CAMOSUN COLLEGE
School of Health & Human Services
Dental Programs

DHYG 231 Dental Radiology
Winter 2018

COURSE OUTLINE

The Approved Course Description is available on the web @ http://camosun.ca/learn/school/health-human-services/student-info/archives/index.html?p=DHYG+%28Dental+Hygiene%29

✞ *Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records.*

1. Instructor Information

(a) Instructor	Bev Jackson		
(b) Office hours	By Appointment		
(c) Location	D004		
(d) Phone	(250) 370-3507	**Alternative:**	250 915-5636
(e) E-mail	jacksonb@camosun.bc.ca		

2. Course Content and Schedule

a. Course Description
This course examines the basic principles of x-ray generation, radiation biology and the uses of x-radiation in dentistry. Principles of paralleling and bisecting techniques are taught along with radiation safety and protection in order to provide a safe environment and to produce optimum radiographic images for interpretation. Legal and ethical issues, concepts related to application of advanced radiographic and imaging techniques as well as techniques for clients with special needs are discussed. Learners are also introduced to radiographic interpretation.

b. i) Pre-requisites: DHYG 219, DHYG 220, DHYG 270 and DHYG 271
ii) Co-requisites: DHYG 280 and DHYG 281
iii) Pre or Co-requisites: BIOL 260, DHYG 221 and DHYG 222

c. Course Particulars
i) Credits: number of credits (3.0)
ii) Components: Class Hours: 2.5 hours per week / Out of class: approximately 2.5 hours.
iii) Is the course available by distance education? No
iv) Is prior learning available for this course? No

***Activities**: include lecture and discussion of course outcomes and of equipment used for radiography (holders, PID, anode/cathode tube, etc.). Students will also identify structures and components using diagrams and slides in class. Review questions are provided for each concept to ensure comprehension and integration of knowledge. The assignment involves students preparation of a short presentation of a radiography related concept to peers.*

A weekly schedule of classes will be posted on D2L. In order to get the most out of class, students are expected to be prepared by reading text chapters and completing any preparation as discussed in class for subsequent classes.

3. Required Materials

1. Text:
   Iannucci J.M., Howerton L. (2017). *Dental radiography: principles and techniques* (5th Ed.). St. Louis Missouri. Elsevier. (ISBN – 978-0-323-29742-4)

4. Intended Learning Outcomes

Learning Outcomes Course: DHYG 231 Dental Radiology	***Program (Global) Outcomes***
By the end of this course you will know and be able to: *1. Discuss fundamental principles of radiology* *2. Demostrate an understanding of the basic principles of radiation biology and the uses of x-radiation in dentistry to maintain and provide a safe environment and to produce optimum radiographic images.* *3. Examine legal and ethical issues related to oral radiography in relation to dental hygiene practice.* *4. Use systematic methods for interpreting radiographs.* *5. Describe concepts, principles and applications of advanced radiography techniques and radiographic imaging.* *6. Describe adaptations or modifications to oral radiography techniques required for successful imaging for clients with special needs.*	*A. Function as a professional dental hygienist.* *B. Communicate and collaborate effectively with individuals, family, community and interdisciplinary teams.* *C. Demonstrate critical thinking and use evidence based decision-making to provide optimal dental hygiene services to individuals, families and community.* *D. Advocate improving oral health and access to oral health services for individuals, families and community.* *E. Coordinate and contribute to the effective management of the practice environment to ensure quality care and services.* *F. Function as a competent clinician using the dental hygiene process of care.* *G. Educate individuals, families and community about oral health including its relationship to general health.* *H. Apply health promotion principles to improve the health of individuals, families and community.*

5. Course Elements

1. Discuss fundamental principles of radiology.

- **Describe the history of x-radiation and radiography**

- describe briefly the history of x-radiation and radiography identifying the discovery of x-rays and improvements in techniques to date

