

COURSE INFORMATION

COURSE PREFIX/NO: **DHG 121**
COURSE TITLE: **Dental Radiography**
LEC HRS/WEEK: 2.0
LAB HRS/WEEK: 3.0
CREDIT HRS/SEMESTER: 3.0

[DL ATTENDANCE/VA STATEMENT](#)
[TEXTBOOK INFORMATION](#)

Course Description

This course provides the application of the principles of radiology with emphasis on exposing, processing, mounting, evaluating, and interpreting dental radiographs. Radiation safety is stressed.

Co-Requisite: DHG 165, DHG 243

Pre-Requisite: DHG 154, DHG 125, DHG 115

LEARNING OBJECTIVES

Upon the successful completion of DHG 121, the student is expected to have a thorough comprehension of and be competent to perform the following:

1. The basic principles and concepts of radiation in general and x-radiation in particular.
2. The component parts and workings of the Dental X-ray Machine and the production of x-rays.
3. Factors affecting the quality of the x-ray beam and the radiographic image.
4. The effects of ionizing radiation on living tissues.
5. Radiation bioeffects, health, and safety.
6. Radiation protection procedures for the operator and the patient.
7. Selection of appropriate radiographic surveys, film types, duplicating, and record keeping.
8. Intraoral techniques for bitewings, occlusal films, and periapicals including currently accepted methods, but emphasizing the paralleling technique for periapicals.
9. Supplementary techniques and patient management including endodontic, localization, edentulous, pedodontic, and techniques for difficult anatomy and patients with disabling conditions.

10. Technique of proper film processing, handling, and record keeping.
11. Quality assurance procedures.
12. Viewing techniques and principles of interpretation.
13. Panoramic radiography and other extraoral radiographic techniques with instruction in interpretation as appropriate.
14. Alternate imaging modalities.
15. The appearances of normal radiographic landmarks, artifacts, and shadows.
16. Developmental abnormalities and basic disease process of teeth and supporting structures.
17. Legal issues related to dental radiography.
18. Demonstrate professionalism in dress, conduct, and attitude.

Required Text and Materials

Johnson (1998) Essentials & Dental Radiography for Dental Assistants & Hygienists. 6th Edition. Appleton & Lange

Haring and Lind (1993). Radiographic Interpretation For The Dental Hygienist. Philadelphia: W.B. Saunders Company.

Each student is required to purchase two (2) boxes of size two (2) Kodak E-Speed Film. This item is to be purchased from the Bookstore and must be brought to the first clinical radiology session. Students must have film purchase verified by course instructor.

Course Requirements

In order to successfully complete DHG 121, the student is required to fulfill the following requirements:

1. attend lecture and lab sessions
2. complete all reading assignments
3. perform all laboratory tasks to a satisfactory level
4. complete any assigned activities
5. take all major tests with a grade of 80% or better
6. expose required films with a grade of 80% or better on bitewing and 86% or better on full mouth series. All films averaged together must be a grade of 80% or better.
7. follow dress code as described in Dental Hygiene Clinic Manual.

Course Implementation

Methods of instruction used to present course material include:

Didactic:

- *Lecture
- *Discussion/Problem Solving
- *Role Playing/Decision making
- *Reading Assignments - to be done prior to each class
- *Audiovisuals
- *Computer Assisted Instruction

Clinical:

- *Repetitive practice in a learning environment/maniken practice
- *Self assessment/problem solving
- *Faculty instruction and demonstration of clinical procedures

Evaluation

Didactic Portion - 50% of final course grade

- A. Weekly Quizzes 10%
- B. Tests 25%
- C. Final Exam 15%

Clinical Portion - 50% of final course grade

A. DXXTR Series

1. Three (3) DXXTR FMS two (2) consecutive 86% or better using staves).
2. Three (3) DXXTR bitewing surveys (a grade of 80% or better).

B. Client Series

1. One (1) adult FMS (86% or better using stabe)
2. Two (2) Adult bitewing surveys (80% or better)
3. One (1) pedo bitewing survey (80% or better)

C. Supplemental Techniques

1. Two (2) DXXTR FMS (using XCP - 86% or better)
2. One (1) DXXTR FMS (bisecting the angle - 86% or better)
3. Four (4) DXXTR occlusal radiographs

***All requirements must be met in clinic in order to receive a grade for this portion of the course. Failure to meet the stated requirements will result in the grade of "F" and the student will be dismissed from the Dental Hygiene Program.

***A grade of 80% is required in lecture and a clinical grade of 80% must be met (except where noted) in order to successfully complete this course.

