Course Outline

Campus Based Course staff

A/Professor N Tedla (Course Convenor), Dr P Polly, A/Professor G Velan (Head of Teaching in Pathology), Professor N Hawkins (Head of School), Professor R Kumar, Dr M Dziegielewski, Dr B Kan, Dr S Van Es, Dr C Van Vliet and Dr T Grassi.

Course Administration

Administrative and general problems related to your attendance, or the content and conduct of the course, can in the first instance be addressed by consulting A/Prof Nicodemus Tedla by e-mail (n.tedla@unsw.edu.au) and in the second instance be addressed by consulting A/Prof Gary Velan (g.velan@unsw.edu.au). Students wishing to see their tutors or other members of staff should call in at the School office (ground floor) and make an appointment with the assistance of the staff. If students have difficulties of a personal nature, they should contact the School's Grievance Officer, Dr P. Pandey or Professor Nick Hawkins, the Head of School.

Should you feel that there are particular circumstances that have affected your performance in the course; you should lodge an application for special consideration. The procedures involved in this are outlined in the UNSW Student Guide, and special forms are widely available on campus e.g. Student Health Centre, Student Centre.

Information on the different research units in the Department of Pathology and the research interests of each staff member is available at Department of Pathology's home page at http://medicalsciences.med.unsw.edu.au/

All students in course PATH3207 are advised that email is the official means by which the School of Medical Sciences at UNSW will communicate with you. All email messages will be sent to your official UNSW email address (e.g., z1234567@student.unsw.edu.au) and, if you do not wish to use the University email system, you MUST arrange for your official mail to be forwarded to your chosen address. The University recommends that you check your mail at least every other day. Facilities for checking email are available in the School of Medical Sciences and in the University library. Further information and assistance is available from DIS-Connect, Tel 9385 1777. The UNSW Library runs free email courses.

Course Details

This course is offered during Session 2 and carries six units of credit. Successful completion of an introduction to basic diseases processes in second year (PATH 2201 or PATH 2202) and molecular basis of diseases in third year (PATH 3205) as well as the following courses in anatomy (ANAT 2111, ANAT 2511, ANAT 1521 or ANAT 2241) are prerequisites for enrolment in the course. Attendance at all practical classes, offsite visits and more than 80% of the lectures is mandatory.

Course Objectives

PATH 3207 comprises teaching current concepts of musculoskeletal diseases including arthritis, metabolic bone diseases, neoplasms in bone, causes of musculoskeletal pain and limitations of movement and neuromascular diseases as well as detailed coverage of fracture healing and its complications, multiple traumas and of biomaterial and prosthetic devices relevant to orthopaedic applications.

Student Learning Outcomes

At the completion of this course you should be able to:

1. Describe and explain the molecular and cellular pathogenetic mechanisms of musculoskeletal and neuromuscular diseases
2. Describe the macroscopic and microscopic appearances of musculoskeletal and neuromuscular diseases
3. Correlate the clinical features of musculoskeletal and neuromuscular diseases with the underlying pathological processes and mechanisms
4. Describe the sensitivity, specificity, cost effectiveness and availability of laboratory and imaging investigations for the diagnosis of musculoskeletal diseases
5. Discuss recent advances in biomedical, bioengineering and molecular biological research related to the pathogenesis and treatment of musculoskeletal and neuromuscular diseases
6. Develop written and oral skills in scientific communication
7. Develop skills in peer review and assessment of scientific research

Graduate Attributes

The students will be encouraged to develop the following Graduate Attributes by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks; see Assessments on page 5:

1. An in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context.
2. The capacity for analytical and critical thinking, as well as for creative problem-solving
3. The ability to engage in independent, team-based and reflective learning
4. The skills of effective communication

Rationale for the Inclusion of Content and Teaching Approach

The intended learning outcomes are achieved through study of the common patterns of response to injury, which are often referred to as pathological processes. In depth study of mechanisms and causes unique to the musculoskeletal system are highlighted in context of the general pathological processes. To understand these processes, you will draw on your knowledge of normal anatomy, histology, biochemistry, physiology, general pathology and biomedical engineering.

