

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

COURSE OUTLINE

COURSE NAME Medical Imaging 3 — Equipment and QC-III

COURSE NUMBER MRAD 3312

DATE January 1995

Prepared by Euclid Seeram, RTR, BSc, MSc

Taught to Level 3 Year

School Health Sciences

School Health Sciences

Program Medical Radiography

Program Medical Radiography

Date Prepared December 1994

Option _____

Term Level 3 Hrs/Wk 2 Credits _____

No. of Weeks 7 Total Hours 14

Instructor(s) Euclid Seeram Office SW1 4084 Local 8231

Office Hours Posted

PREREQUISITES

MRAD 2212 — Medical Imaging 2

COURSE OBJECTIVES

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

1. describe each of the following QC tests: mA Linearity; repeatability and mR/mAs output; overload protective circuitry; radiation leakage; fluoroscopic resolution; maximum exposure rate; fluoroscopic timer accuracy; inspection procedures for radiographic, and fluoroscopic equipment and reject analysis.
2. identify the components of a fluoroscopic imaging scheme.
3. explain the principles of image intensification and discuss two characteristics (conversion factor and resolution) of the image intensifier tube.
4. identify the main components of a fluoroscopic viewing system and describe how each works (image distributor, TV camera tube, and the TV monitor).
5. identify the various types of recording systems for fluoroscopy and explain how each of the following works: spot film devices, videotape and videodisc recorders and multiformat cameras.

COURSE OBJECTIVES cont'd

6. describe the major features of each of the following for mobile x-ray units: power supply, capacitor-discharge and the image intensifier.
7. discuss each of the following considerations when using mobile x-ray equipment: grids, exposure techniques, patient, film/screen combinations, and care and safe handling.
8. state the purpose of automatic film changers and explain how each of the following works: chest changers and cassetteless tables.
9. state the purpose of automatic injection devices.
10. identify major components and state the purpose of each of the following computer-assisted techniques: computed tomography (CT), digital fluorography (DF), digital radiography (DR) and magnetic resonance imaging (MRI).
11. describe how each of the following computer-assisted imaging techniques work: CT, DF, DR and MRI.
12. State the advantages of CT, DF, DR and MRI.

EVALUATION

Final Examination	50%	A grade of 60% is required to pass this course.
Mid-Term	25%	
Projects	15%	
Laboratory	10%	

REQUIRED TEXT(S) AND EQUIPMENT

Carlton, R. and Adler, A. Principles of Radiographic Imaging. Delmar Publishers. 1992.

REFERENCE TEXTS AND RECOMMENDED EQUIPMENT

Bushong, S. Radiologic Science for Technologists. Mosby-Year Book Inc. 5th Edition, 1995.

Gray, J. et al. Quality Control in Diagnostic Imaging. University Park Press. 1983.

Safety Code 20A. X-ray Equipment in Medical Diagnosis — Ottawa. 1990.

COURSE SUMMARY

Through lectures and laboratory exercises, this course will address quality control concepts and tests for radiographic and fluoroscopic imaging systems. In addition, the principles of fluoroscopic imaging systems and mobile radiographic/fluoroscopic systems will be discussed. Finally, the course will conclude with a discussion of computer applications in radiology, including digital imaging concepts, computed tomography, digital radiography and fluoroscopy as well as magnetic resonance imaging.

COURSE OUTLINE
(continued)

Week Lecture or Lab Number	Material Covered	References
1	Films, Screens and Cassettes • Screen-film contact test • Care, cleaning and inspection of intensifying screens Darkroom and Accessory Equipment • Light-leakage test • Safe handling time • Illuminators (view box uniformity)	
2	Reject-Repeat Analysis • Purpose • Equipment • Procedure • Tolerance • Action QC Tests — Radiography • mA linearity • Repeatability and mR/mAs output • Inspection procedures • Others	Gray, J. et al Chapter 4
3	Fluoroscopy and Imaging Systems • Image intensifiers • Viewing systems • Recording system	
4	QC Tests — Fluoroscopy • Fluoroscopic resolution • Maximum exposure rate • Fluoroscopy timer • Scatter radiation • Inspection procedures	Gray et al

COURSE OUTLINE
(continued)

Week Lecture or Lab Number	Material Covered	References
5	Mobile X-Ray Units • Generators and Power Supply² ▸ Fullwave (AC) ▸ Battery (cordless) ▸ Capacitor discharge ▸ Image Intensifier • Considerations³ Automatic Film Changers and Automatic Injection Devices	
6	Computer Applications • Digital imaging concepts • Computed tomography ▸ Physical principles and instrumentation	
7	Computer Applications • Digital Fluoroscopy • Digital Radiography • Magnetic Resonance Imaging	