

D H 305A: INTRODUCTION TO DENTAL RADIOGRAPHY I

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	2
Hours:	2 lecture per week (24 total per quarter)
Advisory:	Not open to students with credit in D H 60A.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	CSU
Grade Type:	Letter Grade Only
Repeatability:	Not Repeatable

Student Learning Outcomes

- Describe radiation interaction with biological matter (chromosomal, carcinogenesis) and identify the radiation protective factors provided to the patient to reduce radiation absorption and exposure

Description

The first in a series of four dental radiology courses for the dental hygiene student. Component parts, functions, operations of the dental x-ray unit and radiation safety are emphasized. Relationships between anatomical and radiographic landmarks are analyzed. Intended for students in the Dental Hygiene Baccalaureate Degree Program; enrollment is limited to students accepted in the program.

Course Objectives

The student will be able to:

- Understand basic principles and concepts of radiation in general and x-radiation in particular
- Explain the radiation effects of ionizing radiation on living tissue
- Discuss radiation bioeffects and its relation to human health and safety
- Compare radiation protection procedures for the operator and the patient
- Compare the different intraoral techniques used for bitewing, occlusal, and periapical radiography using currently accepted methods
- Plan the selection of appropriate radiographic surveys and film types for patients
- Recognize and compare skull and dental anatomy seen on radiographic films or textbook diagrams or pictures
- Compare and contrast the identification and description of atypical dental anatomical findings
- Demonstrate the technique of proper film processing, and understand film chemistry, and the influence of silver halide crystals size

Course Content

- The dental x-ray machine
 - Amperage, voltage, roentgen, contrast, density
- X-ray production in the Coolidge tube
 - Wavelength properties

- Wavelength penetration
 - Amplitude
 - Frequency
- Source of electrons and thermionic energy
 - kVp and kinetic energy
 - Tungsten target and copper stem
 - Photon interaction with matter; scatter and secondary radiation
 - Characteristic radiation, Bremsstrahlung radiation
 - Ionization, free radical formation
 - Stochastic effects
 - Nonstochastic effects
 - Radiation injury
 - Radiation sickness
 - Biologic effects of radiation production
 - Effects of ionizing radiation on the individual cell
 - Theories of the effect of radiation on the cell
 - Radiosensitivity of individual tissues
 - Chronic
 - Acute
 - Cumulative effect of x-ray damage
 - Medical illness
 - Somatic effects
 - Genetic effects
 - Chromosomal damages
 - Maximum permissible dose
 - Radiation measurements
 - rad
 - rem
 - roentgen
 - gray
 - sievert
 - MPD operator
 - MPD patient
 - Lead equivalency
 - Thyroid collar
 - Lead cape
 - Lead apron
 - Inherent filtration devices
 - Lead housing
 - Insulating oil
 - Added filtration components
 - Aluminum filter
 - Collimator
 - Federal, State, Local levels of radiation regulations
 - Film speed, analog conversion, digital capture
 - Film processing equipment
 - Plate scanning equipment
 - Digital technology and equipment
 - 3-D imaging
 - Radiation protective measures
 - FDA and ADA guidelines for the patient exposures
 - Time factors related to dental insurance
 - Need factors related to risk
 - ALARA principle
 - Intensifying screens
 - Radiation reduction
 - Light spectrum wavelength
 - Properties of luminance
 - Radiation protective factors for the operator
 - Wall construction
 - Exposure button placement
 - Dosimeter

4. Training and licensing
5. Distance and angles away from patient
- D. X-ray production
 1. Contrast
 - a. Long scale
 - b. Short scale
 - c. Dentist preference; hygienist preference
 - d. Contrast manipulation
 - e. Contrast discrimination for disease detection
 2. Density
 - a. Effects of milliamperage and kilovoltage on density and contrast
 3. Effects of receptor/tubehead placement on image
 - a. Magnification
 - b. Target anode to object distance
 - c. Object to receptor distance
 4. Effects of time, milliamperage, and kilovoltage on x-ray production
 - E. Intraoral radiographs
 1. Radiation measurements
 - a. mA, kVp, time differentials for molar, premolar, incisor and occlusal
 2. Filmholder types
 - F. Extraoral
 - a. TMJ
 - b. Cephalometric
 - c. Water's
 - d. Panoramic images
 1. Focal trough positioning
 2. Biteplate positioning
 3. Infection control
 3. Patient preparation
 4. Indications for use
 5. mA, kVp, time, skull size
 - G. Dental anatomy
 1. Anatomical landmarks of the skull
 2. Intraoral anatomical landmarks
 3. Comparative dental radiographic anatomy of film and digital
 4. Periodontal radiographic anatomy
 5. Mounting radiographs
 - H. Image characteristics
 1. Penumbra
 2. Disease misinterpretations
 3. Radiopaque typical and atypical findings
 4. Radiolucent typical and atypical findings
 - I. Film processing
 1. Darkroom regulations
 2. Chemical composition of the developing solutions
 - a. Influence of pH, time, temperature
 3. Influences of film speed, silver halide crystals, emulsion gel, packets
 4. Manual and automatic processing techniques

Lab Content

Not applicable.

Special Facilities and/or Equipment

Multimedia classroom

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Written and or slide quizzes
Midterm

Final exam
Technique evaluation of dental radiographs
Quality analysis of dental radiographs

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
Discussion
Cooperative learning exercises
Demonstration

Representative Text(s) and Other Materials

Iannucci and Howerton. Dental Radiography, Principles and Techniques, 5th ed. 2017.

Yamamoto, J.. Radiology Lab Policy and Information Manual. .

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- A. Read assignments from the course primary textbook chapters listed on the course schedule that average two chapters per assignment.
- B. Review and complete the multiple choice quiz located at the end of each chapter.
- C. Read and comprehend the lecture syllabus that averages 20-30 pages.
- D. Identify head and neck landmarks using skull pictures, drawings, textbooks and slides.

Discipline(s)

Dental Technology