COURSE NUMBER AND TITLE: DNTA 1305

HOURS: 3 Credit Hours, 2 Lecture, 3 Laboratory hours a week, 80 Contact Hours

LECTURE: Friday 10:00-12:00 PM, Room U-127  
LAB: TBA, Room U-167

COURSE (CATALOG) DESCRIPTION: Introduction to radiation physics, protection, the operation of radiographic equipment, exposure, processing and mounting of dental radiographs. Specific federal and state safety and standard practices for the classroom and lab settings will be practiced.

End-of-Course Outcomes: Describe the theory and principles of radiographic techniques, physics, and radiation health and safety; expose, process, and mount radiographs; and demonstrate quality assurance practices.

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<tr>
<th>INSTRUCTORS</th>
<th>OFFICE</th>
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<tbody>
<tr>
<td>Dr. Bob Bennett</td>
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<td>Ms. Laura Esquivel</td>
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<td>Ms. Lori Renteria</td>
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OFFICE HOURS: Wednesday 8:00 am-12:00 pm, Fri. 8:00-10:00 am

INSTRUCTOR EMAIL ADDRESS: bob.bennett@harlingen.tstc.edu

MAJOR COURSE REQUIREMENTS:
A. Introduction and History of Dental Radiography, Operation of the Dental X-ray Machine
B. Production of Quality Radiographs
C. Process Dental Films and Digital Radiography
D. Effects of Radiation Exposure and Radiation Protection
E. Intraoral Radiographic Procedures, Periapical Examination Using Paralleling and Bisecting Techniques, Bitewing Examination, Occlusal Examination
F. Radiographic Error Corrections, Quality Assurance, Safety and Environmental Responsibilities in Dental Radiography
G. Mounting and Interpretation, Identification of Anatomical Landmarks and
LEARNING OBJECTIVES:
A. Introduction and History of Dental Radiography, Operation of the Dental X-ray Machine
1. Define the terms related to dental radiography.
2. Identify the major components of an x-ray machine.
3. List the four controls on most dental x-ray machines.
4. List the components of the tube head.
5. Label the components of a typical dental x-ray tube.
6. Discuss the principles of x-ray tube operation in creating radiographs.
7. Explain the function of the mA, kVp, and timer control devices in radiograph production.
8. Name the three transformers, describe their functions, and state their locations.
9. Identify the sequential steps in operating the dental x-ray machine.

B. Production of Quality Radiographs
1. Define the terms relating to radiographic production.
2. Differentiate between radiolucent and radiopaque areas on a dental radiograph and give an example of each.
3. Compare and contrast radiographic density and contrast.
4. Discuss the factors that affect the radiographic image.
5. List the geometric factors affecting image sharpness.
6. Describe the rules for shadow casting an image.
7. Discuss the factors that influence magnification and distortion.
8. Describe how mA, kVp, and exposure time affect film density.
9. Discuss how kVp affects contrast.
10. Differentiate between short-scale contrast and long-scale contrast.
12. Explain the Inverse Square Law, and give two examples of how it is used and calculated.

C. Process Dental Films and Digital Radiography
1. Define relevant terms.
2. Describe the four parts of an intraoral film.
3. List the sequence of steps in processing dental films and the significance of each.
4. Identify the chemicals used in the developer and fixer solutions, and the
function of each.
5. Compare and contrast automatic and manual film processing.
6. Explain how a latent image becomes a visible image.
7. List the chemicals and equipment needed for processing dental x-rays.
8. Discuss safelights and safelight filters.
9. Describe rapid film processing procedures.
10. Explain the role chemical replenishment and solution changes play in maintaining optimal processing chemistry.
11. Describe the types of errors that can occur due to improper processing.
12. Correctly process radiographs.
13. Compare and contrast digital imaging and radiographs.
14. Discuss the concepts, purposes, and uses for digital radiography.
15. Describe the equipment and types of digital radiography.
16. Discuss the advantages and disadvantages of digital radiography.

D. Effects of Radiation Exposure and Radiation Protection
   1. Define the terms related to radiation biology, protection, and infection control.
   2. Compare the theories of biological damage and the short and long term effects of dental radiation on genetic and somatic cells.
   3. Discuss risk versus benefits of dental radiographs, implementing the ALARA concept. (SCANS 7B)
   4. Identify the body cells in order of their radiosensitivity.
   5. Identify factors that influence radiation injury and the areas of the body most easily injured.
   6. Describe the sequence of events following a radiation exposure.
   7. Identify the effects of oral radiation therapy.
   8. Describe radiation protection measures for the patient and for the operator.
   9. Identify a collimator, its use, and recommended diameter of the beam on the patient’s skin.
  10. Identify a filter, its use, and the filtration requirements required for various machines.
  11. Compare and contrast inherent, added, and total filtration.
  12. Discuss how proper film handling can reduce radiation exposure for the patient.
  13. Discuss how personnel monitoring devices can determine radiation exposure for the operator.
  14. Discuss Maximum Permissible Dose and compare the MPD for radiation workers, pregnant women, and the general public.
  15. Demonstrate radiation protection methods for patients and operators.

