



**MACQUARIE UNIVERSITY  
DEPARTMENT OF HEALTH & CHIROPRACTIC  
DIVISION OF ENVIRONMENTAL & LIFE SCIENCES  
UNIT OUTLINE CHIR 879 RADIOLOGICAL STUDIES I**

**Year and Semester: 2008 Semester 1**

**Unit convenor: Peter Bull**

**Prerequisites: HLTH204, HLTH307, HLTH308**

Students in this unit should read this unit outline carefully at the start of semester. It contains important information about the unit. If anything in it is unclear, please consult one of the teaching staff in the unit.

The 2008 academic teaching year commences on Monday 25 February 2008 and concludes on Friday 5 December 2008.

**ABOUT THIS UNIT**

This unit introduces the principles of musculoskeletal imaging and radiographic practice. It covers the terminology and concepts of radiological diagnosis. Students learn to identify & differentiate pathological conditions of the spine and extremities. It introduces radiographic positioning of the extremities, emphasizing the importance of correct exposure factors and accurate positioning techniques

This unit forms part of a suite of units in radiological science that leads to eligibility for licensure to own & operate x-ray equipment.

**TEACHING STAFF**

**Unit Convenor**

Dr Peter Bull <a href="mailto:pbull@els.mq.edu.au">pbull@els.mq.edu.au</a>	E7A Rm 231 9850 9383
Consultation Hours	By Appointment

### Unit Lecturers

Dr Peter Bull	As above
Consultation Hours	

All unit outlines must include details of how to contact staff, and if there are formal consultation times they must be adhered to or students advised to the contrary.

### CLASSES

- 1 x 2hr lectures pw
- 1 x 1hr lecture pw
- 1 x 2 hour tutorial every alternate week
- Self-directed study: 1 - 2 hours/ week
- The timetable for classes can be found on the University web site at:  
<http://www.timetables.mq.edu.au/>

### REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

- Yochum, T., & Rowe, L., 2005, Essentials of Skeletal Radiology – Vols I & II, (3rd ed.) Lippincott, William & Wilkins, Baltimore.
- Bull PW. Course Notes in Radiography 2008

### UNIT WEB PAGE

- The web page for this unit can be found at: [www.chiro.mq.edu.au](http://www.chiro.mq.edu.au) and following the links for either Postgraduate or Undergraduate students
- You will need a log in for access to the lecture notes, this will be provided to you in your first lecture.

### LEARNING OUTCOMES

*"The eye does not see what the brain does not know" – Yochum & Rowe*

Students will develop a comprehensive understanding of diseases and disorders that are identifiable with plain film and advanced imaging. Students will learn the hallmark appearances of these conditions and develop pattern recognition skills that allow the differentiation of those appearances.

Each topic is considered from the following criteria:

- Clinical features
- Pathogenesis
- Radiological features
- Differential diagnoses
- Treatments & prognoses

Students will also learn the correct radiographic positioning techniques for extremity radiography. Students will be able to practically demonstrate the positioning for the major areas of skeletal radiography.

At the completion of this course students will be expected to have a comprehensive knowledge of those common disease processes that affect the skeleton and to identify the hallmark x-ray appearances of those conditions. To understand the pathogenesis and to be able to provide a logical differential diagnosis based on the various x-ray appearances, patient history and clinical features.

The student can then formulate a clinical plan of management including any appropriate referral for advanced imaging.

In addition to the discipline-based learning objectives, all academic programs at Macquarie seek to develop students' generic skills in a range of areas. One of the aims of this unit is that students develop their skills in the following:

**1. Academic skills:**

Able to become more reflective

Able to improve cognitive/reasoning skills

Able to problem solve

Able to think critically and independently

Able to apply and adapt knowledge to the real world

Able to understand data collection instruments

Able to analyse / interpret and work with data

Able to critique

Able to improve creative thinking

**2. Information technology / literacy:**

General computer literacy

Able to use the internet

Able to use library resources

**3. Self-management skills:**

Able to work independently

Able to plan and organize learning activities

Able to become more self aware

**4. Communication skills:**

Improve general literacy skills

Improve language skills (particularly for international students)

Improve general discussion skills

Improve listening and comprehension skills

Able to become flexible and open to the ideas of others

## TEACHING AND LEARNING STRATEGY

Include lecture format augmented with slide presentations of x-ray cases.