This course will be beneficial to students wishing to pursue careers in the health sciences, especially in clinical rehabilitation medicine, biomedical research or hospital-based laboratory work. A sound understanding of musculoskeletal pathology should provide an effective framework from which to approach diagnosis and management of common clinical scenarios that you may well encounter in your future careers.

Teaching Strategies

The course employs a variety of teaching modes in order to facilitate your learning:

1) A series of lectures introduce you to pathological processes, as well as specific examples of those processes affecting the musculoskeletal system. These lectures are given by invited and campus based discipline experts.
2) Tutorials that are designed in a form of team-based collaborative learning that incorporate small group tutorials and a series of topical quizzes to be completed individually and as a team. It is anticipated that students will have an enhanced learning experience through the use of team-based learning and peer teaching. The tutorials intended to extend and amplify your understanding of material presented in lectures in an interactive format, where you are given opportunities to seek clarification on any aspect of the topocs covered, as well as to tackle concepts that might be difficult to grasp.
3) Practical classes that incorporate clinico-pathological correlation sessions are intended to allow you to apply your understanding of disease processes to microscopic and macroscopic appearances of disease in tissues (lesions), and to correlate these with the clinical manifestations. Computer-based virtual microscopy is utilised together with a variety of diagnostic imaging modalities and laboratory investigations, in order to permit correlation between disease processes, changes in cells and tissues at the microscopic level and the clinical manifestations of disease.
4) Evidence based symposia based on cutting edge topics in musculoskeletal diseases that are organised, designed, delivered and assessed by students working in small groups.
5) In order to relate knowledge acquired in the classroom to real-world situations, students have opportunities to visit state of the art research laboratories in musculoskeletal diseases, the Institute of Forensic Medicine at Glebe, a Department of Diagnostic Imaging, Departments of Rehabilitation Medicine and a Molecular Diagnostic laboratory.
6) Learning is supported via an eLearning Blackboard module (accessible via student number and zPass at http://lms-blackboard.telt.unsw.edu.au/. Announcements, timetables, lecture slides and other resources will be made available during the course.
7) The PATH3207 Student Manual contains specific learning objectives for tutorials and practical classes, together with the course timetable and useful background information.

