Course Change Request

Indiana University
Port Wayne Campus

Check Appropriate Boxes: Undergraduate credit ☑  Graduate credit ☐  Professional credit ☐

1. School/Division: Health & Human Services/Dental Education

2. Academic Subject Code: DMYG

3. Current Course Number: H303

4. Current Credit Hours: 2.0

5. Current Title

6. Effective Semester/Year for changes listed below: Fall 2011

7. Instructor: B. Spaulding

8. Change course number to: ________________________________ (must be cleared with University Enrollment Services)

9. Current course title:

Change to:

Recommended abbreviation (optional)

10. Current credit hours fixed at: __________________________ or variable from: 1.0 to 2.0

Change to credit hours fixed at: __________________________ or variable from: 1.0 to 3.0

11. Current lecture contact hours fixed at: _________________ or variable from: __________ to __________

Change to lecture contact hours fixed at: _________________ or variable from: __________ to __________

12. Current non-lecture contact hours fixed at: _______________ or variable from: __________ to __________

Change to non-lecture contact hours fixed at: _______________ or variable from: __________ to __________

13. Is this course currently graded with S-F (only) grades? Yes ______ No ______

Change to S-F (only) grading? Yes ______ No ______

14. Does this course presently have variable title approval? Yes ______ No ______

Is variable title approval being requested? Yes ______ No ______

15. Is this course being discontinued? For all campuses ______ or for this campus only ______

16. Current course description

______________________________________________________________________________

Change course description to (not to exceed 50 words)

______________________________________________________________________________

17. Justification for change: Additional didactic instruction is needed to thoroughly cover new techniques.

(Use additional paper if necessary)

18. Are the necessary reading materials currently available in the appropriate library? Yes ______

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of this course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: __________________________

Department Chairman/Division Director

Date __________________________

Dean of Graduate School (when required)

Approved by: __________________________

Dean

Date __________________________

Chancellor/Vice-President

Date __________________________

University Enrollment Services

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 725 University Enrollment Services Final-White; Chancellor/Vice-President Blue; School/Division-Yellow;

Department/Division-Pink; University Enrollment Services Advance-White
College of Health and Human Services
Department of Dental Education
Dental Assisting Program

FALL 2011

Mrs. Brandy Spaulding
H303 RADIOLOGY
Mrs. Spaulding
Neff Hall, Suite 150 E
(260) 481-6837
Office Hours by Appointment

Credit Hours: 3
Lecture: Wednesdays 8:00-9:50 am (KT 118)
Lab: Wednesdays 12:30-5:00 pm (NF 166)

Lectures, labs, and clinical syllabi are subject to change at the instructor's discretion.

COURSE DESCRIPTION:
Principles associated with production of dental radiographs and manipulation of dental intraoral radiographic equipment. Students will rotate through the lab on Wednesday afternoons exposing radiographs on DXTTR mannequins, as well as mounting competencies.

COURSE OBJECTIVES:
Upon completion of this course, the student will be able to:
1. State the purpose and intent of dental radiology.
2. State and recognize the radiation hazards and precautions of dental radiation.
3. Apply the policies and procedures established at IPFW regarding ionizing radiation.
4. Differentiate the types of intraoral films used in dental radiology.
5. Correctly place films and film holders on DXTTRS.
6. Expose diagnostically acceptable films on DXTTRS.
8. Evaluate radiographs, determining which films would be considered diagnostic.
9. Identify the landmarks found in various types of films to assist in mounting radiographs.
10. Understand and interpret intraoral and extraoral radiographs.

TEACHING METHODS:
- powerpoint
- slides
- white board
- skulls
REQUIRED TEXTS:
- Spaulding, DHYG H303 Radiology Course Manual, 2011

There are Quiz Questions at the end of every chapter. You are strongly encouraged to review these questions.

