A POLYTECHNIC INSTITUTION

School of Health Sciences
Program: Medical Radiography
Option:

Course Outline

MRAD 2216
Radiographic Procedures 2

Start Date:	September, 2004					**End Date:**	December, 2004		
Total Hours:	63	**Total Weeks:**	7			**Term/Level:**	2	**Course Credits:**	4
Hours/Week:	9	**Lecture:**	4	**Lab:**	5	**Shop:**		**Seminar:**	**Other:**

Prerequisites

Successful completion of Level 1

MRAD 2216 is a Prerequisite for:

Entry into Level 3

v Course Description (required)

Positioning for radiographic procedures related to the urinary and digestive systems as well as vertebral column, hip and shoulder girdle radiography will be covered. Skills to evaluate the diagnostic and technical acceptability of the radiographs for the respective areas will also be examined. Methods for formulating technique changes for various exams and for the variations of the normal patient will be developed. Renal tomography will be discussed. Labs will reinforce theoretical components of the course.

v Detailed Course Description (optional)

The goals of this course are to provide students with the skills required to:

1. position patients for the views/projections being studied.
2. understand renal tomographic applications.
3. evaluate the diagnostic and technical acceptability of radiographs of areas being studied.
4. calculate technique changes and recognize variables of techniques for various exams and the variations of the normal patient.
5. produce specified radiographs using radiographic phantoms.

v Evaluation

Final Examination	40%	Comments: All labs and projects must be satisfactorily completed before a course mark will be given.
Midterm	30%	
Rad Eval Quizzes	10%	
Applied Lab	10%	
Positioning Lab Assignment	5%	
Positioning Lab	5%	
TOTAL	100%	(60% is required for a pass.)

v Course Learning Outcomes/Competencies

Upon successful completion, the student will be able to:

1. Define, describe and demonstrate beam directions, centring points and patient positioning relating to the radiography of the:
   - colon
   - vertebral column
   - shoulder girdle
   - hip girdle
   - urinary system
2. Describe required projections relating to radiographic examinations of the colon and urinary system.
3. Describe tomographic considerations for renal structures.
4. Demonstrate radiographic judgement, organizational and communication skills and radiographic competence while positioning a patient.
5. Evaluate radiographs for the studied areas for diagnostic acceptability based on:
   a. inclusion of all required structures
   b. demonstration of correct positioning
   c. appropriate level of density demonstrated
6. Assess main contributing factors to the overall radiographic image quality based on the:
   a. type of patient involved (body habitus, pathology, and limitation of movement)
   b. appropriate technique factors required
   c. acceptable processing methods used
7. Propose possible solutions to poor radiographic quality.
8. Calculate radiographic technique factors using the DuPont Bit System.
9. Outline technique chart adjustments to be made with respect to:
   a. patient body habitus
   b. patient pathology
   c. patient age
   d. specific equipment used (generators, imaging system, grids, etc.)

CAMRT COMPETENCIES

On successful completion of the above outcomes, you should be prepared to perform the following competencies as defined in the "Competency Profile" for radiographers established by the CAMRT.

RADIOGRAPHIC PROCEDURES 3

Critical Task List

A1 ***Utilize the request for consultation***
A1.1 Verify that examination is ordered by authorized professional
A1.2 Verify the patient's means of transport
A1.4 Correlate clinical information to the prescribed examination
A1.5 Priorize work
A1.6 Plan the radiographic imaging procedure

A2 ***Prepare room for radiographic imaging procedures***
A2.1 Clean the examination room and the equipment
A2.2 Change the linen on the x-ray table
A2.5 Obtain accessory imaging apparatus
A2.6 Select the correct image receptor system (conventional vs digital)

A3 ***Prepare the patient***
A3.1 Identify the patient
A3.2 Verify clinical information with the patient or clinical staff
A3.3 Ensure proper patient attire for the procedure
A3.4 Confirm patient preparation
A3.5 Remove all items that would compromise the quality of the image
A3.6 Explain the procedure to the patient
A3.7 Confirm that patient's consent is obtained before commencing the procedure
A3.8 Take appropriate action if patient refuses procedure
A3.9 Document patient's history of allergies when using contrast media
A3.10 Record additional clinical information
A3.11 Facilitate patient transport using good body mechanics