**RADLAB** teaching files are utilised along with various CD-ROM programs.

Practical tutorials will develop radiographic positioning skills.

## RELATIONSHIP BETWEEN ASSESSMENT AND LEARNING OUTCOMES

Both written and practical examinations will be held at the end of the semester.

Written exams will constitute 50% of total assessment, while practical slide identification & practical radiography exams will constitute 50% of total assessment.

Practical exams in radiography will require the student to discuss and role play a radiographic examination. The student will be expected to know the radiographic protocols for the case history given and discuss any further or optional imaging that might ensue in the clinical environment.

Films will not be taken during the practical exam. Knowledge of radiographic exposures and radiographic critique will be asked during the oral viva. Each practical exam is a maximum of 10 mins (5 mins for positioning) and therefore only one projection in the described series will be asked to be demonstrated through role-play. Two examiners shall be present at all times. Please note that only projections demonstrated in tutorials will be examined in practical exams. Additional projections will be presented in lectures and may be examined theoretically.

\*Please note : There is always difficulty with practical class sizes, therefore student co-operation in the allocation of practical classes would be appreciated. Practical classes are limited to 15. Students are not able to swap their practical class once allocated as it disadvantages other students. 80% attendance to these tutorials is a unit requirement.

Students are encouraged to practice on the anatomical phantoms as much as possible during the course as well as to practice positioning on each other. Students are not under any circumstances allowed to make an exposure without the supervision of a Radiography tutor. (This is in breach of the Radiation Licensing Act, and will result in serious disciplinary action.)

## ASSIGNMENTS

### Submission of Assignments in 2008

1 All assignments must be submitted to the appropriate assignment box for your unit. Assignment boxes are located in the reception area of the ELS Centre (Room 101), which is on the ground floor at the western end of building E7A. Campus maps are available at <http://www.bgo.mq.edu.au/campus.htm>. The Centre opens from 8.30am to 5.30pm on Monday to Friday.

2 All assignments are to be submitted by 5.00pm on the date specified and must include a completed and signed coversheet stapled to the front cover. The Assignment Cover Sheet can be downloaded from the web at [www.els.mq.edu.au](http://www.els.mq.edu.au), click on *Assignment Cover Sheet*.

### Examinations

The University Examination period in for First Half Year 2008 is from Wednesday 11 June to Friday 27 June 2008.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations.

<http://www.timetables.mq.edu.au/exam>

The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration. Information about unavoidable disruption and the special consideration process is available at

<http://www.reg.mq.edu.au/Forms/APSCon.pdf>

If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period. (Individual Divisions may wish to signal when the Division's Supplementaries are normally scheduled.)

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is the final day of the official examination period.

## PLAGIARISM

The University defines plagiarism in its rules: "Plagiarism involves using the work of another person and presenting it as one's own." Plagiarism is a serious breach of the University's rules and carries significant penalties. You must read the University's practices and procedures on plagiarism. These can be found in the *Handbook of Undergraduate Studies* or on the web at: <http://www.student.mq.edu.au/plagiarism/>

The policies and procedures explain what plagiarism is, how to avoid it, the procedures that will be taken in cases of suspected plagiarism, and the penalties if you are found guilty. Penalties may include a deduction of marks, failure in the unit, and/or referral to the University Discipline Committee.

## UNIVERSITY POLICY ON GRADING

Academic Senate has a set of guidelines on the distribution of grades across the range from fail to high distinction. Your final result will include one of these grades plus a standardised numerical grade (SNG).