CRITERIA FOR EVALUATION:
- 5 examinations and 1 slide exam on radiographic anatomy and interpretations
- 1 comprehensive examination (over entire semester)
- 5 FMX (full mouth series with horizontal or vertical BWX) on DXTTR
  **Each FMX is worth 140 points possible**
- Peer Proficiency practice (in clinic-practice filmholder placement on peer)
- Weekly film mounting check offs (checkoff = 2 minutes or less, to complete H303 class)
- Film processing practice on darkroom & processor using infection control procedures

EXAMINATIONS: are composed of multiple choice, matching, true & false questions. The comprehensive final examination date will be announced. Once the total number of course points has been derived a course grade will be assigned according to the following percentages:

<table>
<thead>
<tr>
<th>94-100</th>
<th>A</th>
</tr>
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<tbody>
<tr>
<td>88-93</td>
<td>B</td>
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<tr>
<td>80-87</td>
<td>C</td>
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<tr>
<td>75-79</td>
<td>D</td>
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<tr>
<td>below 75</td>
<td>F</td>
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</tbody>
</table>

and dismissal from the dental assisting program

| student late to class or lab | 2 points |
| student absent from class or lab | 5 points |

Your final grade will be determined after reviewing your tardiness or lack of attendance
Important! Read the following sections thoroughly:

Absence from Class:
If a student must miss a course session (clinic, laboratory, lecture, extramural experience, etc.) he/she must give the professor of the course notice prior to the course session/extramural experience to be missed. All examinations, practicals, and quizzes must be taken before the course meets again. Failure to do so will result in the student receiving a grade of zero for any/all examination/s, practical/s and/or quizzes scheduled for the missed course session. Students will not receive credit for unscheduled/bonus quizzes. The student must, however; schedule a time (convenient with the course professor) to make-up all missed course work. Students not completing all course work will receive an incomplete for that course. Students who miss a lecture must obtain missed lecture notes from a classmate.

Academic Dishonesty:
Professional, mature conduct is expected of all students. Any form of academic dishonesty is in direct conflict with professionalism and will result in an F grade for the course and dismissal from the program. Please see the IPFW student handbook for the university policy regarding academic dishonesty. Our program chooses the most stringent course of action regarding dishonesty = dismissal from the program. No exceptions. The healthcare profession follows strict codes of ethics and morals.

Professionalism:
The practice of dental assisting carries with it a high degree of responsibility. Exposing your patient to radiation is an excellent example of one of those responsibilities that demands unwavering ethical behavior. Professional, mature conduct is expected of all students. Refer to the professional behavior policy for additional information.

DISABILITIES STATEMENT: If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb Union, Room 113, telephone number 481-6658) as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at http://www.ipfw.edu/sss.
Preclinical Requirements:
Prior to receiving the opportunity to experience clinical radiology with patients in the spring semester, the following requirements must be met:

1. A satisfactory demonstration of developing procedures utilizing an automatic processor and manual processing (dip tanks). However, automatic processing will be emphasized.

2. A satisfactory demonstration of film mounting timed in two minutes or less on an adult FMX mount to complete the course and begin H305 Radiology Clinic. Students will practice mounting each week until a FMX is mounted accurately and mounted in two minutes or less.

3. The first full-mouth series will be a "group" series. Each group of 2 students will be required to do a complete series on DXTTR as a pass/fail grade.

   FMX #1 A maximum of 24 films will be exposed for the series (18 radiographs with 6 retakes)

   With your radiology textbook, your group will sit down at a viewbox and self-evaluate your radiographs using the blue evaluation form & chapter 20 exposure chapter. After self-evaluation the completed series will then be re-evaluated with one of the instructors to determine areas that need to be improved upon. After retake radiographs are completed, reevaluate any retakes that you replace in the FMX mount, turn in the diagnostic FMX mount, the non-diagnostic radiographs in the retake envelope, and the blue evaluation form paper clipped and turn in to your instructor's mailbox with the following information on all three: student name date turned in DXTTR number

4. Following the group DXTTR series, each individual student will then be responsible to take a second, third, fourth and fifth series on DXTTR with:

   FMX #2 & #3 a maximum of 22 films (18 radiographs and 4 retakes)
   FMX #4 & #5 a maximum of 20 films (18 radiographs and 2 retakes)