Course Schedule

Week	Date	Time	Location	Lecturer	Title
2	25/7/2011	12	Biomed ThE	de Permentier	**Lecture** - Revision of Bone and Joint Histology
	27/7/2011	9	Biomed ThB	Tedla	**Lecture** - Pathological Basis of Bone/Joint pain and limitation of movement
	29/7/2011	3	WW G2/G4 WW 109/110	Tedla/Hameed/Shum/ Magarinos/Ahmadzai	**Tutorial** - Anatomy of Bone and Joints
	29/7/2011	4	WW G2/G4	Tedla/Hameed/Shum/ Magarinos/Ahmadzai	**Practical** - Histology of Bone and Joints
3	01/8/2011	12	Biomed ThE	Tedla	**Lecture** - Fracture Healing I
	03/8/2011	9	Biomed ThB	Tedla	**Lecture** - Fracture Healing II
	05/8/2011	3	WW G2/G4 WW 109/110	Tedla/Hameed/Shum/ Magarinos/Ahmadzai	**Tutorial** - Fracture Healing and Complications
	05/8/2011	4	WW G2/G4	Tedla/Hameed/Shum/ Magarinos/Ahmadzai	**Practical** - Histopathology of Fractures
					- Briefing on off-site visits
4	8/8/2011	12	Biomed ThE	Tedla	**Prelude to evidence-based symposium**
	10/8/2011	9	Biomed ThB	Grassi	**Lecture** - Back Pain
	12/8/2011	3	WW G2/G4	Grassi/ Hameed/Shum/ Magarinos/Ahmadzai	**Combined Tutorial and Practical** - Back pain
5	15/8/2011	12	Biomed ThE	Kumar	**Lecture** - Bone Tumours I
	17/8/2011	9	Biomed ThB	Kumar	**Lecture** - Bone Tumours II
	19/8/2011	3	WW G2/G4 WW 109/110	Tedla/ Hameed/Shum/ Magarinos/Ahmadzai	**Tutorial** - Primary and Secondary Bone Tumours
	19/8/2011	4	WW G2/G4	Tedla/ Hameed/Shum/ Magarinos/Ahmadzai	**Practical** - Histopathology of Bone Tumours
6	22/8/2011	12	Biomed ThE	Stanford	**Lecture -** Orthopaedic surgery: Joint Replacements
	24/8/2011	9	Biomed ThB	Walsh	**Lecture** - Advances in Experimental Approaches to Orthopaedics
	25/8/2011	9	St Georges Hospital	Cole	**Offsite visit** - Department of Rehabilitation Medicine, Group 1
	26/8/2011	9	St Georges Hospital	McIver	**Offsite visit** - Molecular Diagnostics Laboratory, Group 2
	26/8/2011	9	POWH	Walsh	**Offsite visit** - Experimental models of Orthopaedics, Group 3
	26/8/2011	9	Glebe	Duflou	**Offsite visit** - Department of Forensic Pathology, Group 4
	26/8/2011	9	NRA	Sturnieks	**Offsite visit** - Falls and Balances Laboratory, Group 5
7	29/8/2011	12	Biomed ThE	Vu	**Lecture** - Strains, Sprains and Dislocations
	31/8/2011	9	Biomed ThB	Morris	**Lecture –** Diagnostic Imaging of Musculoskeletal Diseases
	01/9/2011	9	St Georges Hospital	Cole	**Offsite visit** - Department of Rehabilitation Medicine, Group 2
	02/9/2011	9	St Georges Hospital	McIver	**Offsite visit** - Molecular Diagnostics Laboratory, Group 5
	02/9/2011	9	POWH	Walsh	**Offsite visit** - Experimental models of Orthopaedics, Group 4
	02/9/2011	9	Glebe	Duflou	**Offsite visit** - Department of Forensic Pathology, Group 3
	02/9/2011	9	NRA	Sturnieks	**Offsite visit** - Falls and Balances Laboratory, Group 1

Mid Session Break

Week	Date	Time	Location	Lecturer	Title
8	12/9/2011	12	Biomed ThE	McNeil	**Lecture** - Arthritis I
	14/9/2011	9	Biomed ThB	McNeil	**Lecture** - Arthritis II
	16/9/2011	3	WW G2/G4 WW 109/110	Kumar/ Hameed/Shum/ Magarinos/Ahmadzai	**Tutorial** - Arthritis
	16/9/2011	4	WW G2/G4	Kumar/ Hameed/Shum/ Magarinos/Ahmadzai	**Practical** - Histopathology of Arthritis and Clinical correlations
Part I on-line progress assessment with feedback commences on 19/9/11					
9	19/9/2011	12	Biomed ThE	McFarland	**Lecture -** New approaches in Musculoskeletal Repair
	21/9/2011	9	Biomed ThB	Kan	**Lecture** -Metabolic Bone Diseases
	23/9/2011	3	WW G2/G4 WW 109/110	Kan/ Hameed/Shum/ Magarinos/Ahmadzai	**Tutorial** – Metabolic Bone Diseases
	23/9/2011	4	WW G2/G4 WW 109/110	Kan/ Hameed/Shum/ Magarinos/Ahmadzai	**Practical** – Clinico-pathological correlations of metabolic Bone Diseases
10	26/9/2011 26/9/2011	12 12	Biomed ThF WW LG03	Tedla/Simar Polly/Barry	**Evidence-based symposium** **Evidence-based symposium**
	28/9/2011 28/9/2011	9 9	Biomed ThC WW LG03	Tedla/ Barry Polly/Simar	**Evidence-based symposium** **Evidence-based symposium**
	30/9/2011 30/9/2011	3 3	Biomed ThA/C WW LG02/03	Tedla/Simar Polly/Barry	**Evidence-based symposium** **Evidence-based symposium**
	30/9/2011 30/9/2011	4 4	Biomed ThA/C WW LG02/03	Tedla/Simar Polly/Barry	**Evidence-based symposium** **Evidence-based symposium**
03/10/2011 PUBLIC HOLIDAY					
11	05/10/2011	9	Biomed ThB	Polly	**Lecture** - Muscular Dystrophies
	07/10/2011	3	WW G2/G4	Polly	**Combined Tutorial and Practical** - Muscle Diseases
					DiGirolamo/Tam/Kee
Part I on-line assessment closes on 07/9/11					
12	10/10/2011	12	Biomed ThE	Tedla	**Lecture** - Head Injury
	12/10/2011	9	Biomed ThB	Velan	**Lecture -** Pathogenesis of Shock
	14/10/2011	3	WW G2/G4	Tedla/ Hameed/Shum/ Magarinos/Ahmadzai	**Combined Tutorial and Practical**-Head injury and Shock
Part II on-line progress assessment with feedback commences on 10/10/11					
13	17/10/2011	12	Biomed ThE	Kwok	**Lecture** – Pathological Basis of Upper and Lower Motor Neuron Lesions
	19/10/2011	9	Biomed ThB	Duflou	**Lecture** – Forensic Pathology of the Musculoskeletal System
	21/10/2011	3	WW G2/G4	Tedla/Shum/Magarinos	Practical Examination
Part II on-line assessment closes on 21/10/11					