A4 ***Position the patient***
A4.1 Plan the examination according to patient condition, to minimize patient discomfort
A4.2 Demonstrate a knowledge of the imaging procedure
A4.3 Inform the patient of the need to touch in order to position, prior to touching
A4.4 Use touch for guidance, safety and comfort
A4.5 Touch the patient at the anatomical landmark(s) required for positioning for the examination
A4.6 Position the patient to demonstrate the required anatomical structures
A4.7 Use immobilization and positioning aids as required
A4.8 Direct the central ray to the correct anatomical landmark(s)
A4.9 Align the imaging system with the required anatomical structures
A4.10 Collimate to the area of interest only to maximize image quality
A4.11 Instruct the patient as to breathing requirements
A4.12 Use proper body mechanics when moving patient

A5 ***Operate image equipment***
A5.1 Select and use apparatus and accessory equipment safely
A5.2 Perform the initial set-up of the equipment
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
A6.3 Unload the film cassette/magazine and process exposed film
A6.4 Reload the cassette/magazine

A7 ***Critique images and implement corrective measures***
A7.1 Verify patient/film ID
A7.2 Check for correct use and proper placement of markers
A7.3 Identify anatomy and patient position on the image
A7.4 Verify that required structures are demonstrated
A7.5 Recognize film artifacts and take appropriate action
A7.6 Determine whether the diagnostic quality of the image is acceptable
A7.7 If image is unacceptable, determine the reason
A7.10 Determine corrective action and repeat the procedure, if the image is unacceptable
A7.12 Determine whether additional views are required

A8 ***Complete post-procedural tasks***
A8.1 Complete the examination within an appropriate time frame
A8.3 Explain post-procedural activities to the appropriate person(s)
A8.4 Dismiss the patient

B1 ***Protect the patient***
B1.1 Question female patients to ascertain possibility of pregnancy
B1.5 Use protective practices to reduce the risk of damaging effects of radiation in the diagnostic range
B1.6 Collimate only to the area of interest to minimize patient dose
B1.7 Select exposure factors consistent with optimal image quality and minimum radiation dose

B2 ***Protect the technologist***
B2.1 Stand behind protective barriers
B2.2 Wear lead protective apparel when remaining in the radiation area
B2.3 Remain as far as possible from patient and source during exposure
B2.4 Use positioning aids/immobilization devices to avoid having to hold the patient during the procedure
B2.5 Direct x-ray towards primary barriers only

B4 ***Protect others not required to be present during the procedure***
B4.1 Close the doors of the radiation area when in use
B4.2 Instruct people to leave the vicinity during imaging procedure

B5 ***Monitor personal radiation exposure***
B5.1 Wear radiation monitoring device

C1 ***Ensure patient safety***
C1.1 Confirm the patient's identity
C1.2 Provide for the patient's safety needs
C1.3 Use proper patient transfer techniques
C1.4 Use stretcher and wheelchair locks and guardrails

C2 ***Establish patient trust and confidence***
C2.1 Dress in a professional manner
C2.2 Introduce self to the patient
C2.3 Explain the procedure at an appropriate level of understanding for the patient
C2.4 Answer the patient's questions as fully as possible
C2.5 Avoid inappropriate conversation in the presence of the patient
C2.6 Use reassuring verbal and non-verbal communication techniques
C2.8 Perform tasks in an organized and confident manner

C3 ***Attend to the patient's trust and confidence***
C3.1 Assess the patient's comfort needs
C3.2 Assess and attend to the patient's physical needs
C3.3 Move patient during procedure, with consideration to patient's physical condition
C3.4 Provide proper care as necessary to meet the patient's comfort and physical needs
C3.5 Provide for patient privacy

C4 ***Perform patient care procedures***
C4.1 Maintain a clean/aseptic work environment (medical asepsis)