The grade attained for each FMX must be a minimum of 86%. If the FMX is not at the minimum (120/140 points), the student will be instructed to complete a remediation FMX to obtain a 86% competency. If you receive a grade of 119 or below, you are required to schedule x-ray unit 3 with Mrs Schory, the Dental Clinic Manager. Let your instructor know when you are scheduled and she will distribute film to you. All FMX's must be at 120 or higher. If students wish to practice independently to improve, please see your instructor for film after you make an appointment.
You must use each filmholder equally this semester. Follow the 5-5-4 rule. XCP 5 times, Stabe 5 time and Snap a ray 4 times. One the next full mouth alternate the filmholders in the rule. It is important to have as much experience with each filmholder as possible since you never know what will work best on your patients. Also use each filmholder in different areas of the mouth. This will allow you to see what works best in different areas of the mouth for you personally.

<table>
<thead>
<tr>
<th>FMX 1 group series</th>
<th>no more than 6 retakes</th>
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<tbody>
<tr>
<td>FMX 2 individual #1</td>
<td>no more than 4 retakes</td>
</tr>
<tr>
<td>FMX 3 individual #2</td>
<td>no more than 4 retakes</td>
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<tr>
<td>FMX 4 individual #3</td>
<td>no more than 2 retakes</td>
</tr>
<tr>
<td>FMX 5 individual #4</td>
<td>no more than 2 retakes</td>
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</tbody>
</table>

Guidelines for a Diagnostic Radiograph are:
1. clarity of film
2. density of film
3. correct contrast
4. no cone cuts
5. proper film placement
6. correct horizontal angulation
7. correct vertical angulation
8. a clear, non-scratched film
9. film processing
10. proper film mounting
11. correct student self-evaluation
12. no double exposure or film reversal

Radiation Hazards and Precautions:
Misuse of radiation may cause many harmful effects to the human body, ranging from erythema (reddening of the skin) to premature death. However, in a routine radiographic dental examination (16-18 films) the radiation received is very slight. In fact, the dental patient is exposed to less radiation during a dental exam than in the process of one chest exposure. Provided the following procedures are followed, there is no need for undue concern.

1. Each student will be issued a monthly radiation monitoring badge. The badge is to be worn on the student's uniform between the head and waist whenever they are in the clinic or radiology clinic. The monitoring badge will be kept in clinic A. Please obtain your radiology badge in the box marked with “dental assisting" or “first year hygiene" in the front of clinic A, by the clinic manager's office. Return your monitoring badge after lab.

FOR FALL SEMESTER: Failure to wear your radiology monitoring badge in radiology lab or not returning it to the box before you leave lab will result in a 5 point deduction per lab session toward your final grade score. For spring semester, the point deduction is much higher. Losing your radiology badge will result in a loss of 15 points per incident. You are
required to protect yourself and the badge will monitor this.

2. No one should ever hold a film in the patient's mouth. A filmholder must be used. Ask for help from your radiology professors if you are having difficulty.

3. The x-ray machine should be properly adjusted and calibrated. This is determined by various detecting methods and device. If you have a problem with exposure density or contrast, please tell an instructor immediately.

4. It is imperative that all patients be protected against radiation by use of the lead apron with thyroid collar at **ALL** times.

**Lab Attire:**
- complete uniform with clinic shoes
- gloves
- absolutely no jewelry
- clean, short nails, no polish
- hair pulled back away from face
- no gum
- Masks will be required when we work on patients. Optional during this semester

These subjects are discussed more completely in the clinic manual that you were given at Orientation. There is a 2 point deduction per incident in radiology lab. Come prepared when you walk into Neff 166 radiology lab.

**Peer Clinical Competency**~ the last radiology lab

COME EARLY TO RADIOLOGY LAB for your peer clinical competency and you should also get into your room early to complete your last FMX.

You will need the following for the last radiology lab:
~ safety glasses
~ need to wear mask, gloves, (disp. gown ~ optional, no aerosol)
~ sterile filmholders
~ you will bag your film holders and any borrowed for spring radiology clinics before you leave lab

When you have completed your FMX, self evaluate, obtain a instructor evaluation, take the two retake films, self evaluate again if necessary, and then turn in as usual.