E. Intraoral Radiographic Procedures, Periapical Examination Using Paralleling and Bisecting Techniques, Bitewing Examination, Occlusal Examination
   1. Define key words
   2. State the purpose for bitewing and periapical radiographic examinations.
   3. Compare and contrast periapical and bitewing radiographs.
4. Identify the sizes of films that can be used for these radiographic surveys, and the indications for each.
5. Identify the sizes and numbers of films required to make these radiographic surveys.
6. Explain the concepts of horizontal and vertical angulation.
7. Discuss positive and negative vertical angulation and where each is appropriate.
8. Compare the types of film holders available for these film surveys.
9. Assemble the XCP film holder and describe the four rules for its use.
10. Compare and contrast film packet placement for maxillary and mandibular periapical exposures using the paralleling and the bisecting angle technique.
11. Demonstrate proper film placement for each of the films in each series.
12. Compare and contrast horizontal and vertical bitewings, and when each would be indicated.
13. Discuss the principles for the bisecting angle technique and for the paralleling technique.
15. Differentiate between conventional periapical film placement and endodontic film placement techniques.
16. Locate points of entry on the face.
17. Identify proper seating positioning for the patient.
18. Discuss correction of errors for each of the techniques.
19. State the purpose of the occlusal radiograph.
20. Discuss the technical considerations for occlusal examination.
21. Compare the topographical with the cross-sectional technique.
22. State the sequence of steps for topographical and cross-sectional techniques for both arches.

Laboratory objectives
23. Demonstrate the proper technique for each of the three intraoral x-ray examinations: periapical paralleling, periapical bisecting angle, and bitewing examinations. (SCANS 7D)
24. Identify errors in radiographs taken with each of the three techniques.
25. Demonstrate two proper techniques for an occlusal radiograph.

F. Radiographic Error Corrections, Quality Assurance, Safety and Environmental Responsibilities in Dental Radiography
1. Identify the types of radiographic errors caused by faulty exposure techniques, incorrect film positioning, angulation, faulty processing techniques and improper film handing.
2. Discuss the consequences of using outdated film, processing solutions, or faulty safelights.
3. Differentiate between quality assurance and quality control.
4. List the objectives of dental radiographic quality assurance and control.
5. Describe various tests for quality assurance and quality control.
6. Compare and contrast the reasons for light or dark films and how to correct them.
7. Identify proper handling and disposal of chemicals and materials associated with radiographic procedures.

Laboratory objectives
9. Identify errors on a radiograph series and take and the appropriate measures to correct them. (SCANS 7C)
10. Demonstrate the use of a step wedge.

G. Mounting and Interpretation, Identification of Anatomical Landmarks and Deviations
1. Define key terms
2. Discuss the reasons why proper film mounting is important.
3. Describe the use of the identification dot in film mounting.
4. Discuss the recommended order for mounting radiographs.
5. List the items to check after the radiographs are mounted.
6. Describe optimal conditions for viewing radiographs.
7. Differentiate between interpretation and diagnosis of the radiograph.
8. Identify all radiopaque and radiolucent appearing restorative materials.
9. Differentiate between normal and pathological conditions of bone structures and teeth.
10. Identify radiographically apparent caries, periodontal disease, and common oral pathologies on a radiograph.
11. Discuss the limitations of radiographs in the diagnosis of periodontal disease, caries, and other oral pathologies.
12. Define the key words related to identification of radiographic landmarks and anatomy.
13. Recognize and describe the radiographic appearance of the teeth and alveolus.
14. Explain the significance of recognizing and identifying normal anatomical landmarks.
15. Identify the anatomical landmarks of the maxilla and mandible.
16. Compare and contrast radiopaque and radiolucent and identify which structures have these characteristics.

Laboratory objectives
17. Identify anatomical landmarks of the oral cavity on a complete radiographic series.
18. Properly mount a bitewing and periapical radiographic series.

H. Infection Control, Legal and Ethical Responsibilities, Patient Relations
1. Define key words.
2. Discuss the importance of infection control when exposing dental radiographs.
3. Describe infection control guidelines as they relate to dentistry.
4. List the infection control procedures used before, during, and after film exposures.
5. Discuss the “chain of infection”, and how it relates to transmissible diseases.
6. Discuss the federal and state regulations concerning the use of dental x-ray equipment.
7. Describe licensure and certification procedures for exposing radiographs
8. Discuss risk management.
9. Explain informed consent.
10. Explain the procedure and documentation for patients who refuse radiographs.
11. Discuss ways to maximize patient compliance.
12. Describe five personality traits.
13. Define communication and listening skills.
14. Explain the importance of patient education in dental radiography.
15. Identify patient benefits from radiographic examination.