- **Discuss the concepts of radiation physics and generation of x-radiation**

- describe the physics of radiation in terms such as atomic structure as it pertains to the production of x-radiation
- define ionizing radiation and the concept of ionization
- explain the relationship between x-radiation and other sources of electromagnetic radiation using the electromagnetic spectrum
- describe characteristics of short and long wave x-rays, specifically those of x-radiation
- describe the generation of x-radiation including electrical terms and equipment required for production
- describe in detail the x-ray tube, its' components, and their functions
- describe conditions that must exist for the production of x-radiation and explain, in a simplified manner, how x-radiation is produced
- name and describe the two ways in which x-rays are produced; Bremsstrahlung and Characteristic
- explain the effect of increased and decreased kilovoltage (kV), milliamperage (mA) and time (s) on the quality and quantity of x-radiation produced
- describe ways in which x-rays interact with matter including the Photoelectric effect, Compton scatter and Unmodified (Coherent) scatter

- **Discuss radiographic imaging including film, technique, distance factors, film processing and quality assurance**

- describe traditional radiographic film composition including the sensitivity of film emulsion (film speed)
- describe the concept of latent image
- discuss the storage and handling of radiographic film
- identify various types and sizes of intra-oral film and packaging
- describe characteristics of periapical and bitewing radiographs and discuss uses for each in dentistry
- describe rationale and methodology for the paralleling technique
- describe rationale and methodology for the bitewing technique
- describe principles, indications and limitations of bisecting the angle technique
- compare shadow casting principles relative to quality of image characteristics for these two radiographic techniques (paralleling and bisecting)
- define density, contrast and detail(definition) and describe imaging factors affecting each
- discuss terms used to describe quality of radiographic images (umbra, penumbra, magnification, etc.)
- discuss and apply the concepts of the inverse square law

- relate the quantity and quality of x-radiation produced by increased and decreased kV, mA and time to film quality
- describe film processing identifying chemical reactions that occur on film during the various steps
- describe the composition and care of solutions used for automatic processing
- discuss requirements and quality control for the darkroom
- describe and identify causes for processing errors on finished radiographs

2. Demonstrate an understanding of the basic principles of radiation biology and the uses of x-radiation to maintain and provide a safe environment and to produce optimum radiographic images.

- differentiate between background and man-made radiation
- describe direct and indirect theories of biological effects of radiation
- define radiation biology and discuss the potentially harmful effect of any exposure to radiation including factors that influence the body's response
- discuss the cellular response to radiation including genetic, somatic and carcinogenic
- discuss the radio-sensitivity of various cells and tissues
- describe the effects of radiation therapy on oral tissues

➢ **Use of x-rays in dentistry**

- briefly define exposure, dose and dose equivalence using SI units and traditional units of radiation measurement
- discuss the amounts of radiation used in dental radiography
- discuss the need for radiation protection standards for the public and operators of x-radiation equipment
- define primary beam, secondary radiation, scatter radiation and leakage radiation
- relate the characteristics of x-rays to their use in dentistry
- describe the risks and benefits of dental radiographs
- discuss the ALARA concept and describe ways of applying the concept to reduce radiation exposure to the dental client
- discuss ways dental office personnel can protect themselves from x-radiation
- discuss quality assurance mechanisms as a part of radiation protection

3. Examine legal and ethical issues related to oral radiography in relation to dental hygiene practice.

- describe the main legal and ethical issues related to dental radiography
- briefly describe how radiographs are used during the assessment, planning, implementation and evaluation phases of preventive dental care
- identify rationale to determine the need for radiographs
- explain "informed consent" as it relates to oral radiographs and describes issues related to informed consent
- define the client's and dentist's ownership rights of radiographic records
- describe the use of radiographs in forensic dentistry

- **Describe infection control in radiography**

- discuss the importance of having infection control guidelines for radiography procedures in the dental office
- discuss barriers vs. surface disinfection using the various film/sensor holders and equipment
- describe infection control protocols for handling films/sensors during all steps of exposure and image uptake or processing

4. Use systematic methods for interpreting radiographs.

- **Sort and mount radiographs while identifying anatomical structures and landmarks**

- describe preservation of radiographs and purposes of mounting
- describe types of film mounts including their advantages and disadvantages
- discuss handling of processed radiographs and correct mounting procedures
- discuss the purpose of radiographic viewers
- describe the terms radiopaque and radiolucent and apply these terms to structures on dental radiographs
- identify normal soft and hard tissues and structures on a full mouth set of radiographs differentiating between mandibular and maxillary anatomy
- describe radiographically, normal variations to anatomic landmarks including foramina, sinuses, trabecular patterns, etc.