As students get done, get into pairs, wash hands, set up a unit in clinic A with barriers: headrest, operator tray, light handles and light switch. Obtain sterile and disposable filmholders, 2 bite wing tabs, and 2 double-film packets, place sterile film holders on
operator tray, put on PPE, and begin practicing film placement clinical competencies with the three film holders and practice bitewings (1 film for periapical placement and 1 film for bitewing placement). Start as you would on DXTTR, 4 bitewing placements first, max right periapicals, etc... when you feel competent in placement and the patient tells you that you are not hurting them, then sign up for one of the instructors to come over to your station. We will call off a film placement area (ie. maxillary right premolar periapical, left molar bitewing, etc...) and determine if you have completed the competency.

After you have completed your competency, disinfect unit, rinse off filmholders and bag filmholders for sterilization.

You will need to bag your filmholders:

1 complete XCP anterior/posterior set, together in one bag (yellow and blue)
1 complete XCP anterior/posterior set, together in one bag (you will be short one blue anterior ring, you will use the red ring--same thing and add one red XCP BWX bar, and horizontal, type 2 BWX block)
snap-a-ray/EEZZEE grip separately

include on bag~ your full name, DAST and date (optional), place bags in bin for autoclaving

For the clinic filmholders that you borrow from, follow the same procedures, but write:
Staff on bag
### RADIOLOGY
#### LECTURE SCHEDULE

