

## **COURSE INFORMATION**

COURSE PREFIX/NO:	<b>DAT 127</b>
COURSE TITLE:	<b>Dental Radiography</b>
LEC HRS/WEEK:	3.0
LAB HRS/WEEK:	3.0
CREDIT HRS/SEMESTER:	4.0

[DL Attendance/VA Statement](#)  
[Textbook Information](#)

## **Course Description**

This course provides the fundamental background and theory for the safe and effective use of x-radiation in dentistry. It encompasses the history of x-rays, production and uses of radiation, radiographic film, exposure factors, interpretation of radiographs and radiation hygiene.

## **LEARNING OBJECTIVES**

Upon the successful completion of DAT 127, 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 DAT 127, the student is required to fulfill the following requirements:

1. attend lecture and lab sessions
2. complete all reading assignments
3. perform all lab performance tasks to a satisfactory level
4. complete any assigned activities
5. take all major tests with a grade of 70% 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 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 Assisting Clinic Manual.
8. register for DANB Radiation Health & Safety Exam. Student will need to provide instructor with receipt received when mailing application "Certified Mail" through U.S. Postal Service.

**YOU MUST PROVIDE THIS RECEIPT TO INSTRUCTOR TO RECEIVE CREDIT FOR THIS COURSE.**

## **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/manikin 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%

## **COMPREHENSIVE**

### **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 stave)
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 Assisting Program.

\*\*\*A grade of 70% 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 Assisting 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) - 3 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 Assisting 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

D. 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 ten (10) point deduction on the test. All make-up tests will be given in the Assessment Center.

E. **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 DAT 127

### 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. Forensic Purposes

#### III. Overview of Radiation Safety

- A. Patient 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. recall 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
- E. Unerupted Teeth
- F. Calculus
- G. Root Resorption
- H. Retained Root Tips

- I. Impactions
- J. Foreign Bodies
- K. Tori
- L. Overhangs
- M. Abcess
- N. Widened PDL Space
- O. Dolaceration
- P. Pulp Stones
- 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. Accessory 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

## XVII. 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. Patient Education

## XVIII. 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

## XIX. 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, Gemination and Concrescence

G. Taurodontism

H. Macrodontia and Microdontia

I. Supernumerary 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. Subtraciton Technique

I. Position Emission Tomography

J. Rare Earth Imaging Techniques