Failure to maintain these averages in the lecture portion and clinical portion of this course will result in dismissal from the Dental Hygiene Program.

Due Date:

Radiographs are due no later than one (1) week after retakes are exposed. If no retakes are required, students are to submit radiographs for grading no later than one (1) week after exposure.

Grading Scale

90 - 100 = A
80 - 89 = B
79 - 70 = C
Below 70 = F

Course Standards and Evaluation

1. Attendance Policy

A. All absences must be reported directly to Mrs. Smith, by the student, prior to the beginning of class.

B. Due to the intensive nature of the coursework and the clinical experiences required of the student, it is the policy of this course that the student is allowed absences equivalent to one week of clinic and/or class. This would translate into one (1) - 2 hour class period and one (1) - 3 hour clinic session. Any unexcused absences (those without doctor's excuses) beyond the one allowed may result in the student's dismissal from the Dental Hygiene Program. If a student is absent more than three (3) consecutive days, a doctor's statement will be needed.

C. It is the responsibility of the student to secure all materials and information given during an absence from the didactic portion of the class.

D. Clinical sessions will be made up at the convenience of the instructor during a time to be announced.

E. Class starts promptly at 9:30 AM for lecture and 7:30AM and 3:00 PM for lab. If a student is late for class by ten (10) minutes, the student will be considered tardy. Three (3) tardies shall be counted as one (1) absence.

2. Testing Policies

A. Tests will be given during class time. Students will be given ample notification before testing occurs.

B. Students will be allowed to review tests, however, they are NOT allowed to keep the tests.

C. Make-up Policy For Tests

All tests missed due to an absence will be made up by the next didactic class. If a student is absent on the day of a written test the student will automatically receive a seven (7) point deduction on the test. All make-up tests will be given in the Assessment Center.

D. There will be no make-up quizzes!!!! A grade of zero will be assigned to students who miss quizzes. Quizzes will be given during each class period. Anyone who arrives late, after a quiz has started, will be allowed to take the quiz, however, they must do so in time originally allotted for the quiz.

Dress Policy

Due to the fact that Dental Hygiene Clinic will be in session during the hours scheduled for radiology clinic, all students participating in radiology clinic will adhere to the following dress code.

1. Each student must wear clean white clinic shoes, and a clean lab jacket over required uniform to all clinic sessions.
2. No shorts, miniskirts, or blue jeans should be worn in this clinic.
3. Hair must be worn out of the face.
4. Chewing gum is NOT acceptable in radiology clinic.
5. A watch, a plain wedding band, or small earrings may be worn (no dangles). No other jewelry may be worn.

**If a student does not abide by the dress policy, she/he will be asked to leave the clinic and correct the problem. If the problem is not corrected within five (5) minutes, the student will be asked to leave the clinic and not return for that session. All material missed must be made up at a designated time with an instructor.

Film Badges:

All students must wear a film badge during all radiology and laboratory sessions. These monitoring devices will be purchased from the York Technical College Bookstore for a fee of \$12.00. This fee covers the student badge replacement for one year. Purpose and rationale for use of film badge will be discussed in class. You will not be permitted in lab or clinic without this monitoring device.

DENTAL RADIOGRAPHY COURSE OUTLINE DHG 121

SPECIFIC OBJECTIVES AND LECTURE HANDOUTS WILL BE PROVIDED FOR EACH UNIT OF STUDY

I. Introduction

- A. Terminology
- B. Role of Auxillary

C. Facilities

1. operatories
2. darkroom
3. viewing area
4. manikins

II. Uses

- A. Detection and Diagnosis
- B. Legal Evidence
- C. Pre-Authorization of Dental Insurance
- D. Forensic Purposes

III. Overview of Radiation Safety

- A. Client Protection
- B. Operator Protection

IV. Paralleling Technique

- A. Introduction
- B. Fundamentals of Shadow Casting
- C. Principles of Paralleling Technique
- D. Advantages
- E. Disadvantages

V. Interproximal Technique

- A. Uses
- B. Film Sizes
- C. Angulation
 1. vertical
 2. horizontal
- D. Film Stabilization
- E. Steps in Obtaining Exposures
 1. Posterior
 - a. molar
 - b. premolar
 2. Identification
 3. Mounting
 4. Viewing and Interpretation

VI. Guidelines for Exposing Dental Radiographs

- A. Surveys
 1. full mouth survey
 2. modified full mouth survey
 3. bitewing survey
- B. Client Types
 1. new client - adult and transitional
 2. recare client - adult and transitional
 3. high risk
 4. low risk
 5. classification of periodontal disease
- C. Legal Aspects