- **Interpret dental radiographic images**

- define and differentiate between "diagnosis" and "interpretation" as they pertain to dental radiographs.
- discuss a systematic method for interpreting radiographs.
- given a full-mouth set of radiographs, systematically review the films, interpreting all normal images and identifying the presence of abnormalities including artifacts and processing errors.
- describe and apply correct descriptive terminology in interpreting radiographs
- describe how to use the problem-solving process to distinguish normal from abnormal conditions.
- describe the radiographic appearance of common anatomic variations that mimic pathology
- recall (from DHYG 122) the radiographic appearance of primary tooth root resorption and incompletely formed apices

- **Describe and interpret the radiographic appearance of dental restorations and dental restorative materials**

- list dental materials that appear either radiopaque or radiolucent
- identify radiographically, dental restorations and materials as accurately as possible.
- discuss benefits and limitations of radiographs for obtaining specific restorative details

5. Describe concepts, principles and applications of advanced radiography techniques and radiographic imaging

➢ **Discuss digital intra-oral radiography techniques**

- describe radiographic imaging using digital technology
- differentiate between the two types of intra oral technology (PSP and CCD 'sensor')
- discuss how a computer stores the radiographic images
- describe traditional techniques that are the same as or different in regard to positioning digital film devices

➢ **Discuss specialized intra-oral radiographic techniques**

- describe the techniques, indications and limitations of occlusal radiographs
- describe radiographic techniques used for endodontics
- describe methods used to localize abnormal radiographic findings, including the 'Buccal Object Rule'
- describe the disto-molar technique for taking radiographs on third molar

➢ **Discuss extra-oral radiography, specifically panoramic imaging**

- describe cassettes and film used for extra-oral radiographs
- discuss the methods used for extra-oral radiographic digital imaging
- describe uses of extra-oral radiographs in dentistry
- differentiate the techniques of traditional film and digital panoramic imaging
- describe the principles, indications and limitations of panoramic radiographs.
- describe the purpose and technique of lateral jaw radiographs, cephalometric radiographs and temporomandibular joint radiographs

➢ **Discuss alternate imaging modalities as they are used in dentistry**

- discuss reasons for the development of alternate imaging techniques other than conventional radiography
- describe and discuss the use of the following techniques as they are used in dentistry; contrast media (angiography, sialography, etc.) computerized tomography, subtraction techniques, ultrasound, magnetic resonance imaging and positron emission tomography (nuclear medicine)

6. Describe adaptations or modifications to oral radiography techniques required for successful imaging for clients with special needs.

- describe radiographic techniques for edentulous clients
- describe modifications to radiographic techniques for children
- describe modifications to radiographic techniques that may be required for clients with special medical, physical or intra-oral needs

6. Basis of Student Assessment

a. Assignment 10%
b. Term test #1 25%
c. Term test #2 30%
d. Final exam 35%

7. Grading System

[X] Standard Grading System (GPA)

[ ] Competency Based Grading System

A. GRADING SYSTEMS *http://camosun.ca/learn/calendar/current/pdf/academic-policies.pdf*

The following two grading systems are used at Camosun College

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	**B-**	**Passing grade for DHYG courses**	4
65-69	C+	Minimum level has not been achieved.	3
60-64	C		2
50-59	D		1
0-49	F		0

8. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College Calendar, Student Services or the College web site at http://www.camosun.bc.ca
Also, refer to the resources for learning section of the DHYG student handbook.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section. Additional information regarding the dental hygiene program is in the student handbook.
http://camosun.ca/learn/calendar/current/pdf/academic-policies.pdf