DHYG 3760 - Dental Radiology

Fall 2026 Syllabus, Section 01, CRN 41173,

Credit hours: 3

Instructor

Suzanne Smith

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Public Instructor Information

Instructor Title: Professor
Instructor Professional Qualifications: MEd, Health Education & Promotion, Kent State University, 2006; BSAS, Dental Hygiene, Youngstown State University, 1991; AAS, Dental Hygiene, Youngstown State University, 1988

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Course Description

3760. Dental Radiology. History and development of radiographs, radiographic theory and techniques, hazardous effects of radiation, and methods of protection. Emphasis on interpretation of normal anatomic structures and pathologic entities; and the use of diagnosis in prevention of dental and related diseases. Prereq.: DHYG 2602L. 3 s.h.

TEACHING METHODS/LEARNING EXPERIENCES

A. Lecture

B. Audiovisuals

C. Discussion

D. Continuing education courses on www.dentalcare.com

E. Textbook website (Evolve/Elsevier)

COURSE OUTLINE

A. Radiation History (1.5 hours)

1. Key terms

2. Importance and uses of dental images

3. Discovery of x-radiation

4. Pioneers in dental x-radiation

5. History

a. Dental x-ray equipment

b. Dental x-ray film

c. Dental radiographic techniques

d. Dental imaging

B. Radiation Physics (2.5 hours)

1. Key terms

2. Atomic structure

3. Ionization
4. Types of radiation
5. Characteristics of electromagnetic radiation

6. Properties of x-radiation
7. X-Ray Machine
    a. Component parts
    b. Tube head

c. Dental x-ray tube

8. Production of x-radiation
9. Interactions of x-rays with matter
    a. No interaction
    b. Absorption and photoelectric effect
    c. Compton scatter
    d. Coherent scatter

C. Radiation Biology (1.5 hours)

1. Key terms

2. Radiation injury
    a. Mechanisms and theory
    b. Dose-response curve
    c. Sequence of injury
    d. Determining factors for injury

3. Radiation effects
    a. Short-term and long-term
    b. Somatic and genetic
    c. Relative sensitivity of tissues to radiation
4. Radiation measurements
5. Sources of radiation exposure
6. Risk
    a. Exposure risks
    b. Risk estimates
    c. Risk vs. benefit

D. Radiation Protection (1.5 hours)

1. Key terms

2. Patient protection

a. Before x-ray exposure

b. During x-ray exposure

3. Filtration

4. Collimation

5. Receptor handling and processing

6. Operator protection

7. Monitoring devices

8. Radiation exposure guidelines

9. Patient education

E. Radiation Characteristics (2 hours)

1. Key terms

2. Kilovoltage peak (KVp)

a. Quality of the useful beam

b. Density

c. Contrast

d. Range of KVp

3. Milliamperage (mA)

a. Quantity of the x-ray beam

b. Density

c. Relationship to exposure time

d. Range of KVp

4. Intensity

a. Kilovoltage peak

b. Milliamperage

c. Exposure time

d. Distance

e. Inverse square law

f. Half-value layer

F. Dental X-ray Image Characteristics (1.5 hours)

1. Key terms

2. Image Characteristics

a. Radiolucent

b. Radiopaque

3. Visual characteristics

a. Density
b. Contrast
i. film vs. subject contrast
ii. high vs. low contrast
iii. short-scale vs. long-scale contrast
iv. stepwedge

4. Geometric characteristics
a. Sharpness
b. Magnification
c. Distortion

G. Dental X-ray Equipment (.75 hours)

1. Key terms

2. Regulation of x-ray machines

3. Types of x-ray machines
a. Intraoral
b. Extraoral
c. Portable

4. Component parts of an x-ray machine

5. Receptor holders, beam alignment devices, and collimating devices

H. Digital Imaging (.50 hours)

1. Key terms

2. Purpose and use

3. Radiation exposure concepts

4. Types

5. Equipment used

6. Advantages and disadvantages

I. Dental X-ray Film (.75 hours)

1. Key terms

2. Importance

3. Dental x-ray film composition

4. Latent image

5. Intraoral film

6. Extraoral film

7. Film speed

8. Intensifying screens and cassettes
9. Film storage and protection

J. Film Processing (1.5 hours)

1. Key terms
2. Automatic film processor
a. Component parts
b. Procedural steps
c. Care and maintenance
3. Darkroom
4. Film duplication
5. Processing errors