NOTE: **Any** changes in timetable will be announced on Blackboard at http://lms-blackboard.telt.unsw.edu.au/
"POWH" refers to Prince of Wales Hospital: "NRA" refers to Neuroscience Research Australia
Timetable for the Offsite Visits may change at short notice if the host institutes have encountered unforeseen circumstances

Lecture Program Outline

Lecture Title	Lecturer	**Content outline**
Revision of bone and joint histology	PD	Types of bones and joints, histology of synovial joint, micro architecture of bone, processes of bone formation and bone re-modelling
Pathological bases of bone/joint pain and limitation of movement	NT	Aetiology, pathogenesis and diagnosis of bone and joint pain
Fracture healing I	NT	Types of fractures, stages of fracture healing, determinants of traumatic fracture healing and assessment of bone healing
Fracture healing II	NT	Acute, intermediate and chronic complications of fractures
Back Pain	TG	Aetiology and pathogenesis back pain: Comparison of intervertebral disc disease, degenerative joint disease and inflammatory arthropathies
Bone Tumours I	RKK	Types of bone tumours, macro and microscopic features, clinical features and complications
Bone Tumours II	RKK	Metastases to bone; sources of metastases, histopathological features; Involvement of the bone in haematological malignancies
Strains, sprains and dislocations	DV	Clinical evaluation of muscle, tendon, ligament and meniscus injuries with special emphasis to shoulder and elbow dislocation and knee and ankle injuries.
Advances in experimental approaches to orthopaedics	BW	Summary on a cutting edge research in experimental orthopaedics
Diagnostic imaging of musculoskeletal diseases	SM	An outline of types of imaging techniques available for musculoskeletal diseases and their indications, cost, advantages and disadvantages
Orthopaedic surgery: joint replacements	RS	Indications for joint replacement; procedures for hip and knee replacement; surgical outcomes, cost and complications
Metabolic bone disease	BK	Classification; macroscopic, microscopic, radiological and clinical features; complications
Arthritis I	PMcN	Rheumatoid arthritis: Aetiology, pathogenesis, clinical features, diagnosis and complications
Arthritis II	PMcN	Causes of arthritis; pathogenesis and clinical features of osteoarthritis and crystal induced arthropathies
Muscular dystrophies	PP	Causes and effects of muscular dystrophies, histo-pathological diagnosis and indications for muscle biopsies
New approaches to musculoskeletal repair	CM	Summary on a cutting edge research on new approaches in treatment of musculoskeletal damages
Pathogenesis of shock	GV	Definition, pathophysiology, causes and effects
Head injury	NT	Intracranial haemorrhage-epidural, subdural, subarachnoid, intracerebral: causes and effects
Upper and lower motor neuron lesions	JK	Pathological basis of UMN and LMN lesions, compare and contrast clinical manifestations and discuss underlying aetiology
Forensic pathology of musculoskeletal system	JD	Medico-legal relevance of investigation of death; Comparisons of coronial and hospital autopsy; Forensic investigation of musculoskeletal injuries

