BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

Operating Unit: Health Sciences
Program: Medical Radiography
Option:

Course Outline

MRAD 3312
Image Recording, Equipment and Quality Control III

Start Date: January, 1999 **End Date:**

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

Total Hours: 14
Total Weeks: 7

Hours/Week:	Lecture:	Lab:	Shop:	Seminar:	Other:

Prerequisites

Course No.	Course Name
MRAD 2212	Image Recording, Equipment and Quality Control III
MRAD 1272	Physics of Medical Radiography

MRAD 3312 is a Prerequisite for:

Course No.	Course Name
N/A	

Course Calendar Description

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

Course Goals

This course is a continuation of *Image Recording, Equipment and Quality Control II*. It provides students with the fundamental principles of fluoroscopic equipment and selected QC tests for fluoroscopy. In addition, students will explain the operation of mobile radiographic/fluoroscopic equipment and describe the characteristic features of computerized imaging equipment.

Evaluation

Final Examination	
Mid-Term	
Projects	
Laboratory	
TOTAL	100%

A grade of 60% is required to pass this course.

Course Learning Outcomes/Competencies

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

1. Explain each of the following QC tests for fluoroscopic equipment:

    a. overload protective circuity
    b. radiation leakage
    c. fluoroscopic resolution
    d. maximum exposure rate
    e. fluoroscopic timer accuracy
    f. inspection procedures for fluoroscopic procedures
    g. reject analysis

2. Explain the principles of image intensification and describe the following two characteristics of the image intensifier tube:

    a. conversion factor
    b. resolution

3. Describe the main components of a fluoroscopic viewing system (image distributor, TV camera tube, and the TV monitor.)

4. Explain how each of the following recording systems for fluoroscopy works:

    a. spot film devices
    b. videotape and videodisc recorders
    c. multi format cameras

5. Describe the major features of each of the following for mobile x-ray units:

    a. power supply
    b. capacitor-discharge units
    c. image intensifier units

6. Describe the fundamental principles of each of the following computer-assisted imaging techniques:

    a. computed tomography (CT)
    b. digital fluoroscopy (DF)
    c. digital radiography (DR)
    d. magnetic resonance imaging (MRI)
    e. radiology information systems (RIS)
    f. picture archiving and communication systems (PACS)

On successful completion of these outcomes, students will be prepared to meet the requirements of the following competencies as listed in the CAMRT "Competency Profile" for Radiography.

A2 Prepare the room for fluoroscopic imaging procedures.
A2.5 Obtain accessory imaging equipment.
A2.6 Select the correct image receptor system (conventional vs digital).

A4 Position the patient.
- A4.10 Collimate to the area of interest only to maximize image quality.

A5 Operate imaging equipment.
- A5.1 Select and use apparatus and accessory equipment safely.
- A5.2 Perform the initial set-up of the equipment.
- A5.3 Select the computer protocol for digital imaging.
- A5.4 Select the source-image distance.
- A5.5 Use radiographic markers.
- A5.6 Select the fastest film/screen/grid combination for optimum image quality appropriate for the examination.
- A5.7 Select appropriate kV, mA and time or automatic exposure control parameters.
- A5.8 Modify exposure factors on the basis of the patient's age, physique and condition
- A5.9 Take the exposure.

A6 Process images
- A6.1 Imprint ID information.
- A6.2 Manipulate computer data, if applicable.
- A6.3 Unload the film cassette/magazine and process exposed film.
- A6.4 Reload the cassette/magazine.

A7 Critique images and implement corrective measures
- A7.8 Manipulate the digital image.

D2 Monitor radiographic/fluoroscopic equipment
- D2.1 Perform visual inspection of cables and equipment.
- D2.2 Recognize improper functioning of imaging and accessory equipment/devices.
- D2.3 Ensure the proper operation of safety devices.
- D2.4 Record and report equipment malfunctions to the appropriate person.

D3 Perform quality control tasks
- D3.1 Perform quality control tests on imaging and accessory equipment.
- D3.2 Use test results to initiate corrective action.
- D3.3 Record and maintain records/charts of all tests
- D3.4 Test lead aprons and shields
- D3.5 Report test results to appropriate person
- D3.6 Conduct repeat/reject analysis

Course Content Verification

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

Program Head/Chief Instructor _____ Date _____

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

Instructor(s)

Euclid Seeram, RTR., B.Sc., M.Sc.
Office No.:
Office Hrs.:
Office Phone:
E-mail Address:

Learning Resources

Required:

Bushong, S. *Radiologic Science for Technologists*. Mosby-Year Book Inc. 6th Edition, 1997.

Recommended:

Additional notes will be taken from:

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

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

BCIT Policy Information for Students

Assignment Details

Quality Assurance Project: Breakdown of Marks

ASSIGNMENT — to be done in groups

Prepare a report on the Elements of a QA Program in your hospital.

ASSIGNMENT

Quality Control Report

The report should include a discussion of the following:

a. Dept's definition of QA and QC.
b. A brief account on the history of the development of the dept's QC Program.
c. Define staff responsibilities.
d. Discuss the Dept's philosophy on QC. ..... 10 Marks

e. What parameters are monitored?
f. The format of a QC Test.
g. List equipment available in the dept. (for QC test procedures) ..... 10 Marks

h. Give examples of QC forms available. ..... 3 Marks

I. Discuss the dept's image quality standards. ..... 5 Marks

j. Comment on the following:
- Record keeping
- Education and resources
- Policy and/or Procedural Manual. ..... 4 Marks

k. Benefits of a QA Program.
l. Conclusion: This should include a statement of your own perceptions of the QA Program (e.g., recommendations). ..... 4 Marks

m. References. ..... 2 Marks

n. List of names of students and topics covered. ..... 2 Marks

TOTAL ..... 40 Marks

Week of/ Number	Outcome/Material Covered	Reference
1 2	**Fluoroscopic Imaging Systems** • Image intensifiers • Viewing systems • Recording system	
3	**QC Tests — Fluoroscopy** • Fluoroscopic resolution • Maximum exposure rate • Fluoroscopy timer • Scatter radiation • Inspection procedures	
4	**Mobile X-Ray Units** • Generators and Power Supply ▸ Full wave (AC) ▸ Battery (cordless) ▸ Capacitor discharge ▸ Image Intensifier	
5	**Computer Applications** • Digital imaging concepts • Computed Tomography ▸ Physical principles and instrumentation	
6	**Computer Applications** • Digital Fluoroscopy • Digital Radiography	
7	**Reject-Repeat Analysis**	

Mid Term Examination

The Mid Term Examination will be scheduled as follows:

AC February 11, Thursday, 10:30–11:30 am.
BD February 25, Thursday, 10:30–11:30 am.

This examination will be based on material covered in Weeks 1, 2 and 3.