K. Film Mounting and Viewing (.75 hours)

1. Key terms
2. Mounting and Viewing
a. Qualified individuals
b. Time and place
c. Labeling
d. Relationship to digital imaging
e. Equipment
f. Procedure/sequence
g. Knowledge of anatomy
h. Preferred method
3. X-ray examinations
a. Areas
b. Diseases
c. Abnormalities

L. Dental Images and the Dental Radiographer (.50 hours)

1. Key terms
2. Dental images
a. Importance
b. Uses
c. Benefits
d. Common dental conditions seen
3. Dental radiographer

a. Knowledge and skill requirements
b. Duties and responsibilities
c. Professional goals

M. Patient Relations and the Dental Radiographer (.50 hours)

1. Key terms

2. Communication

a. Verbal
b. Nonverbal
c. Listening

3. Trust/ Facilitation skills

4. Patient relations

a. First impressions
b. Chairside manner
c. Attitude

N. Patient Education and the Dental Radiographer (.50 hours)

1. Key Terms

2. Importance

3. Methods
4. Common questions

O. Legal Issues and the Dental Radiographer (1.5 hours)

1. Key terms

2. Federal and state regulations
3. Licensure requirements
4. Risk management
5. Informed consent and Informed refusal
6. Malpractice

7. Dental records

P. Infection Prevention and the Dental Radiographer (.75 hour)

1. Key terms

2. Rationale

3. Infection control procedures

a. Before x-ray exposure
b. During x-ray exposure
c. After x-ray exposure

Q. Quality Assurance in the Dental Office (1.5 hours)

1. Key terms

2. Purpose and frequency of testing x-ray machines

3. Quality assurance plan

a. Quality control tests

b. Administration procedures

4. Operator competence

R. Introduction to Dental Imaging Examinations (1.5 hour)

1. Key terms

2. Intraoral radiographic examination

a. Types

b. Purpose

c. Receptor and technique used

b. General diagnostic criteria

3. Extraoral radiographic examination

4. Prescribing dental images

S. Paralleling Technique (1.5 hours)

1. Key terms

2. Basic principles and rules

3. Equipment

4. Preparation

a. Equipment

b. Patient

5. Procedures

6. Modifications

7. Advantages and disadvantages

T. Bisecting Technique (1.5 hours)

1. Key terms

2. Basic principles and rules

3. Equipment

4. Preparation

a. Equipment

b. Patient

5. Procedures

U. Bite-Wing Technique (1.5 hours)

1. Key terms

2. Purpose and use

3. Basic principles and rules

4. Equipment

5. Preparation

a. Equipment

b. Patient

6. Procedures

7. Bitewing series

a. Number of exposures

b. Horizontal vs. Vertical bitewings

c. Modifications

V. Exposure and Technique Errors (1.5 hours)

1. Key terms

2. Appearance of image errors

a. Technique errors

b. Receptor placement errors

c. Angulation errors

d. Beam alignment errors

e. Miscellaneous errors

W. Occlusal and Localization Techniques (1.5 hours)

1. Key terms

2. Purpose and uses

a. Occlusal examination

b. Localization techniques

3. Preparation

a. Patient

b. Equipment

4. Vertical angulations for occlusal technique

a. Maxillary occlusal projections

b. Mandibular occlusal projections

5. Localization techniques

a. Buccal object rule

b. Right-angle technique

X. Imaging of Patients with Special Needs (1.5 hour)

1. Key terms

2. Gag reflex

3. Disabilities and modifications in technique

a. Physical

b. Developmental

4. Pediatric patients

a. Tooth eruption sequence

b. Prescribing dental images

c. Recommended techniques

d. Patient management

5. Purpose and uses of imaging examinations for

a. Edentulous patients

b. Endodontic patients

Y. Panoramic Imaging (.75 hours)

1. Key terms

2. Purpose, use and fundamentals