C5 ***Assist in the administration of contrast media and other drugs***
C5.1 Obtain the patient's history to determine contraindications to contrast media
C5.2 Inform the patient regarding the possible effects of contrast media and other drugs
C5.3 Select and prepare contrast media and other drugs
C5.8 Watch for changes in patient's status after the administration of contrast media and other drugs

D1 ***Monitor and maintain processing equipment and facilities***
D1.2 Prepare new chemicals
D1.3 Perform start-up/shut-down procedures
D1.7 Check solution levels
D1.9 Inspect the safelight filter
D1.10 Ensure that the dark room is light-tight
D1.13 Perform sensitometry
D1.14 Use sensitometry results to initiate corrective action

D2 ***Monitor radiographic equipment***
D2.1 Perform visual inspection of cables and equipment
D2.2 Recognize improper functioning of imaging and accessory equipment/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
D3.3 Record and maintain records/charts of all tests

E2 ***Demonstrate professional behaviour***
E2.1 Participate as a member of the health care team
E2.2 Practice effective communication and conflict resolution skills
E2.3 Respect values, beliefs and needs of others
E2.4 Take responsibility for actions
E2.5 Demonstrate professional deportment

v Verification

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

Ritz McDonald — Authoring Instructor
30 August 2004 — Date

I verify that this course outline has been reviewed.

M. Delgrelli — Program Head/Chief Instructor
Sept 1/04 — Date

I verify that this course outline complies with BCIT policy.

Dean/Associate Dean
1 September 2004 — Date

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

v Instructor(s)

Rita McLaughlin, ACR, CBI, MA Office Location: SW3-4084 Office Phone: 604-456-8181
Office Hrs.: 8:30-16:30 and by appointment E-mail Address: rita_mclaughlin@bcit.ca

v Learning Resources

Required:

1. MRAD 2216 Radiographic Procedures 2 Manual.
2. "Merrill's Atlas of Radiographic Positions and Radiologic Procedures," Phillip W. Ballinger (10th Edition). Vol. 1, 2 and 3 (2003).
3. "Radiographic Critique" Kathy McQuillen-Martensen (1996).

Recommended:

1. "Skeletal Anatomy" — Byron.
2. "Joy of Sectioning" — Dowdell.
3. "Textbook of Radiographic Positioning and Related Anatomy" — Bontrager.

v Information for Students

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

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.

Attempts: Students must successfully complete a course within a maximum of three attempts at the course. Students with two attempts in a single course will be allowed to repeat the course only upon special written permission from the Associate Dean. Students who have not successfully completed a course within three attempts will not be eligible to graduate from the appropriate program.

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.

v Information for Students (cont'd.)

Radiographic Evaluation Quizzes

There will be a Rad Eval quiz each week in the film critique labs (Room 4060). In addition to ensuring comprehension of material, the objective of these quizzes is to encourage peer coaching and to promote confidence in your abilities. These are desirable skills in the workplace.

Persons participating in the Rad Eval quiz will be randomly selected each week. The topic will be from the area studied the previous week. Persons not selected for the weekly quiz may be asked to prepare an oral presentation.

In Term 2, the quizzes will be done with partners. The procedure will be as follows:

- During the lab, you will be given 5 minutes to critique a radiograph using the 10 point radiographic evaluation technique and form.
- When you have finished critiquing your radiograph, a partner will be assigned to review the critique.
- Discuss the critique with your partner. You may choose to change the critique after the discussion, prior to handing in the Rad Eval form.
- The final decision on what is presented on the radiographic evaluation form rests with the originating partner.

Rad Eval Quizzes are worth 10% of the final grade

Applied Lab

The lab will be done with an assigned partner. Partners and room assignments will be randomly selected on a weekly basis.

Assume that you are relieving another technologist for coffee. He/she has just developed the last film for a radiographic series on the patient on the table.

The following set-up will be used:

- machine/equipment will be on
- view/projection will be indicated on the radiographic evaluation form
- phantom will be on the table in the position that it was when the radiograph was taken
- technique that was used for the radiograph will be set on the control panel
- exposed cassette will be in position as it was exposed

You will evaluate the radiograph with your partner using the 10 point radiographic system.