<p>| Date       | Time  | Topic                                                                 |
|------------|-------|                                                                     |
| August 24  | 8-10am| Course Introduction                                                  |
|            |       | Dental Radiographs &amp; the Dental Radiographer (chapter 11)           |
|            |       | Radiation History (chapter 1)                                        |
|            |       | Dental X-ray Equipment (chapters 2 &amp; 6)                             |
| August 24  | 1-5pm | Dental X-ray Film (chapter 7)                                        |
|            |       | Film Holders (chapter 6)                                             |
|            |       | Film Mounting &amp; Film Viewing (chapter 27)                           |
|            |       | Introduction to Radiographic Examinations (chapter 16)              |
|            |       | Bite-Wing Technique (chapter 19)                                     |
| August 31  |       | Paralleling Technique (chapter 17)                                   |
|            |       | Infection Control (chapter 15)                                       |
| September 7|       | Exam #1 (manual pgs &amp; corresponding textbook reading)               |
|            |       | Radiation Biology / Radiation Protection (chapters 2, 4, &amp; 5)       |
| September 14|      | Radiation Characteristics (chapter 3)                               |
|            |       | Dental X-ray Image Characteristics (chapter 8)                      |
|            |       | Radiation Physics (chapter 2)                                        |
| September 21|     | Exam #2 (manual pgs &amp; corresponding textbook reading)               |
|            |       | Exposure and Technique Errors (chapter 20)                          |
| September 28|      | Exposure and Technique Errors (chapter 20)                          |
| October 5  |       | Exam #3 (manual pgs &amp; corresponding textbook pages)                 |
|            |       | Patient Management &amp; Special Problems (chapter 25)                 |
| October 12 |       | X-ray film Processing &amp; Processing Errors (chapter 9)              |</p>
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>October 19</td>
<td>Exam #4 (manual pgs &amp; corresponding textbook pages)</td>
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<tr>
<td></td>
<td>X-ray film Processing &amp; Processing Errors (chapter 9)</td>
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<tr>
<td>October 26</td>
<td>Radiology Anatomy (chapter 26)</td>
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<tr>
<td></td>
<td>Bring Skulls</td>
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<tr>
<td>November 2</td>
<td>Exam #5 (manual pgs &amp; corresponding textbook pages)</td>
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<tr>
<td></td>
<td>Radiology Anatomy (chapter 26) continued</td>
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<td></td>
<td>Bring Skulls</td>
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<tr>
<td>November 9</td>
<td>Radiographic Interpretations</td>
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<tr>
<td>November 16</td>
<td>Radiographic Interpretations</td>
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<td></td>
<td>Note to Students: complete patient education manual pages</td>
</tr>
<tr>
<td></td>
<td>with Chapter 13 before 10/28</td>
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<tr>
<td>November 23</td>
<td>Classes Suspended - Thanksgiving Break</td>
</tr>
<tr>
<td>November 30</td>
<td>Exam #6 Anatomy Slide Exam (manual pgs &amp; corresponding textbook pages)</td>
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<tr>
<td></td>
<td>Patient Education (Chapter 13)</td>
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<td></td>
<td>Bring completed patient education manual pages for class discussion</td>
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<tr>
<td>December 7</td>
<td>Discuss DHYG H305 Radiology Clinic I requirements &amp; Final Examination Review</td>
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<tr>
<td>Week of Dec 12-16</td>
<td>Comprehensive Final Examination TBA</td>
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<td>DATE</td>
<td>ACTIVITY</td>
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<tr>
<td>August 24 (1:00-5:20 pm)</td>
<td>ALL STUDENTS MEET FOR LECTURE (Room WALB G21)</td>
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<tr>
<td>August 31</td>
<td>DXTTR Group FMX #1 (w/ 4 horiz. BWX) (paralleling w/ all three film holders)</td>
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<tr>
<td>September 7</td>
<td>DXTTR Group FMX #1 (paralleling w/ all three film holders)</td>
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<tr>
<td>September 14</td>
<td>DXTTR GROUP FMX #1 DUE AT THE END OF CLASS</td>
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<tr>
<td>September 21**</td>
<td>DXTTR Individual FMX #2 (w/ 4 horiz. BWX) (paralleling w/ all three film holders)</td>
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<tr>
<td>September 28</td>
<td>DXTTR Individual FMX #2 (paralleling w/ all three film holders)</td>
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<tr>
<td>October 5</td>
<td>INDIVIDUAL FMX #2 DUE AT THE END OF CLASS</td>
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<tr>
<td>October 12**</td>
<td>DXTTR Individual FMX #3 (w/ 4 vertical BWX) (paralleling w/ all three film holders)</td>
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<tr>
<td>October 19</td>
<td>DXTTR Individual FMX #3 (paralleling w/ all three film holders)</td>
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<tr>
<td>October 26</td>
<td>INDIVIDUAL FMX #3 DUE AT THE END OF CLASS</td>
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<tr>
<td>November 2**</td>
<td>DXTTR Individual FMX #4 (w/ horiz. BWX) (paralleling w/ all three film holders)</td>
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<tr>
<td>November 9</td>
<td>INDIVIDUAL FMX #4 DUE AT THE END OF CLASS</td>
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<tr>
<td>November 16**</td>
<td>DXTTR Individual FMX #5 (w/ 4 horiz. BWX - 2 film packets) (paralleling w/ all three film holders)</td>
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<tr>
<td>Date</td>
<td>Description</td>
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<td>--------------</td>
<td>------------------------------------------------------------------------------</td>
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<tr>
<td>November 23</td>
<td>Classes Suspended- Thanksgiving Break</td>
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<tr>
<td>November 30</td>
<td>INDIVIDUAL FMX #5 DUE AT THE END OF CLASS</td>
</tr>
<tr>
<td>December 7**</td>
<td>Peer Proficiency Practice with sterile film holders in Clinic A**</td>
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<td></td>
<td>** see instructions in this manual</td>
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</tbody>
</table>

**students rotate to new lab time**

**Laboratory Rules**
Each student is **required to use all three filmholders** to become competent in radiology. If a student fails to use all three film holders equally, then the student will receive a **20 point deduction** per incident that will be averaged into the final grade. The instructors know which filmholders were used by looking at the processed films. This is for your benefit that you are competent with all three filmholders. You never know which of the three you will use in the spring semester in patients and in offices. In the spring semester with patients, you may choose whichever filmholders you like. Your choice.