3. Equipment

4. Preparation

a. Patient

b. Equipment

c. Patient positioning

5. Diagnostic image

6. Errors and corrections

7. Advantages and disadvantages

Z. Extraoral Imaging (.50 hours)

1. Key terms

2. Purpose and uses

3. Equipment

4. Preparation

a. equipment

b. patient

4. Projection techniques

a. Lateral jaw
b. Skull
c. TMJ

AA. Three-Dimensional Digital Imaging (.50 hours)

1. Key terms
2. Fundamentals and uses
3. Training and equipment
4. Common uses
5. Equipment and patient preparation
6. Advantages and disadvantages

BB. Normal Anatomy: Intraoral Images (.75 hours)

1. Key terms
2. Anatomic landmarks
   a. Maxilla
   b. Mandible
3. Tooth anatomy
   a. Tooth
   b. Supporting structures
   c. Radiolucent vs. radiopaque

CC. Normal Anatomy: Panoramic Images (1.5 hours)

1. Key terms
2. Bony landmarks
   a. Maxilla
   b. Mandible
   c. Surrounding structures
      2. Air spaces
      3. Soft tissues

DD. Introduction to Image Interpretation (.75 hours)

1. Key terms
2. Importance
3. Roles of dental personnel
4. Time, place, sequence
5. Patient education

EE. Descriptive Terminology (.75 hours)

1. Key terms
2. Radiolucent lesions

a. Appearance

b. Location

c. Size

3. Radiopaque lesions

a. Appearance

b. Location

c. Size

FF. Identification of Restorations, Dental Materials, and Foreign Objects (.50 hours)

1. Key terms
2. Materials used in dentistry

a. Restorative

b. Orthodontic

c. Prosthodontic

d. Endodontic

e. Surgical

3. Miscellaneous objects

GG. Interpretation of Dental Caries (.50 hours)

1. Key terms

2. Appearance

3. Interpretation

4. Conditions with similar appearances

HH. Interpretation of Periodontal Diseases (.50 hours)

1. Key terms

2. Recommendations

a. Image type

b. Exposure technique

3. Interpretation of bone loss

a. Horizontal vs. vertical

b. Localized vs. generalized

c. Mild, moderate, and severe

4. 2018 Classifications

5. Appearance of calculus

II. Interpretation of Trauma, Pulpal Lesions, and Periapical Lesions (1.5 hours)

1. Key terms

2. Fractures

a. Crown

b. Root

c. Jaw

3. Resorption

a. Internal

b. External

4. Pulpal conditions

a. Sclerosis

b. Obliteration

c. Stones

5. Periapical Radiolucencies

a. Granuloma

b. Cyst

c. Abscess

6. Periapical Radiopacities

a. Condensing osteitis

b. Sclerotic bone

c. Hypercementosis

Course Readings

Group	Title	Author	ISBN
Required	Dental Radiography Principles and Techniques, 6th ed.	Ianucci, J., & Howerton, L.	978-0323695503
Required	#559: Intraoral Imaging: Basic Principles, Techniques and Error	dentalcare.com	
Required	#601: Intraoral Radiographic Anatomy	dentalcare.com	
Required	#533: Panoramic Radiographs: Technique and Anatomy Review	dentalcare.com	
Optional	Wilkin's Clinical Practice of the Dental Hygienist, 14th	Boyd, L.D. & Mallonee, L.F	978-1284255997
Optional	Exercises in Oral Radiography and Interpretation, 5th ed.	Langlais, R., Miller C.	978-0323400633

The course readings are based on the current edition of the course textbooks. Students are responsible for all assigned course readings as specified in the Tentative Course Schedule of this syllabus. Classroom lecture, PowerPoint presentations, and study guides are based on the course readings. Additional information, examples, and images in the assigned course readings supplement and reinforce the classroom activities and provide deeper understanding and learning. Assessment questions may be based on all course readings and content; therefore, preparation should be comprehensive.

