A POLYTECHNIC INSTITUTION

Course Outline

School of Computing and Academic Studies
Program: Medical Radiography
Option:

Physics 2285
Physics: Medical Radiography 2

Start Date:	September 9					**End Date:**	December 10		
Total Hours:	21	**Total Weeks:**	7			**Term/Level:**	2	**Course Credits:**	1.5
Hours/Week:	3	**Lecture:**	1	**Lab:**	2	**Shop:**		**Seminar:**	**Other:**

Prerequisites

Course No.	Course Name
Physics 1275	Physics Medical Radiography 1

Physics 2285 is a Prerequisite for:

Course No.	Course Name
Physics 3385	Physics Medical Radiography 3

Course Description (required)

Physics of Medical Radiography 2 (2285) is an introductory level course that emphasizes the application of physical phenomena in medical radiography. Topics include X-ray production, X-ray output, production efficiency, x-ray attenuation equations and attenuation mechanisms. The physics of such devices as X-ray tubes, K-edge filters and intensifying screens will be discussed.

Evaluation

Term Test	35%	Comments: A mark of 60% is required to pass.
Laboratory Reports	25%	
Final Exam	40%	
TOTAL	100%	

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- define relevant physics terms with units,
- describe the two electron-target interactions which produce x-rays, and the two which do not,
- draw, label and use energy level diagrams to calculate x-ray energies,
- explain how changes in technique factors will affect x-ray production efficiency
- describe how changes in technique factors will affect the x-ray spectrum
- solve x-ray attenuation problems using the attenuation equations
- compare the two main attenuation mechanisms with respect to their dominance, and their effect on scatter and patient absorbed dose
- explain the occurrence of absorption edges, and how they are used in the design of filters and intensifying screens

Competency profile

This course provides a foundation of applied science for the Radiography program, and in the process, covers a portion of the following competencies:

- A2.6, A4.2, A4.10, A5.4, A5.6, A5.7, A5.8, A7.5, A7.7
- B1.5, B1.6, B1.7, B1.8, B2.1, B2.2, B2.3, B2.5, B3.2, B3.3, B4.1, B4.2, B5.1, B5.2, B5.3
- C2.4,C2.7
- D1.13, D1.14, D2.2, D3.1, D3.2

Verification

I verify that the content of this course outline is current.

Talman — Authoring Instructor

Sept 7/04 — Date

I verify that this course outline has been reviewed.

M. Filippelli — Program Head/Chief Instructor

Sept 7/04 — Date

I verify that this course outline complies with BCIT policy.

per A. D'Spirito — Dean/Associate Dean

Sept 7/04 — Date

Note: Should changes be required to the content of this course outline, students will be given reasonable notice.

Instructor(s)

J. Talman M.Sc.	Office Location: SW3-4096	Office Phone: 451-7151
	Office Hrs.: TBA	E-mail Address: jtalman@bcit.ca

Learning Resources

Required:

- Bushong, Stewart C., *Radiologic Science for Technologists: Physics, Biology and Protection*, 7'th edition, Mosby, (2001).
- A Manual of Experiments in Medical Radiography Technology

Information for Students

(*Information below can be adapted and supplemented as necessary.*)

Passing Grade: The passing grade in this course is 60%. The final mark is a weighted average of all tests and lab work.

Laboratory Reports: will be completed each week and graded by an instructor. **Students must complete the laboratory exercises and hand in finished reports on time to obtain a grade.** No marks will be given for experiments from which you were absent, except by special arrangement with instructor.

Final Exam: will test material covered in the whole term.

Assignments: Late assignments, lab reports or projects will **not** be accepted for marking. Assignments must be done on an individual basis unless otherwise specified by the instructor.

Makeup Tests, Exams or Quizzes: There will be **no** makeup tests, exams or quizzes. If you miss a test, exam or quiz, you will receive zero marks. Exceptions may be made for **documented** medical reasons or extenuating circumstances. In such a case, it is the responsibility of the student to inform the instructor **immediately**.

Ethics: BCIT assumes that all students attending the Institute will follow a high standard of ethics. Incidents of cheating or plagiarism may, therefore, result in a grade of zero for the assignment, quiz, test, exam, or project for all parties involved and/or expulsion from the course.

Attendance: The attendance policy as outlined in the current BCIT Calendar will be enforced. Attendance will be taken at the beginning of each session. Students not present at that time will be recorded as absent.

Illness: A doctor's note is required for any illness causing you to miss assignments, quizzes, tests, projects, or exam At the discretion of the instructor, you may complete the work missed or have the work prorated.

Course Outline Changes: The material or schedule specified in this course outline may be changed by the instructor. If changes are required, they will be announced in class.

Schedule

Chapter in Notes	Topics	Reference /Reading
1	**X-ray Production** • Electron-Target Interactions Back-scatter Brems x-ray production Characteristic x-ray production • X-ray Spectrum • Energy Level Diagrams (Review) • X-ray Production Efficiency • Total X-Ray Power (x-ray output) • The 15% Rule • X-ray Beam Quality and Quantity • Changing the X-ray Spectrum mA kV target filtration voltage wave-form	Bushong: • Chapter 11, pp. 141-152 • Chapter 12, pp. 154-163 • Related topics
2	**X-ray Attenuation** • Subject Contrast • Exponential Attenuation Exponential attenuation equation Half-value layer Attenuation equation in terms of the HVL • Heterogeneous X-ray Beams • X-ray Beam Filtration • Anode Heel Effect • Attenuation Mechanisms Compton scatter Photoelectric attenuation • Dominant Attenuation Process • Attenuation Events and Absorbed Dose • Absorption Edges K-edge filters Intensifying screen phosphors (rare earth elements)	Bushong: • Chapter 13, pp. 164-175 • Related topics