You will practice film mounting every week. After you have mounted the films, see one of the instructors to verify accuracy. After you have demonstrated accuracy, then you will work on speed. You will need to mount a FMX in two minutes or less with no errors to complete H303 and start H305. When you are ready to be checked off, see an instructor for a FMX. They will choose the FMX to be used for your checkoff,
INSTRUCTIONAL OBJECTIVES

Upon completion of this course, the student should be able to:

radiology history, radiation protection, radiation biology, patient safety:
1. discuss the major events in the development of dental radiology.
2. identify major contributors and researchers in radiation development and technology.
3. trace the progress of radiography and identify their contributions.
4. list the uses of dental radiographs.
5. define the uses of dental radiographs.
6. define the term: radiation biology.
7. define the mechanisms of radiation injury.
8. explain the following terms: ionization, free radical formation, and latent period.
9. identify the cells that are most sensitive to radiation.
10. differentiate short-term (acute) and long-term (chronic) in regards to radiation exposure.
11. identify the somatic and genetic effects of radiation.
12. define the ALARA principle & what does this principle mean?
13. identify the two current systems of radiation measurement and define the terms: Roentgen, RAD, REM, Gy, and Sv.
14. calculate the traditional and international systems if given a number (e.g. 1 Gy = 100 rads).
15. explain background radiation and give examples of natural, artificial, and other kinds.
16. identify the risk estimates of radiation on organs, such as; thyroid gland, bone marrow, skin, and eyes.
17. explain the patient exposure and dose of radiation when different areas have been changed (e.g. film speed, collimation, technique, and exposure factors).
18. differentiate between risk versus benefit in regards to exposing patients to dental radiographs.
19. identify proper equipment and techniques when exposing radiation to a patient (e.g. filtration, collimation, position indicating device, lead apron with thyroid collar, fast film, film-holding device, exposure factor selection, and proper technique).
20. identify the proper techniques after exposing the patient (e.g. proper film handling and proper film processing).
21. discuss the proper operator protection guidelines; distance, position and shielding recommendations.
22. discuss radiation monitoring, including; equipment and personnel monitoring.
23. describe the federal radiation exposure guidelines and for the state of Indiana (ISDH).
24. define the following terms; MPD and MAD.
25. define the following terms; primary beam/primary radiation, central ray, useful
beam/useful radiation and secondary/scatter radiation.
26. list the various parts of the intraoral x-ray machine.

*film types, film holders, patient preparation & guidelines:*
27. list and define the composition of x-ray film.
28. identify and differentiate the various sizes of intraoral film.
29. discuss the film speed sensitivity and its purpose.
30. discuss the film speeds used in dentistry.
31. discuss the storage of film and protection of film in a dental office.
32. identify and differentiate the various film holders.
33. define the following terms; radiolucent, radiopaque, density, contrast, sharpness and magnification.
34. identify the factors that influence the terms just mentioned above.
35. describe the various types of intraoral radiographic procedures available and differentiate between them.
36. describe the primary preparation for intraoral radiography.
37. define the following key terms; long axis of the tooth, parallel, perpendicular, midline, and occlusal plane.
38. identify the points of entry located on the face for maxillary and mandibular arches that are used for intraoral radiography.
39. define the following terms; vertical and horizontal.

*paralleling technique, bite-wing technique:*
40. define the paralleling technique.
41. identify the advantages and disadvantages of the parallel technique.
42. define the bisecting technique.
43. identify the advantages and disadvantages of the bisecting technique.
44. define the bite-wing technique and explain the purpose of this technique.
45. discuss shadowcasting principles to the imaging of oral structures.
46. identify the film mounting process and understand the basic concepts of film mounting.

*patient management, working with medically compromised patients:*
47. discuss patient management problems due to oral anatomical constraints and various ways to manipulate the radiographic technique.
48. understand and utilize the various techniques when working with patient management problems.
49. identify the various methods to be utilized when working with patients that are physically or mentally disabled.
50. discuss management techniques that can be used with phobic or apprehensive dental radiography patients.
infection control:
51. describe the rationale for infection control.
52. discuss protective attire and barrier techniques used in radiography.
53. detail infection control procedures necessary prior to x-ray exposure.
54. detail infection control procedures necessary during x-ray exposure.
55. detail infection control procedures necessary after x-ray exposure.