VII. Dental Film

A. Introduction

1. exposure
2. latent image
3. processing
4. identification
5. mounting
6. viewing and interpretation

B. Types of Dental Film

1. Intraoral
 - a. nonscreen
2. Extraoral
 - a. screen
 - b. non-screen
 - c. cassettes

C. Composition of Film

1. Intraoral
 - a. nonscreen
2. Extraoral
 - a. screen
 - b. nonscreen

D. Film Covering and Packaging

E. Film Speed (sensitivity)

F. Intraoral Film Size and Usage

G. Extraoral Film Size and Usage

H. Exposure Holders and Cassettes

I. Duplicating Film

J. Film Storage and Protection

K. Film Requirement for FMS and BWS

VIII. Mounting

A. Definition

B. Systems of Mounting

C. Steps in Mounting

D. Teeth Included on Individual Projections

IX. Darkroom and Processing

A. Introduction

B. Fundamentals of Processing

1. basic facts of processing
2. selective reduction
3. radiopaque
4. radiolucent

C. Processing Solutions

1. Developer
 - a. purpose
 - b. constituents

2. Fixer

- a. purpose
- b. constituents

3. Manual Processing Procedure

D. Darkroom and Equipment

E. Darkroom Illumination

F. Processing Tanks

G. Care of Tanks and Solutions

H. Rapid Processing

I. Automatic Processing

J. Quality Control

- 1. integrity of darkroom
- 2. processing equipment
- 3. surface marks
- 4. drying problems

K. Duplicating Procedures

X. Radiographic Quality and Darkroom Errors

A. Film Processing Failures

- 1. light film
- 2. dark film
- 3. absence of image
- 4. fogged film
- 5. grey film
- 6. pressure marks
- 7. green/yellow hue to film
- 8. peeling emulsion
- 9. film scratches
- 10. white, chalky film
- 11. damp, wet film

B. Faulty Exposure Techniques

- 1. Incorrect Film Placement
 - *missing crowns
 - *missing apices
 - *missing mesial structures
 - *missing distal structures
 - *slanting occlusal plane
 - *bent film packet
 - *diamond or herringbone pattern
 - *incorrect position of identification dot
- 2. Incorrect Tube Head Positioning
 - *elongation
 - *foreshortening
 - *overlapping
 - *cone cut
- 3. Incorrect Exposure Results
 - *light image
 - *dark image
 - *absence of image
 - *poor definition
 - *double image

- *superimposed image
- *pressure marks
- *black paper stuck to film
- 4. Incorrect Handling of Film
 - *smudged film
 - *thin, black lines
 - *white lines or marks
 - *black image
 - *partial image
 - *clear areas on film
 - *dark or opaque areas on film
 - *reticulation
 - *curled film
- 5. Chemical Contamination Results
 - *white spots on film
 - *dark spots on film
 - *iridescent stain
 - *dark brown or gray film
 - *brownish yellow stains
- 6. Film Fog
 - *age
 - *storage
 - *radiation
 - *safelight
 - *white light
 - *processing contamination
 - *chemical
 - *cigarette

XI. Anatomical Landmarks

- A. Maxillary Landmarks
- B. Mandibular Landmarks

XII. Interpretation of Radiographs

- A. Restorations
- B. Caries
- C. Bone Level
- D. Missing Teeth
- F. Calculus
- G. Root Resorption
- H. Retained Root Tips
- I. Impactions
- J. Foreign Bodies
- K. Tori
- L. Overhangs
- M. Abscess
- N. Widened PDL Space
- O. Dolaceration
- P. Pulp Stones
- Q. Fractures

- Q. Fractures
- R. Sclerotic Bone
- S. Anatomic Landmarks

XIII. Bisecting The Angle Technique

- A. Bisector
- B. Goal
- C. Advantages
- D. Disadvantages
- E. Angulations
 - 1. Vertical
 - 2. Horizontal

XIV. Supplemental Radiographs

- A. Occlusals
- B. Radiography for Children
- C. Edentulous Survey
- D. Extraoral Radiography
 - 1. Panoramic
 - 2. Lateral jaw survey
 - 3. Lateral skull survey
 - 4. Facial profile survey
 - 5. Posteroanterior survey
 - 6. Sinus survey
 - 7. TMJ survey
 - 8. Cephalometric survey

