

	School of Health & Human Services Medical Radiography Technology
	Course Name: Physics of Medical Imaging and Radiation Therapy Course Number: MRAD 165

COURSE OUTLINE

The Approved Course Description is available on the web:

<http://camosun.ca/learn/calendar/current/web/mrad.html#MRAD165>

Please note:

- *This outline will be electronically stored for five (5) years only. It is strongly recommended students keep this outline for their records.*
- *This course is only open to students in the Medical Radiography program.*

Introduction:

In this intermediate level course, students examine the interactions of physical phenomena to understand the fundamental principles of radiation used for imaging and therapy. Students explore the differences between various imaging modalities such as sonography, conventional x-ray, computed tomography, nuclear imaging, and magnetic resonance imaging. Students experiment with theoretical knowledge during laboratory activities and examine the practical applications of medical imaging physics through classroom presentations.

Students must achieve a minimum of a C+ (65%) to use this course as a prerequisite. Refer to the Camosun Calendar for detailed information about course prerequisites.

1. Instructor Information

(a) Physics Instructor:	Stephanie LaForest
(b) Office Hours:	Monday- Friday 10:30- 11:20 am Or by appointment
(c) Location:	F346C
(d) Phone:	250-370-3513
(e) Email:	laforests@camosun.bc.ca
(f) Website:	http://online.camosun.ca/ (D2L)

2. Intended Learning Outcomes/Competencies

Letters and numbers following certain learning outcomes indicate the specific competencies covered from the CAMRT Medical Radiography Competency Profile:

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

- a) Solve problems and perform calculations using the correct units, measures, and notations. (D1.1)
- b) Understand the structure of the atom and calculations associated with electron transitions. (D1.1)
- c) Apply basic physical concepts in the nature of light to calculate wavelength, frequency, and energy of a photon. (D1.1)
- d) Describe and perform calculations relating to electricity and magnetism, including electric fields and potential, basic circuits, magnetic fields, and magnetic properties of matter. (D1.1)
- e) Describe the modes of x-ray production, compare x-ray voltage waveforms, and calculate energies of Bremsstrahlung and characteristic x-rays. (D1.1)
- f) Describe the physical meaning of x-ray technique factors and explain how changes will affect the x-ray spectrum. (E1.1, E1.2, E1.3, E1.4)
- g) Describe and perform calculations related to Compton scatter and the photoelectric effect, as well as x-ray attenuation of monoenergetic and polyenergetic beams. (D1.3)
- h) Describe and perform calculations relating to nuclear stability, binding energy, and decay processes. (D1.1)
- i) Compare and contrast the appropriate use of radiographic imaging, PET, CT, nuclear imaging, magnetic resonance imaging, and sonographic imaging as determined by physical and biologic effects. (C3.2, C4.2, D5.1, D5.2, D5.3, D5.4)
- j) Describe the fundamental principles of radiation therapy as a treatment option for a variety of diseases.
- k) Explore the use of modern research techniques to understand current practices in Medical Imaging. (A2.16, A8.3)

[CAMRT Medical Radiography Competency Profile](#)

3. Learning Resources

Required Textbook:

MRAD 165 Course pack

Optional Textbook:

Bushong 10ed. Radiological Science for Technologists

Other Materials: Scientific Calculator (to be brought to every class).

4. Student Assessment

Assignments / Tutorials	10 %
Labs	10 %
Research Project	20 %
Midterms	30 %
Cumulative Final Exam	30 %
TOTAL	100%

Students must achieve a C+ (65%) to use this course as a prerequisite.

Assessment Details

Assignments are based on the problems in the MRAD 165 Course pack. The assignments will come from the end of Module problem sets. Assignments will be marked for completeness.

The Friday class period will alternate between labs and tutorials. The class will alternate between completing **experiments** and short **tutorial exercises or assignments**. You must be present in the lab to take your own data.

Mid Term / Final Exam: There will be two midterm exams. Problems on the midterms will be similar to those in the assignments and tutorials. The final exam will be cumulative, covering all content in the course and will take place in the final exam period.

All outstanding course work must be submitted prior to the last day of classes.

Assessment Policies

Please note the following **very important course policies**:

1. In order to pass the course, students **must successfully complete all** labs.
2. Unless otherwise specified, labs and assignments will be due at the beginning of class on their respective due dates. Late labs/assignments will be subject to a 10 % per day late mark deduction, up to a maximum of 50%.
3. Tests including the midterm and final exam must be written at the designated times.
4. Exceptions to the above policies will be made only in the case of exceptional circumstances such as illnesses or medical emergencies. Should such eventualities arise, please contact the instructor within 24 hours of the missed lab/test and obtain documentation.

5. Course Content and Schedule:

Lecture Days/Times & Room Number:

Monday – Thursday: 8:30 – 9:20 AM, Fisher 322

Lab & Tutorial Days/Times & Room Number:

Friday: 8:30-10:20 AM, Fisher 322 (Lab /Tutorial/Test as announced)

6. Grading System

The following two grading systems are used at Camosun College. This course will use:

Standard Grading System (GPA)

Competency Based Grading System

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+	Minimum level of achievement to use the course as a prerequisite.	3
60-64	C		2
50-59	D	Minimum level of achievement for which credit is granted.	1
0-49	F	Minimum level has not been achieved.	0

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 E-1.5 at camosun.ca for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> 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
IP	<i>In progress:</i> A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. <i>(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of</i>
CW	<i>Compulsory Withdrawal:</i> 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,

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

CONDUCT POLICIES

It is the student's responsibility to become familiar with the content of these policies. The policies are available in each School Administration Office, Registration, and on the College web site in the Policy Section.

[Academic Policies and Procedures](#)
[Student Conduct Policy](#)

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, Registrar's Office or the College web site at

<http://www.camosun.bc.ca>

MRT PROFESSIONAL CODE OF ETHICS

Camosun College Medical Radiography Technology students are expected to abide by the Canadian Association of Medical Radiation Technologist (CAMRT) Code of Ethics inasmuch as it applies to them in the learning and clinical environments. This information is available on the CAMRT website at:

[CAMRT Code of Ethics](#)

MRT Department Policies & Procedures

Camosun College Medical Radiography Technology students are responsible for knowing all of the MRT Department Policies and must abide by them, including dress codes & lab safety procedures.

<http://camosun.ca/learn/programs/mrt/handbook.pdf>

8. GENERAL INFORMATION

Suggested Study Time/Study Habits

- You will probably need to spend 6-8 hours outside of class per week reading and studying the content for this course to achieve full marks. Your instructor will be available during the scheduled “open lab” hours for students needing additional support mastering the course content.

Attendance

- You are expected to attend all classes, and be on time. It is your responsibility to keep up to date on *all* information given during a class missed, including notes, hand-outs, assignments, changed exam dates etc. Missed exams or quizzes cannot be made up except in case of documented illness (doctor’s note required). **Lab attendance is mandatory.**

The Medical Radiography Technology program is committed to promoting competence, professionalism and integrity in our students and developing their core skills to succeed throughout their academic programs and in their careers. The purpose of Academic Honesty Guidelines is to provide clear expectations of appropriate academic conduct and to establish processes for discipline in appropriate circumstances. It is the student’s responsibility to become familiar with the content and the consequences of academic dishonesty. Before you begin your assignments, review the Academic Policies on the Camosun College website:

<http://camosun.ca/learn/becoming/policies.html>



These materials were originally created by BCIT. Adaptations have been made to reflect Camosun College policies. Permission to use these materials has been granted by