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Day	Date	Reading(s)	Proposed Topic	Due/To Prepare for Class
Mon	8/24	Syllabus Chapter 18 Chapter 15	Introduction to Course Introduction to Dental Imaging Examinations Legal Issues and the Dental Radiographer	Study Guide
Wed	8/26	Chapter 7 Chapter 21	Dental X-ray Equipment Bite-wing Technique	Study Guide
Mon	8/31	Chapter 1	CE Certificate #559 Due Quiz 1 Radiation History	CE Certificate #559 Due; Quiz 1; Study Guide
Wed	9/2	Chapter 2	Radiation Physics	Study Guide
Mon	9/7	No Class		
Wed	9/9	Chapter 3	Radiation Biology	Study Guide
Mon	9/14	Chapter 4	Quiz 2 Radiation Protection	Quiz 2; Study Guide
Wed	9/16	Chapter 5	Radiation Characteristics	Study Guide
Mon	9/21	Chapter 6	Dental X-ray Image Characteristics	Study Guide
Wed	9/23	Chapter 11	Quiz 3 Film Mounting and Viewing	Quiz 3; Study Guide
Mon	9/28	Chapter 19	Paralleling Technique	Study Guide
Wed	9/30		Exam #1 (All Chapters Weeks 1-5)	Exam #1
Mon	10/5	Chapter 28	CE Certificate #601 Due Normal Anatomy: Intraoral Imaging	CE Certificate #601 Due; Study Guide
Wed	10/7	Chapter 9 and Chapter 10	Quiz 4; Dental X-ray Film Film Processing	Quiz 4; Study Guide
Mon	10/12	Chapter 22	Exposure and Technique Errors	Study Guide
Wed	10/14	Chapter 16 and Chapter 17	Quiz 5; Infection Control and the Dental Radiographer; Quality Assurance in the Dental Office	Quiz 5; Study Guide
Mon	10/19	Chapter 25	CE Certificate #533 Due Panoramic Imaging	CE Certificate #533 Due; Study Guide
Wed	10/21	Chapter 29	Quiz 6 Normal Anatomy: Panoramic Imaging	Quiz 6; Study Guide
Mon	10/26	Chapter 23	Occlusal and Localization Techniques	Study Guide
Wed	10/28	Chapter 24	Imaging of Patients with Special Needs	Study Guide
Mon	11/2	Chapters 12, 13, and 14	Dental Radiographs and the Dental Radiographer; Patient Relations and the Dental Radiographer; Patient Education and the Dental Radiographer	Study Guide
Wed	11/4	Chapter 8	Quiz 7; Digital Imaging	Quiz 7; Study Guide
Mon	11/9	Chapter 26 and 27	Extraoral Imaging Three-Dimensional Digital Imaging	Study Guide
Wed	11/11	No Class		
Mon	11/16	Chapter 30 and 31	Introduction to Image Interpretation Descriptive Terminology	Study Guide
Wed	11/18		Exam #2 (All Chapters Weeks 6-13)	Exam #2
Mon	11/23	Chapter 32, 33, and 34	Identification of Restorations, Dental Materials and Foreign Objects; Interpretation of Dental Caries; Interpretation of Periodontal Disease	Study Guide
Wed	11/25	No Class		
Mon	11/30	Chapter 35	Quiz 8 Interpretation of Trauma and Pulpal and Periapical Lesions	Quiz 8; Study Guide
Wed	12/2	Chapter 20	Bisecting Technique	Study Guide

Mon	12/7	Comprehensive of all Week 1-15 Class Readings	Final Examination 8 am -10 am	Final Examination
Wed	12/9	No Class		

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.