XV. Characteristics of Radiation

- A. Physics of Radiation
 - 1. Matter
 - 2. Energy
 - 3. Atomic Structure
 - *Atom
 - *Molecule
 - *Electrons
 - *Protons
 - *Neutrons
 - *Nucleus
 - *Energy Levels
 - 4. Radiation
 - A. Isotopes
 - B. Decay
 - *Particular Radiation
 - *Electromagnetic Radiation
 - *Electromagnetic Spectrum
 - *Wavelength
 - *Frequency
 - 5. Characteristics of X-Radiation
 - A. Photons
 - B. Kinetic Energy to X-ray Photons

1. Bremsstrahlung
 2. Characteristic Radiation
- C. Ionizing Radiation

XVI. Effects of Radiation Exposure

- A. Ionizing Radiation
- B. Natural
- C. Man Made Radiation
 1. Effects
 - *Biological
 - *Cumulative
 - *Somatic Cells
 - *Genetic Cells
- D. Radiation Damage Theories
 1. Direct Hit
 2. Indirect Hit
- E. Cell Sensitivity
 1. Radiosensitive
 2. Radioresistant
 3. Law of B and T
 4. Cells in order of radiosensitivity
 5. Alara concept
- F. Radiation Injury Factors
 1. Total dose
 2. Dose rate
 3. Area exposed
 4. Variation in species and individual sensitivity
 5. Variation in cell sensitivity
 6. Age
- G. Events Following Radiation Exposure
 1. Latent period
 2. Period of injury
 3. Recovery period
- H. Oral Radiation Therapy

VII. Radiation Protection

- A. Professional Responsibility
- B. Legislation
- C. Measurements of X-Radiation
 1. Roentgen - Coulomb per kilogram (C/KG)
 2. Rad/Gray (GY)
 3. Rem/Sievert (SV)
 4. Absorbed dose
 5. Dose equivalent
 6. Minimum permissible dose
 7. Exposure
 8. Exposure rate
 9. Radiation
 10. Threshold exposure
 11. Erythema exposure

- 12. Latent period
- D. Radiation Safety Terminology
 - 1. Primary beam
 - 2. Useful beam
 - 3. Secondary radiation
 - 4. Scatter Radiation
 - 5. Leakage radiation
 - 6. Filter
 - 7. Filtration
 - 8. Added filtration
 - 9. Inherent filtration
 - 10. Total filtration
 - 11. Collimator
 - 12. Collimation
 - 13. Controlled area
 - 14. Half-value layer
 - 15. Protective barrier
 - 16. Primary protective barrier
 - 17. Radiation protection supervisor
 - 18. Secondary protective barrier
 - 19. Structural shielding
- E. Protective Measures and Modifications
- F. Monitoring
- G. Radiation Exposure Protection
 - 1. NCRP
- H. Maximum Permissible Dose
- I. Quality Control
- J. Client Education

VIII Dental X-Ray Machine: Components and Functions

- A. Introduction
- B. Parts and Components
 - 1. Structural parts
 - 2. Electrical parts
 - 3. Principles of operation
 - 4. Amperage
 - 5. Voltage
 - 6. Electric current
 - 7. Transformers
 - 8. Control Devices

IX. Technical Aspects of Radiation Production

- A. Radiation Production
 - 1. Operation of machine
 - 2. Production of quality radiographs
 - *Filtration
 - *Collimation
 - *Quality Factors
 - *Acceptable Radiograph Requirements

XX. Extraoral Radiography

A. Panoramic Radiography

1. Uses
2. Screens, cassettes, grids
3. Interpretation

XXI. Localization

A. Techniques

1. Uses

XXII. Developmental Abnormalities

- A. Amelogenesis Imperfecto
- B. Dentinogenesis Imperfecto
- C. Dentinal Dysplasia
- D. Odontodysplasia
- E. Dens In Dente
- F. Fusion, Geminatio and Concrescence
- G. Taurodontism
- H. Macrodontia and Microdontia
- I. Supernumery Teeth
- J. Missing Teeth
- K. Malpositioned Teeth
- L. Palatal and Mandibular Clefts
- M. Chinibism
- N. Agnathia
- O. Craniofacial Dysostosis
- P. Osteogenesis Imperfecta
- Q. Ectodermal Dysplasia
- R. Cleidocranial Dysostosis

XXIII. Current Technology

- A. Computed Tomography
- B. Nuclear Medicine
- C. Xeroradiography
- D. Use of Contrast Media
- E. Intraoral Source Radiography
- F. Ultrasound
- G. Magnetic Resonance Imaging
- H. Subtraction Technique
- I. Positron Emission Tomography
- J. Rare Earth Imaging Techniques