CAMOSUN COLLEGE
School of Health & Human Services
Department: Allied Health & Technologies
Medical Radiography

Camosun.ca/hhs-handbook

MRAD 159 Principles of Radiographic Imaging 2
Winter 2021

COURSE OUTLINE

The course description is available on the web:
http://camosun.ca/learn/calendar/current/web/mrad.html#MRAD159

✷ *Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.*

1. Instructor Information

(a) Instructor	Linda Johnson	
(b) Office hours	Mondays 1530-1630 or by appointment	
(c) Location	Various	
(d) Phone	778-977-2580 (cell)	Click or tap here to enter text.
(e) E-mail	JohnsonL@camosun.bc.ca	
(f) Website		

2. Course Description & Intended Learning Outcomes

In this advanced-beginner course, students build on their knowledge of how to operate radiographic and accessory imaging equipment. Students explore fluoroscopy, mammography, mobile radiography, as well as intra-operative equipment. Students focus on the digital imaging process and digital archiving principles as they apply to a variety of radiographic imaging modalities. In the lab component of this course, students execute quality control tests and apply tolerance standards as outlined in federal safety codes to assess equipment performance.

Upon successful completion of this course a student will be able to:

a) describe the evolution, function, and importance of x-ray tubes used in a variety of medical imaging procedures.
b) explain how diagnostic images are produced by describing the components and function of computed radiography, digital radiography, fluoroscopy, mobile radiography, mammography, and C-arms.
c) describe how digital imaging principles and techniques are used in the performance of medical radiography.
d) describe the use of digital archiving principles in the management of imaging data within a variety of workplace settings.
e) apply the principles of quality control and quality assurance to review and analyze radiographic images for accuracy and quality.

3. Required Materials

Bushong, S.C. (2017). Radiologic Science for Technologists: Physics, Biology, and Protection (11th ed.). Elsevier Health Sciences.

Fauber, T. (2017). Radiographic Imaging & Exposure (5th ed.). Elsevier Health Sciences.

4. Course Content and Schedule

Monday Lecture (Synchronous) 1 x 50 minutes
Tuesday/Thursday Pre-lab (Synchronous) 2 x 50 minutes
Tuesday/Thursday Lab (Asynchronous) 50 minutes (per group)

Week	Date	Lecture 1	Seminar (Asynchronous)	Date	Pre-lab	Lab (Asynchronous)	Additional Reading, Tasks, Assessments
	2021	*Mondays*	*Due Sunday*	*2021*	*Tuesdays (C/D) Thursdays (A/B)*	*Assignments Due Wed 12pm (C/D); Fri 12pm (A/B)*	
1	Jan 11	Course Introduction and explanation of assignments	None this week *if needed, use this time to select RFP group and seminar partner/schedule	Jan 12/14	Module 1 MRAD 119 Review	MRAD 119 Review readings & activities	Group Response to RFP announcement (vendor and x-ray system)
2	Jan 18	Module 2 Digital radiography and image processing	Instructor-led seminar	Jan 19/21	Pre-lab 1	QC Lab 1	Mock article quiz
3	Jan 25	Module 3 Information literacy Camosun Library research activity *reminder about library resources and to schedule library help if needed	None this week *use this time to review Camosun's APA LibGuide and MRAD LibGuide	Jan 26/28	Guidelines for creating multiple choice questions for seminar quiz	Work on seminar assignment	Article selection – synopsis and APA reference
4	Feb 1	Module 4 Comparison of digital radiographic systems *explain RFP comparison chart	Continue working on seminar assignment Start building resources for RFP project	Feb 2/4	Pre-lab 2	QC Lab 2	RFP vendor comparison chart – technical specs
5	Feb 8	Module 5 Image quality, post-processing, and artifacts	Student-led seminar 1	Feb 9/11	Pre-lab 3	QC Lab 3	RFP vendor comparison chart – post-processing and technical support Seminar presentations begin - Article quiz 1
6	Feb 15	Reading Break		Feb 16/18	Reading Break		
7	Feb 22	Module 6 PACS and imaging informatics	Student-led seminar 2	Feb 23/25	Pre-lab 4	QC Lab 4	Article quiz 2
8	Mar 1	RFP project check in *Propose ideas to present live	Schedule time to meet with RFP group and gather resources	Mar 2/4	Pre-lab 5	QC Lab 5	RFP resource list Article quiz 3

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		online and determine order of presentations	Student-led seminar 3				
9	Mar 8	Module 7 Digital fluoroscopy	Student-led seminar 4	Mar 9/11	Pre-lab 6	QC Lab 6	Article quiz 4
10	Mar 15	Module 8 Mobile Radiography	Student-led seminar 5	Mar 16/18	Pre-lab 7	QC Lab 7	Article quiz 5
11	Mar 22	Module 9 Digital mammography & BMD	Student-led seminar 6	Mar 23/25	Pre-lab 8	QC Lab 8	Article quiz 6
12	Mar 29	Module 10 Radiation safety and protection	Student-led seminar 7	Mar 30/Apr 2	Study help for QC final test	None this week	Article quiz 7 RFP vendor comparison chart – safety features
13	Apr 5	College Closed (stat holiday)	None this week	Apr 6/8	QC final test	None this week	QC final test
14	Apr 12	RFP presentations *class will run late this day to accommodate all presentations		Apr 13/15	Reflection Look at CAMRT competencies from MRAD 159 and discuss CAMRT exam prep Course Evaluation		Final RFP submissions
15	Apr 19	Final Examination Period (no final exam for this course					

*Camosun College Important Dates: http://camosun.ca/events/important-dates.html?y=2021

5. Basis of Student Assessment (Weighting)

Seminar Presentation	20%
Seminar Quizzes (7)	10%
QC Labs (8)	10%
QC Test	30%
RFP Group Project	30%

Seminar

Students will host a virtual seminar (in pairs) on a relevant topic. Students are encouraged to access a library session in the third week of class so that they can finalize their topic selection and identify relevant literature. By the end of the session, the pair will select an article to feature in their seminar and submit for approval by the instructor. Once the article has been approved, the pair will be asked to summarize key findings and develop 5 simple multiple choice questions based on the article content.

