A POLYTECHNIC INSTITUTION

Course Outline

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

Phys 1275
Physics: Medical Radiography 1

Start Date:	January 5					**End Date:**	April 16		
Total Hours:	63	**Total Weeks:**	14			**Term/Level:**	1	**Course Credits:**	3
Hours/Week:	4.5	**Lecture:**	2.5	**Lab:**	2	**Shop:**		**Seminar:**	**Other:**

Prerequisites

Course No.	Course Name
	Physics 12 and Math 12

Phys 1275 is a prerequisite for:

Course No.	Course Name
Physics 2285	Physics: Medical Radiography 2

Course Description (required)

Physics of Medical Radiography 1 (1275) is an introductory level course that emphasizes the application of physical phenomena in medical radiography. Topics include structural and physical properties of matter, electromagnetic radiation, electrostatics, direct and alternating current circuits, magnetism, solid state physics, and production of x-rays. The physics of x-ray tubes and the x-ray generator components will also be discussed.

Evaluation

Term Tests	30%
Quizzes	15%
Laboratory Reports	10%
Laboratory Test	10%
Final Exam	35%
TOTAL	100%

Comments: A mark of 60% is required to pass this course

Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

- describe the structure of matter using appropriate terms,
- define relevant physics terms with units,
- draw and label diagrams for relevant physics topics
- demonstrate conceptual understanding of physics by solving subjective and objective problems
- solve numerical problems in relevant physics topics using correct units

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.

J Talman — Authoring Instructor

Jan 4/05 — Date

I verify that this course outline has been reviewed.

Frank D Spirito — Teaching Department Head/Chief Instructor

Jan 04/05 — 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

Recommended:

- Scientific calculator: Texas Instruments model TI-30Xa

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.

	Topics	Approx. Dates
1	**Introduction** • Course objectives • Measurements SI units and prefixes Scientific notation • Unit conversion	Jan 5 and 6
2	**Radiological Physics** • Historical background • X-ray generation (brief overview) simplified circuit definitions (mA, kV, time, collimator, grid and screen) x-ray production • electromagnetic radiation	Jan 12 and 13
3	**Structure of Matter** • Atomic structure protons, neutrons, electrons • Atomic energy level diagram binding energy ionization energy excited states electron transition • Photon energy • Tungsten atom • Radioactivity α, β and γ radiation biological effects • Applications gamma camera PET scanner	Jan 14, 19 and 20
4	**Electrostatics** • Electric charges (review) types of charges interaction of charges methods of ionization • Electrostatic field electric field lines of force • Electrostatic applications to Radiography x-ray tube focusing cup static marking of films operating room hazards • Electric potential (voltage) • Equipotential lines • Electron volt energy unit	Jan 26, 27, 28, Feb 2 **Midterm 1: Feb 3**
5	**Electric Current** • Charge transfer battery electric current	Feb 9, 10, 11 and 16

	Topics	Approx. Dates
	• Circuits current, voltage and resistance energy and power internal resistance • Line voltage drop	
6	**Capacitance** • Capacitor definition construction • Charging and discharging a capacitor • Application filtration exposure timing	Feb 17 and 24
7	**Magnetism** • Nature of magnetism applications in radiography (MRI) • Electromagnetic induction • Transformers construction operating principle types of transformers	Feb 25 and Mar 2
8	**AC Circuits** • Ohm's Law and AC peak, average and effective (RMS) advantages of using AC • Rectification full wave	Mar 3 and 9 **Midterm 2: Mar 10**
9	**Solid State** • Solids • Energy bands conductors insulators semiconductors • Solid state diodes rectifiers X-ray detectors • Applications fluorescence (scintillation) phosphorescence thermoluminescent dosimeters imaging plate	Mar 23, 24 and 30
10	**X-ray Generators** • Single phase • Three phase voltage generator voltage wave-form • Three-phase rectification 6-pulse 12-pulse percent ripple	May 31, Apr 6

	Topics	Approx. Dates
	• High-frequency generators constant kV • Grid controlled X-ray tubes	
11	**X-ray Production** • Characteristic production • Brems Production • Spectral Intensity Curve x-ray quality x-ray quantity change produced by mA and kV	April 7 and 8 Review: April 13, 14