Repeat the radiograph if not all criteria are met. Clinical notebooks may be used. **Only one repeat may be made.** While one person is developing the radiograph, the other person should shut the room down. Complete the 10 point radiographic evaluation for your repeat radiograph.

Students are responsible for ensuring rooms are left neat and tidy.
Radiographs and corresponding rad eval sheets are to be handed in at the end of the lab.
This lab is worth 10% of the final grade.

v Positioning Lab Radiograph Assignment Details

Each group will produce the specified radiograph(s) for the weekly positioning lab.

- Submit the film(s) and blue instruction sheet(s) on which you have printed your lab x-ray room number and the names of the group of students.
- The radiographs will be graded and returned to one of the students.
- Each student in the group will receive the same grade.
- Marks will be assigned for:

1. positioning (phantom limitations noted)
2. structures included
3. density/contrast
4. collimation
5. markers and ID
6. lack of artifacts
7. filtration use
8. correct film size (if applicable)
9. timely submission
10. thoroughness and professionalism of submission

Schedule for Radiographic Procedures 2 — Fall 2004

Week / Number	Lab 1 Dates	# of Lectures and Topics	Lab Contents/Format	Notes
1, 2	Sept. 7-10 Sets CD Sept. 13-17 Sets AB	**CD** Tues. Course Outline Enema Intro. Wed. R/S and Obls. Wed. Lat Dec. & Rectum & critique **AB** Mon. Course Outline Enema Intro Tues R/S & Obls. Wed. Lat. Dec., Rectum & critique Wed. L-spine AP/Lat/Spot	**Positioning Lab** • Position – R/S – Recumbent lateral rectum – One lat. decubitus – One oblique • Assignments – Scavenger hunt – Large intestine radiography **Applied Lab** • Level 1 positions **Rad Eval Lab** – Enema critique & films – No quiz	**CR Imaging** • Enema quiz at start of positioning lab • New lab partners and rooms • Ensure logical sequencing when positioning views • Use decubitus filter • Additional practice sheets to be completed prior to next lab ♦ No sensitometry

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Week / Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
3, 4	Sept. 20-24 Sets CD Sept. 27-Oct 1 Sets AB	**CD** Mon AP, Lat, Spot LSpine Tues Obls L Spine Wed. TSpine, CTSpine & critique **AB** Mon. Obls L Spine/TSpine Tues. Lat CT spine & critique Wed. Shinerama	**Positioning Lab** • Position – AP, lat. T. & L. spine – Spot L. spine – One Obl. L. Spine • Assignment – AP T. spine – Obl. L. spine **Applied Lab** – Enema views **Rad Eval Lab** – T & L spine films inc. C/T lat. – Quiz — enema films	**Darkroom Use** • T & L. spine quiz • Computer demo to sensitometry group • Use filter, tight collimation and A-Heel for AP T. spine • Use ingot filter for lat. L. spine • Set a breathing technique for a lateral T. spine • Additional practice to be completed prior to next lab

Week /Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
5, 7	Oct. 4 - 8 Sets CD Oct.18 - 22 Sets AB	**CD** Mon. AP, Obl. Shoulder Tues. AP/Lat. Scapula Wed. Axial Shoulders Wed. Clavicle and Critique **AB** Mon. AP, Obl. Shoulder Tues. AP/Lat. Scapula Wed. Axial Shoulders Wed. Clavicle and Critique	**Positioning Lab** • Position – AP shoulder (3 hand positions) – Obl. shoulder – AP scapula – Scapular Y – Axial shoulder (I/S or S/I) – Axial clavicle • Assignment – Dry bone humerus (I/E/N) – Axial shoulder – AP/axial clavicle **Applied Lab** – T. & L. spine **Rad Eval Lab** – Shoulder girdle views – Quiz T. & L. spine	**CR Imaging** • Shoulder girdle quiz • Use boomerang filter • Computer demo for next sensitometry group. Prior group to complete sensitometry. • Complete additional practice prior to next lab.