Learning Objectives

1 Ensure safe and effective operation of medical imaging equipment in the clinical setting (including radiography, fluoroscopy, mammography, and/or bone densitometry) (D.1.2)
2 Compare and contrast a variety of medical imaging equipment in terms of components, performance, applications, etc. (D.1.2)
3 Discuss emerging technologies in the radiologic technology field (A.2.16)
4 Discuss best practices and intended use of new technologies (A.2.16)
5 Discuss strategies for minimizing radiation dose in the clinical setting (C.3.1-3.5)
6 Discuss issues/implications/challenges with use of technology across clinical settings (A.2.16)

Seminar Quizzes

The quizzes will be based primarily on the seminar articles. The instructor will post a list of the articles on D2L so that everyone in the class can read the article before each seminar.
The 5 multiple choice questions created by the presenters may be used in the quiz, subject to instructor editing/feedback. The instructor will create approximately 5 additional questions. The instructor may draw from prior program or course content, depending on the relevance to the seminar topic. The quizzes will be available online, may be attempted One (1) time and for a 10-minute window only.

QC Labs and Test

Students are responsible for participating in QC labs throughout the term and submitting their completed work to D2L. Students will receive credit for participating in each lab. Near the end of the course, there will be a written test on the content covered in the labs, which may draw from lecture material, lab exercises, and/or assigned readings.

Learning Objectives

7 Describe the purpose of the federal Safety Code for medical x-ray equipment and list the facility personnel roles and responsibilities (A.1.2, C.3.6)
8 Describe the typical quality control (QC)-related duties of a Radiologic Technologist (A.7.2)
9 Explain the functions of the: kVp selector, mA selector, timer, AEC, and back-up timer (D.1.2, D.2.1-2.2)
10 Explain the terms linearity, reproducibility, and reciprocity as they relate to radiation output of the x-ray tube
11 Execute a variety of QC procedures in the laboratory setting (e.g. accuracy of tube loading factors, AEC, adequacy of x-ray beam filtration, beam limiting device, etc.) (A.7.2, D.1.2, D.3.1)
12 List the materials used in the construction of the computed radiography (CR) imaging plates (IPs) (D.1.2)
13 Describe the proper care and usage of CR IPs and the CR reader as per the manufacturer's guidelines (D.2.1)
14 Identify IPs that would no longer be suitable for clinical use due to damage or wear (C.5.1, D.3.1)
15 Describe the components of digital radiographic flat panel detectors (FPDs) (D.1.2)
16 Describe the proper care and usage of FPDs as per the manufacturer's guidelines (D.2.1)
17 Describe the relationship between pixel, matrix, and FOV size and how these affect digital image quality (D.4.1)
18 Define the following terms as they pertain to digital radiography: dynamic range, response function, exposure indicator (EI), noise, uniformity, and residual image (D.4.1)
19 Explain how the digital imaging system determines the EI value and describe factors that affect the EI value (D.1.3, D.2.1-2.2, D.2.5, D.4.1)
20 Describe factors that affect spatial resolution and contrast resolution of a radiographic image (D.2.5, D.4.1)
21 Describe the quality control procedures used to assess the performance of digital radiographic equipment and image quality (e.g. spatial resolution, contrast detectability, EI accuracy and reproducibility, noise, uniformity, etc.) (A.7.2, D.2.7, D.3.1, D.4.1)
22 Recognize the artifacts associated with digital imaging systems and describe how to minimize/avoid them (C.5.1, D.2.7, D.4.1)
23 Recognize when radiographic imaging equipment is malfunctioning and problem solve to determine the most likely cause (C.5.1)

RFP Project

Students will complete a group project and demonstrate their work in the form of a live presentation to their peers. It is expected that group members make themselves available to participate in group meetings and work on their project during the times allocated in the course schedule or agree to

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alternative meeting times. The instructor is available to provide guidance and assist students in finding resources for their presentation. More information about all of the assignments will be published on D2L.

Learning Objectives

24 Apply knowledge of operational components of radiographic imaging systems to clinical practice (D.2.1)

6. Grading System

☒ Standard Grading System (GPA)

☐ Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

Fauber, T. (2017). *Radiographic Imaging & Exposure* (5th ed.). Elsevier Health Sciences.
Ch. 10 covered in MRAD 159; (Ch. 1-9 covered in MRAD119).
Bushong, S. C. (2017). *Radiologic Science for Technologists: Physics, Biology, and Protection* (11th ed.). Elsevier Health Sciences.
Ch. 1-5, 8-9, 31-34 covered primarily in physics; Ch. 14, 17-18, 21-27, 37, 39-40 covered primarily in MRAD 159; (Ch. 6-7, 10-12, 15-16, 29-30, 35-36 covered in MRAD119).

8. College Supports, Services and Policies

Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g., illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts: http://camosun.ca/about/mental-health/emergency.html or http://camosun.ca/services/sexual-violence/get-support.html#urgent

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, centre for accessibility, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit Student Services at http://camosun.ca/services/

College Policies

Policies are available on the College website at http://camosun.ca/about/policies/

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies.

Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Student Appeals, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, and Student Penalties and Fines.

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 website.

A. Grading Systems

http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf#page=2

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-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes.

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at http://www.camosun.bc.ca/policies/E-1.5.pdf#page=4 for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	*In progress*: A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	*Compulsory Withdrawal*: A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.