BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Operating Unit: CASU
Program: Physics
Option:

Course Outline

PHYS 3275
Physics: Medical Radiography III

Start Date: January 2000 **End Date:** May 2000

Course Credits: 3 **Term/Level:** 3

Total Hours: 24
Total Weeks: 16

Hours/Week: **Lecture:** 1 **Lab:** 2 **Shop:** 0 **Seminar:** 0 **Other:** 0

Prerequisites

Course No.	Course Name
PHYS 1275	Physics: Medical Radiography I
PHYS 2275	Physics: Medical Radiography II

PHYS 3275 is a Prerequisite for:

Course No.	Course Name

Course Calendar Description

PHYS 3275 continues the Physics of X-rays covered in PHYS 1275 and PHYS 2275. Lectures cover basic physics of digital concepts in radiography. Topics include counting statistics, digital terminology, binary numbers, data acquisition, computed radiography and digital radiography. Laboratory titles are the inverse square law, output versus kV, HVL, kV accuracy, counting statistics and scatter distribution.

Course Goals

Physics of Medical Radiography is an introductory three level course that emphasizes the application of physical phenomena in medical radiography. Topics include structural and physical properties of matter, static electricity, direct and alternating current, energy, heat, wave motion, electromagnetic radiation, quantum concepts, production of X-rays, interaction of X-rays with matter and digital imaging concepts. Wherever appropriate, the physics of devises such as X-ray tubes, the generator, ionization chamber, photomultiplier tube, TLD, imaging devices etc. will be used to demonstrate applied physics concepts.

Evaluation

Lab Reports	67%
Final	33%
TOTAL	100%

Comments:

Course Learning Outcomes

At the end of this course, the student will be able to:

- define relevant physics terms with units,
- explain or discuss relevant physics concepts with defined terminology,
- draw and label diagrams for relevant applied physics topics,
- demonstrate conceptual understanding of physics by solving numerical, subjective and objective problems,
- explain the radiographic image formation process to a patient

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

Course Content Verification

I verify that the content of this course outline is current, accurate, and complies with BCIT Policy.

M. Filippelli — Program Head/Chief

March 2000 — Date

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Instructor(s)

Richard Saunders	Office No.: SW3-4083	Office Phone: 412-7442
	Office Hrs.: open	E-mail Address: rsaunder@bcit.ca

Learning Resources

Required:

- Physics Laboratory Manual (purchased for PHYS 1275)
- Bushong, Stewart C., Radiologic Science for Technologists, Sixth Edition, Mosby, 1997. (Purchased for MRAD 1102)
- Course notes

Recommended:

BCIT Policy Information for Students

Evaluation

- ***Passing Grade:*** The passing grade in this course is 60%. The final mark is a weighted average of all tests quizzes and lab work.
- ***Quizzes:*** will be directly related on assigned problems and class lecture notes.
- ***Term Tests:*** will be related to assigned problems and concepts covered in classes and tutorials. Each of the term tests will examine approximately the same amount of material.
- ***Laboratory Tests:*** will be directly related to the assigned laboratory sessions. You will be allowed to use your lab data book on lab tests.
- ***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.

Other Course Policies and Information

- ***Assignments:*** Late assignments or projects must be handed in by the due date for marking. A deduction may apply for late reports Assignments must be done on an individual basis unless otherwise specified by the instructor.

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Section	Topics	Reference/ Reading
1	***Review*** • 2275 Exam Review • k-edge, k-edge filters and rare earth elements	
2	***Anode Heat Loading*** • Maximum heat load • Heat loss; fixed anode and rotating anode • Maximum power input curve • Anode heating and cooling curves	
3 & 4	***Counting Statistics*** • Poisson distribution • Image array (pixels) • Normal distribution • Counting statistics and quantum noise • Quantum Mottle	
5 & 6	***Digital Concepts*** • terminology • bits and bytes • binary numbers and number of grey levels • memory organization and size • data acquisition • Analog to digital conversion • PACS, DICOM and JPEG	
7	***Computed Radiography*** • Photostimulable phosphor plate • Latent image • Characteristic Curve • Resolution • Advantages and disadvantages	
8	***Digital Radiography*** • Direct to digital • Scanned Projection Radiography • Amorphous silicon flat panel detector • CCD camera	