On occasion your raw mark for a unit (i.e., the total of your marks for each assessment item) may not be the same as the SNG which you receive. Under the Senate guidelines, results may be scaled to ensure that there is a degree of comparability across the university, so that units with the same past performances of their students should achieve similar results.

It is important that you realise that the policy does not require that a minimum number of students are to be failed in any unit. In fact it does something like the opposite, in requiring examiners to explain their actions if more than 20% of students fail in a unit.

The process of scaling does not change the order of marks among students. A student who receives a higher raw mark than another will also receive a higher final scaled mark.

For an explanation of the policy see

<http://www.mq.edu.au/senate/MQUonly/Issues/Guidelines2003.doc> or

<http://www.mq.edu.au/senate/MQUonly/Issues/detailedguidelines.doc>.

## STUDENT SUPPORT SERVICES

Macquarie University provides a range of Academic Student Support Services. Details of these services can be accessed at <http://www.student.mq.edu.au>.

### 1. INTRODUCTION

#### TOPIC OUTLINE

- Terminology
- Principles of diagnostic image interpretation (ABCs)
- Plain film radiography
- [CT](#)
- [MRI](#)
- Scintigraphy
- SPECT
- Ultrasound
- Tomography
- Contrast examinations
- PET
- Technical considerations

#### LEARNING OBJECTIVES

After you have studied this topic you should be able to:

- i. Describe the various radiographic positioning terms.
- ii. Describe the production of x-rays and the production of a radiographic image.
- iii. Identify the various diagnostic processes for interpreting images – ABCs.
- iv. Describe the operation of a CT scanner and MRI generator.
- v. Identify T1- & T2- weighted images of the spine.
- vi. Describe the principles of scintigraphy & SPECT.

### 2. NORMAL SPINAL ANATOMY & CONGENITAL ANOMALIES OF THE SPINE

#### TOPIC OUTLINE

- Plain film radiography
- [CT](#) & [MRI](#)
- Normal radiographic anatomy
- [Occipitalisation](#)
- [Paramastoid process](#)
- [Posterior ponticle](#)

- [Odontoid anomalies](#)
- [Spina bifida occulta](#)
- [Segmentation defects](#) - block vertebrae, Klippel-Feil Syndrome, Sprengel's deformity
- [Non-union of spinous processes](#)
- [Cervical ribs](#)
- [Hahn's venous grooves](#)
- [Nuclear impressions](#)
- [Hemi-vertebrae](#)
- [Butterfly vertebrae](#)
- [Knife-clasp deformity](#)
- [Tropism](#)
- [Transitional segments](#)
- [Agenesis](#)
- [Limbic bone](#)
- Scoliosis

## LEARNING OBJECTIVES

After you have studied this topic you should be able to:

- i. Describe the various anomalies in the development of the spine.
- ii. Describe any associated clinical features.
- iii. Identify normal spinal anatomy on plain radiographs & axial CT.

## 3. SPONDYLOLYSIS & SPONDYLOLISTHESIS

### TOPIC OUTLINE

- Definitions
- Prevalence
- Aetiology
- Classification
- Clinical features
- Radiological features
- Instability evaluation
- CT, MRI, SPECT
- Adolescent athletes
- Treatment & prognosis
- Impairment rating

## **LEARNING OBJECTIVES**

After you have studied this topic you should be able to:

- i. Describe the aetiology of spondylolysis.
- ii. Describe the various classifications of spondylolysis/spondylolisthesis.
- iii. Describe the clinical and radiological features.
- iv. Describe methods for evaluating instability.
- v. Describe the various advanced imaging techniques.
- vi. Identify special considerations for the elite & adolescent athlete.