Laboratory objectives
16. Demonstrate proper infection control precautions and procedures during radiographic exposure and film developing.
18. Demonstrate proper documentation in the patient’s chart.

I. Radiographic Techniques for Children, Managing Patients with Special Needs, Supplemental Techniques
   1. Define relevant terms.
   2. Identify the factors that determine when radiographs on children should be made.
   3. Discuss the suggested techniques for pediatric radiography.
   4. Describe the film requirements for the pediatric survey, and the procedures for both bitewing and periapical radiographs on children.
   5. Compare and contrast the two methods used to localize objects in the jaws by applying the buccal-object rule.
   6. Explain the importance of making a radiographic survey of edentulous areas.
   7. Identify the film requirements and the three techniques for radiographing edentulous patients.
   8. Define key words used in patient education, evaluation, and management of special needs patients.
   9. Discuss factors that stimulate the gag reflex and ways to control it.
  10. Describe ways that psychogenic stimuli can be reduced in treating the apprehensive patient.
  11. Discuss procedures for management of the hearing and sight-impaired.

Laboratory objectives
  12. Demonstrate procedures to reduce the gag reflex.
  13. Demonstrate procedures for managing the wheelchair-bound patient.
J. Extra-oral Radiography
   1. Define key words used in extra-oral radiography
   2. Describe the purposes and uses of extra-oral films
   3. Identify the kinds of films used in extra-oral radiography
   4. Discuss the appropriate types of extra-oral projections for different treatment settings.
   5. Identify the factors affecting the quality of extra-oral films.
   6. Identify proper positioning for panoramic radiographs.
   7. Compare the advantages and disadvantages of a panoramic versus intra-oral film series.
   8. Discuss the differences between a conventional intra-oral and a panoramic x-ray machine.
   9. Identify factors that result in a faulty panoramic film.

Laboratory objectives
10. Expose two panoramic radiographic surveys to 78% competency using a Dexter skull.
11. Correctly process each film series.

K. Patient Radiographs (1 CMRS)
   1. Identify one patient who meets the requirements for complete radiographic examination.
   2. Identify anatomic landmarks, pathology, and dental restorations on two complete radiographic series.
   3. Explain the significance of the dental film series to the patient.

Laboratory objectives
4. Expose a complete radiographic series on two patients at 78% competency.
5. Process and correctly mount two complete radiographic series.

L. Student Learning Objectives for Critical Thinking
   1. The student will demonstrate the ability to identify the essential question, issue, and/or problem.
   2. The student will demonstrate the ability to gather data relevant to the essential question, issue, and/or problem.
   3. The student will demonstrate the ability to interpret appropriate data effectively.
   4. The student will demonstrate the ability to recognize and evaluate assumptions, major alternative points of view and related theories, principles, and ideas relevant to the question, issue, and/or problem.
   5. The student will demonstrate the ability to develop informed conclusions/solutions.
   6. The student will demonstrate the ability to articulate implications and consequences that emerge from the conclusions/solutions.
   7. The student will demonstrate the ability to communicate any or all parts of the above process in written or oral form.
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| August 31    | • Course Information Sheet  
                • Chapters 1, 2  
                • Library Tour | None                                      |
| September 7  | • Chapters 3 and 4                                                       | None                                     |
| September 14 | • **Test 1**  
                • Chapters 5, 6, and 16 | None                                     |
| September 21 | • **Test 2**  
                • Chapters 13 and 14 | • Introduction to Equipment  
                                   • BW on mannequin using XCP, Snappa-ray, and Bite Tabs |
| September 28 | • **Test 3**  
                • Chapters 15 and 17 | • BW Practical  
                                   • CMRS on mannequin w/ XCP |
| October 5    | • **Test 4**  
                • Chapters 7 and 8 | • 2 CMRS Practicals on mannequin  
                                       (Students 1-4) |
| October 12   | • **Test 5**  
                • Chapters 18, 19, and 20 | • 2 CMRS Practicals on mannequin  
                                       (Students 5-8) |
| October 19   | • **Test 6**  
                • Chapters 21 and 22 | • 2 CMRS Practicals on mannequin  
                                       (Students 9-12) |
| October 26   | • Chapters 23, 24, and 25 | • CMRS Practical on patient  
                                       (Students 1-4) |
| November 2   | • **Test 7**  
                • Chapters 10, 11, and 12 | • CMRS Practical on patient  
                                       (Students 5-8) |
| November 9   | • **Test 8**  
                • Chapters 26, 27, 28, and 9 | • CMRS Practical on patient  
                                       (Students 9-12) |
| November 16  | • **Test 9**  
                • Chapters 29 and 30 | • Digital CMRS on mannequin |
| November 23  | **THANKSGIVING**                                                          | 2 Occlusal Films  
                                   • Automatic Processor Cleaning  
                                   • Digital Pano  
                                   • Film Duplication  
                                   • Manual Developing  
                                   • Quality Control |
| November 30  | • **Test 10** | • MAKEUP AND CLEANUP |
| December 7   | • Comprehensive Final | None                                      |
REQUIRED TEXT AND MATERIALS:
- Pen & Pencil
- 11 Scantron© Sheets (Green- Form No. 882-E)
- Liability Insurance, Accident Insurance, and 3 Hepatitis Immunizations Before the Semester are Required.