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Week /Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
6, 8	Oct. 11-15 Sets CD Oct. 25-29 Sets AB	**CD** Mon. Thanksgiving Tues. Hip Intro, AP Hip Wed. Frog Leg, Mediolateral Wed. Transfemoral and Critique **AB** Mon. Hip Intro, AP Hip Tues. Frogleg, Mediolateral Wed. Transfemoral and Critique	**Positioning Lab** • Position – AP – frogleg – Mediolateral – Transfemoral • Assignment – Hip organization – Transfemoral **Applied Lab** – Shoulder girdle **Rad Eval Lab** Sets CD cancelled – Midterms Sets AB	**Daylight Processing** • Hip quiz • Position views in a logical sequence • Use filter on transfemoral • Computer demo of next sensitometry group. Prior groups to complete sensitometry — seek help if you missed demonstration • Complete additional practice prior to next lab.

Week / Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
9, 10	Nov 1 - 5 Set CD Nov. 8 - 12 Set AB	**CD** Mon. AP and Dens C-spine Tues. Obl. C-spine Wed. Lat. C-spine & crit Wed. Intro to IVPs **AB** Mon. AP, Dens C-spine Tues. Obl. C-spine Wed. Lat. C-spine and Critique Wed. Midterm review	**Positioning Lab for AB** None (Remembrance. Day) **Positioning Lab for CD** • Position – AP – Dens – Oblique – Lateral – Swimmer's • Assignment – AP and lat C. spine **Applied Lab** – Review for CD – None for AB **Rad Eval Lab** – Midterms for CD – No lab for AB	**Darkroom Use** **New Partners and Rooms** • C-spine quiz • Use filter for lat. C-spine • Demo shoulder depression methods • All groups to do sensitometry – seek help if you missed the demonstration • Complete additional practice prior to next lab.

Week / Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
11, 12	Nov. 15–19 Set CD Nov. 22-26	**CD** Mon. Midterm review Tues. Kidneys Wed. Renal Tomos Wed. Bladder and Critique **AB** Mon. Intro to IVPs Tues. Kidneys Wed. Renal Tomos Wed. Blacritique	**Positioning Lab for CD** • Position – Kidneys AP (bi and unilateral) – Obl. Kidney (bi and unilateral) – AP Bladder – Obl. Bladder • Assignment – Renal tomos (3) **Positioning Lab for AB** • Position – AP C Spine – Dens – Oblique – Lateral – Swimmer's • Assignment – AP and lat C. spine **Applied Lab** – Review of previous Level 2 views **Rad Eval Lab** – Hips – Quiz Shoulder	**CR Imaging for IVP lab** IVP quiz • Leave Pixie phantoms on Rm 2 and Rm 6 tables • All groups rotate thru rooms 2 and 6 – 45 minutes maximum allowed for tomos. • Demo ureteric compression application and release. • All groups to complete sensitometry • Additional practice sheets to be submitted **Darkroom Use for C. Spine Lab** • C. spine quiz • Use filter for lat. C-spine • Demo shoulder depression methods. • Demo ureteric compression application and release. • Additional practice to be completed prior to next lab. • All groups to complete sensitometry – seek help if you missed demo

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Week / Number	Lab Dates	# of Lectures and Topics	Lab Contents/Format	Notes
13	Nov. 29 – Dec 3 Sets ABCD	**ABCD** Mon. IVP Contrast Media Tues. Contraindications Checklists Wed. Adverse Reactions Wed. Review Topics	**Positioning Lab for AB only** • Position – Kidneys AP (bi and unilateral) – Obl. Kidney (bi and unilateral) – AP Bladder – Obl. Bladder • Assignment – Renal tomos (3) **Applied Lab for AB only** – Review **Rad Eval Lab for ABCD sets** – C. Spine views – Quiz Hip views	**Darkroom Use** • IVP quiz • Leave Pixie phantoms on Rm 2 and Rm 6 tables • All groups rotate thru rooms 2 and 6 – 45 minutes maximum allowed for tomos. • Demo ureteric compression application and release. • All groups to complete sensitometry – seek help if you missed demo • Additional practice sheets to be submitted