darkroom manual processing, automatic processing, exposure technique errors:
56. discuss film handling in the darkroom with a film processor or with manual processing method.
57. identify and resolve the following film exposure errors; unexposed film, film exposed to light, overexposed film, and underexposed film.
58. identify and resolve the following faulty radiographs during exposure; incorrect positioning of the film, dropped film corner, incorrect positioning of the tubehead or PID, incorrect horizontal angulation, incorrect vertical angulation, blurred radiograph, double image, superimposed image, cone-cut without filmholder, cone-cut with film holder, interproximal overlap, film bending, film creasing, and reversed film.
59. identify the fundamentals of film processing for processors.
60. identify the fundamentals of film processing for manual processing.
61. discuss the location, size, lighting, and equipment requirements necessary for the darkroom.
62. discuss safelighting.
63. discuss the parts of the processing tank.
64. describe the care and maintenance of the processing solutions, equipment, and equipment accessories used in manual film processing.
65. list and identify the component parts of the automatic film processor.
66. describe the care and maintenance of the processing solutions and equipment of the film processor.
67. discuss the advantages of automatic film processing.
68. describe the film duplicating technique and the many purposes of duplicating film.
69. identify and resolve the faulty radiographs during processing; failure to follow the suggested time-temperature cycle (underdeveloped and overdeveloped), reticulation of emulsion, chemical contamination (developer spots, fixer spots, yellow-brown stains), air bubbles, developer cutoff, fixer cut-off, overlapped films, scratched emulsion, fingerprint artifact, static electricity, light leak, and fogged film.

radiation physics:
70. define electromagnetic radiation.
71. define the particle concept.
72. define the wave concept.
73. list and describe the components of the x-ray tube and its main components.
74. describe in detail how dental x-rays are produced.
75. define thermionic emission.
76. describe the effect that the kilovoltage peak has on the quality of the x-ray beam.
77. describe how milliamperage influences the quantity of the x-ray beam.
78. identify the range of kilovoltage and milliamperage required for dental radiography.
79. describe how increasing and decreasing exposure factors affects the density and contrast of the film.
80. state the rules governing kilovoltage, milliamperage, distance and exposure time that are used when changing exposure variables.
81. describe how kilovoltage, milliamperage, exposure time, and source-to-film distance influences the intensity of the x-ray beam.
82. calculate an example of radiation intensity using the Inverse Square Law.

**radiographic anatomy:**
83. define the general terms that describe prominences, spaces, and depressions in bone.
84. identify and describe the normal anatomic landmarks of the maxilla on a human skull and then on radiographs.
85. identify and describe the normal anatomic landmarks of the mandible on a human skull and then on radiographs.
86. identify and describe the radiographic appearance of tooth anatomy.
87. identify each normal radiographic landmark of the maxilla and mandible as either radiolucent or radiopaque.
88. identify each normal radiographic landmark of a tooth as radiolucent or radiopaque.

**quality assurance, radiographic interpretations:**
89. Discuss the quality assurance procedures required in radiography in a dental office.
90. Describe dental caries.
91. Explain why caries appears radiolucent on a dental radiograph.
92. Detail the radiographic classifications of caries.
93. Identify and describe the radiographic appearance of the following: incipient, moderate, and severe occlusal caries.
94. Identify and describe the radiographic appearance of the following: buccal, lingual, root surface, recurrent, and rampant caries.
95. Describe the healthy periodontium.
96. Briefly describe periodontal disease.
97. Discuss the importance of the clinical and radiographic examinations in the diagnosis of periodontal disease.
98. Describe the limitations of radiographs in the detection of periodontal disease.
99. Describe the types of radiographs that should be used to document periodontal disease and the preferred exposure technique.
100. State the difference between localized and generalized bone loss.
101. State the difference between mild, moderate, and severe bone loss.
102. List two predisposing factors for periodontal disease.
103. Recognize and describe the radiographic appearance of calculus.
104. Describe and identify the radiographic appearance of a crown, root and jaw fractures.
105. Describe and identify the radiographic appearance of an avulsion.
106. Describe and identify the radiographic appearance of internal and external resorption.
107. Describe and identify the radiographic appearance of pulpal sclerosis, pulpal obliteration, and pulp stones.
108. Describe and identify the radiographic appearance of a periapical granuloma, cyst, and abscess.
109. Describe and identify the radiographic appearance of condensing osteitis, sclerotic bone, and hypercementosis.
110. Identify amalgam, composite and various restorations radiographically.