GRADING CRITERIA:
- 10 Tests @ 6 % each 60%
- Final 10%
- Lab Practicals
  o Bitewings 5%
  o CMRS 5%
  o CMRS 5%
  o Patient CMRS 10%
  o Digital Radiographs 5%

* If absent from a test, the test must be made-up prior to the next class session or a zero will be given. There will be 5% deducted daily (school days) from your test grade until test is made up.

GRADING SCALE:
100- 93 → A
92- 86 → B
85- 78 → C
77- 0 → F

* Grades below C are unsatisfactory for advancement in the program. Each practical must be passed with a 78% or higher.

DEPARTMENT PARTICIPATION POLICY
It is the responsibility of the STUDENT, not the instructor, to arrange for make-up work. You must make arrangements to make up your work on the first day of your return to class. The make-up work must be completed as soon as possible.

"Class Participation in this course is MANDATORY. Students must maintain a class participation rate of 85% for all daily assignments, class discussions, unit tests, lecture and laboratory quizzes, class projects, and all other assignments, or face a grade of "F" at the end of the term.

It is the student's responsibility to "W" (withdraw) from the course when he/she feels they cannot meet the class participation standard. This withdrawal process will no longer be initiated by the Instructor.
Students must remain in constant contact with their Instructor to understand what their
class participation status is at any time during the term.

Students wishing to Withdraw must file a Schedule Change Form with the Admissions
Office.

ACCOMMODATIONS
If you have a documented disability which will make it difficult for you to carry out class
work as outlined and/or if you need special accommodations due to a disability, please
notify me or visit the Support Services Office within the first two weeks of the semester.
For more information, visit the Support Services Office in the Auxiliary Services Building
or contact (956) 364-4520 as soon as possible to make appropriate arrangements.

ANTI-TERRORISM POLICY
TSTC Harlingen faculty, staff, and students are asked to report all threats, perceived or
real, immediately to College Police located in the Auxiliary Building.
If the threat is imminent, the College Police emergency phone line at 364-4234 or 9-911
should be called. College Police will then coordinate the proper response in
accordance with state and federal laws and TSTC System/College rules and
regulations.

CHEATING
Any evidence of cheating or using the work of another as one's own, will result in
immediate dismissal from the class session, and from the program if verified.

COPYRIGHT STATEMENT
The materials used in the course (textbooks, handouts, media files (podcast, MP3,
Videos, RSS Feeds), and all instructional resources on the colleges Learning
Management System (Moodle) are intended for use only by students registered and
enrolled in this course, and are only to be used for instructional use, activities
associated with, and for the duration of the course. By "handouts," this means all
materials generated for this course, which includes but are not limited to syllabi,
quizzes, exams, lab problems, in-class materials, review sheets, and any additional
materials.

These materials may not be retained in another medium or disseminated further. They
are provided in compliance with the provisions of the Teach Act. These materials may
not be reproduced, displayed, modified or distributed without the express prior written
permission of the copyright holder or TSTC. For further information contact your
instructor.

E-MAIL POLICY
Student email sent to all TSTC faculty and staff offices must be received through the
official TSTC student email system (mymail.tstc.edu) to be acknowledged. Do not send
official email correspondence from any private email system. It is recommended that
students check their TSTC email inbox at least twice weekly for important college notices.

PROFESSIONALISM
The Dental Hygienist is an integral part of the dental team and is expected to value those behaviors that are considered part of professional demeanor. Courtesy to other classmates and to the instructors is expected at all times. This includes attentiveness to course work, effective time management, and attendance.

NOTE
The instructor reserves the right to make any changes to the Course Syllabus she perceives necessary to facilitate the delivery of the course material and student learning. Any changes will be provided in writing to the student.