## **4. THE SPINE IN TRAUMA**

### **TOPIC OUTLINE**

- Cervical spine fractures & dislocations
- Causative forces
- Spinal stability
- Common eponyms
- Case studies
- Thoracic spine fractures & dislocations
- Complications
- Lumbar spine fractures & dislocations
- Chiropractic management
- Sacrum & coccyx fractures
- Pelvis fractures
- Classifications
- Stable & unstable injuries
- Avulsion injuries

## **LEARNING OBJECTIVES**

After you have studied this topic you should be able to:

- i. Describe the various fractures and dislocations.
- ii. Identify the various causative forces.
- iii. Describe stability & instability.
- iv. Identify the various common eponyms for these injuries.
- v. Describe the various complications associated with these injuries.
- vi. Describe the management for these injuries.

## **5. SKELETAL TRAUMA**

### **TOPIC OUTLINE**

- Types of fractures & dislocations
- Fracture orientation
- Fracture healing
- Traumatic articular lesions
- Epiphyseal injuries (Salter-Harris classification)
- Complications
- Fractures of:

Skull & facial bones (LeFort's classification)

Lower limb

Upper limb

Thorax

- Stress fractures
- Advanced imaging – CT, MRI, scintigraphy

### **LEARNING OUTCOMES**

After you have studied this topic you should be able to:

- i. Describe the various types of fractures & dislocations.
- ii. Describe the processes involved in fracture healing.
- iii. Describe the Salter-Harris classification for epiphyseal injuries.
- iv. Describe the various complications involved with fractures & dislocations – non-union, avascular necrosis, soft-tissues.
- v. Describe LeFort's classification of facial injuries.
- vi. Describe the classification of skull fractures.
- vii. Describe the various regional fractures including their common eponyms.
- viii. Identify the use of advanced imaging in injury assessment.
- ix. Describe the pathophysiology of stress fractures.

## **6. SKELETAL DYSPLASIAS**

### **TOPIC OUTLINE**

- Achondroplasia

- Cleidocranial dysplasia
- Epiphyseal dysplasias
- Fibrodysplasia Ossificans Progressiva (Munchmeyer's disease)
- Holt-Oram Syndrome
- Infantile Cortical Hyperostosis (Caffey's syndrome)
- Marfan's Syndrome
- Metaphyseal dysplasia
- Nail-patella Syndrome (HOOD or Fong's disease)
- Ehlers-Danlos syndrome
- Massive osteolysis of Gorham
- Mucopolysaccharidoses –Hurler's, Morquio's
- Osteogenesis imperfecta
- Melorheostosis
- Osteopathia striata
- Osteopetrosis
- Osteopoikilosis
- Progressive diaphyseal dysplasia
- Pyknodystosis
- Tuberous sclerosis

## **LEARNING OUTCOMES**

After you have studied this topic you should be able to:

1. Identify the main distinguishing clinical & radiological features of the above dysplasias.
2. Understand the various complications these cases present to the chiropractor

## **7. BONE INFECTION**

### **TOPIC OUTLINE**

- SUPPURATIVE OSTEOMYELITIS
- BRODIE'S ABSCESS
- CHRONIC OSTEOMYELITIS
- CHILDHOOD INFLAMMATORY DISCITIS
- SEPTIC ARTHRITIS
- NONSUPPURATIVE OSTEOMYELITIS (TUBERCULOSIS)
- SYPHILITIC OSTEOMYELITIS
- MYCOTIC OSTEOMYELITIS

# **PERIPHERAL RADIOGRAPHY**

## **1. WEEK 2-3**

### **Upper limb 1:**

- Fingers,
- Hand,
- Wrist,
- Forearm

## **2. WEEK 4-5**

### **Upper limb 2:**

- Elbow,
- Humerus,
- Shoulder girdle

## **3. WEEK 6-7**

### **Lower limb 1:**

- Toes,
- Foot,
- Ankle
- Tib/fib

## **4. WEEK 8-9**

### **Lower Limb 2:**

- Knee,
- Femur,
- Hip joints

## **5. WEEK 10-11**

### **Pelvic girdle**

## **WEEK 12-13 PRACTICAL EXAMS**