These will not count toward your requirements**

Lab attire: The student is required to wear the class uniform and follow all laboratory rules.

Lab professionalism: Notes on lack of professionalism, collaborative work, listening skills, required attire and language will be made and point reduction will be factored into the grade. These attributes are expected of a dental assisting student.

Attendance and laboratory notes are kept for each student. These will be used in determining the student's final grade by being part of the practice exercises.

Course Grade: The final Radiology I grade will be calculated using 50% of the lecture grade and 50% of the Laboratory grade. Both grade components, Laboratory and Lecture, must be a C or better to pass the course. If one of the grade components is below a C that will be the grade received for the course and the other component grade will be disregarded.

The scale used for the final grade is:

A=90-100%
B= 80-89%
C=70-79%
D=60-69%
F=0-59%

OTHER REFERENCES

IVCC Dental Assisting Student Handbook
Dental Radiography Manual

Student Code of Conduct

Discipline may be taken anytime a student commits or attempts an act of misconduct as written in the IVCC Student Handbook.

Ethical Behavior

1. Honesty is an expected quality of any dental assistant and all dental assistant students.
 - A. Unethical behavior as outlined in the Dental Assisting Program Student Handbook and IVCC Student Handbook is subject to dismissal from the program.
 - B. Plagiarism, falsification of any information and taking supplies or equipment without instructor permission are examples of unethical behavior.
2. Respect is an expected quality of any dental assistant and all dental assistant students.
 - A. Respect is to be exhibited in both verbal and non verbal manners.
 - B. Respect is to be given to classmates, instructors, administrators, patients, dentists their staff, and all IVCC employees.
 - C. Display of disrespect will require a meeting with those involved and the program coordinator and may result in removal from the program.

Discipline may also include any of the means listed in the Dental Assisting Handbook and the IVCC Student Handbook.

- D. Inappropriate words, tone, and gestures are examples of disrespect.
3. IVCC Property and Equipment
 - A. If at any time you use equipment or property of IVCC in an inappropriate manner you will be removed from lab and unable to return until you can verbally explain why your behavior was inappropriate and how you will change it.
 - B. In proportion to the danger or damage presented by your behavior further action as described in the Dental Assisting Handbook and the IVCC Handbook may be invoked.
 4. Shared equipment
 - A. Many items are shared in lab and should not be hoarded or monopolized. If you are hoarding equipment you will be asked to return it to the community area and possibly asked to leave lab for the day. If you are monopolizing equipment you will be reminded to allow others fair time and may be asked to leave lab for the day.

Disability Statement

In an effort to create a classroom environment that maximizes the success of all students, I encourage you to make me aware of any barriers that may inhibit your learning. Feel free to speak to me at any time about concerns or questions you may have about assignments, activities, or assessments. The college provides several support services for students who have to learning. They include, but are not limited to: Disability Services Office, Writing Center/Peer Tutoring, Counseling Center, and Project Success.

If you are a student with a documented cognitive, physical or psychiatric disability you may be eligible for academic support services such as extended test time, texts on disc, notetaking services, etc... If you are interested in learning if you can receive these academic support services, please contact either Tina Hardy (tina_hardy@ivcc.edu, or 224-0284) or Judy Mika (224-0350), or stop by the Disability Services Office in C-211.

Withdrawal

Withdrawal may be completed by the instructor in accordance with the Dental Assisting Handbook or the IVCC Student Handbook.

Withdrawal may be completed by the student via WebAdvisor or through the Registration Office on paper format.

If you are considering withdrawal the councilors are available to help you understand how this may affect you financially and your future academically.

Instructor withdrawal is based on the previous mentioned handbooks and will not take financial or future academics into consideration.