KEY:

Cole	A/Prof Andrew Cole	A/Prof, UNSW; Senior Rehabilitation Staff Specialist, St George Hospital
Duflou	A/Prof Jo Duflou	Associate Professor, Institute of Forensic Medicine, Glebe
Dziegielewski	Dr Mark Dziegielewski	Lecturer, SOMS, Department of Pathology, UNSW
Grassi	Dr Tanya Grassi	Lecturer, SOMS, Department of Pathology, UNSW
Kan	Dr Betty Kan	Lecturer, SOMS, Department of Pathology, UNSW
Kumar	Prof Rakesh Kumar	Professor, SOMS, Department of Pathology, UNSW
Kwok	Dr John Kwok	Research Fellow, Neuroscience Research Australia
McFarland	A/Prof Clive McFarland	A/Professor, Graduate School of Biomedical Engineering, UNSW
McIver	Dr Christopher McIver	Principal Hospital Scientist, Molecular diagnostics, St George Hospital
Morris	Dr Sarah Morris	Senior lecturer, Department of Radiology, POWH
Polly	Dr Patsie Polly	Senior lecturer, Department of Pathology, UNSW
Stanford	A/Prof Ralph Stanford	A/Professor, UNSW; Staff Specialist Orthopaedics, POWH
Sturnieks	Dr Daina Sturnieks	Senior Research Officer, Neuroscience Research Australia
Tedla	A/Prof Nicodemus Tedla	A/Professor, Department of Pathology, UNSW
Velan	A/Prof Gary Velan	A/Professor, SOMS, Department of Pathology, UNSW
Vu	Dr Dzung VU	Senior Lecturer, SOMS, Department of Anatomy, UNSW
Walsh	Prof Bill Walsh	Professor, UNSW; Orthopaedic Research Laboratories, POWH

Guide to Practical Classes

Practical classes and tutorials in Musculoskeletal Diseases are aimed at amplifying and extending your understanding of the topics gleaned from attendance at lectures and reading of the recommended text, as well as correcting any misconceptions. Hence, adequate preparation and active participation are essential.

Practical classes will reinforce the clinico-pathological correlations involved with each topic. They are intended to help you to acquire the ability to recognize the macroscopic and microscopic features of pathology specimens and to relate the pathology to clinical application. The format of each practical class will be at the discretion of the tutor. Macroscopic "pots" will be generally used in conjunction with projected microscopic slides, x-rays and other materials. Materials for the practical classes are located at http://vslides.unsw.edu.au/. Remember, it is much better to make a mistake in the relative safety of a practical class, than to make a critical error in an essay or exam because of misconception of basic pathological principles. ***It is highly recommended that you regularly visit the Museum of Human Disease*.**

A simple guide to description of macroscopic specimens ("pots")

The best approach to the study of macroscopic specimens in the Museum is to be systematic. As you cover each lecture topic this year, you should make it a point to visit the Museum to become familiar with macroscopic examples of that disease process, and other related conditions. One of the major tasks for you will be to learn how to differentiate with the naked eye between disease processes that at first glance have similar appearances. Sometimes this cannot be accomplished even by close examination, in which case you should formulate a list of differential diagnoses, in order of decreasing likelihood. All this takes time and careful attention to honing your skills of observation in the Museum. ***In addition to the specimens and related conditions covered during practical classes, you are expected to cover all specimens in Bay 6, ,Bay 16, Bay 17 and Bay 29.***

1) Anatomical description

Almost all macroscopic specimens will contain sufficient "normal" tissue for you to identify the organ(s) of origin. Hence a good appreciation of normal anatomy is required (i.e. pathology requires integration with your previous studies). Knowledge of the normal dimensions of organs is important in order to comment on pathological enlargement, distortion or shrinkage of tissue. The way in which the tissue has been mounted is also relevant. For example, bones are usually kept intact or cut longitudinally to display abnormalities in the bone marrow and medulla.

2) Description of the lesion(s)

A "lesion" is a recognisable abnormality in an organ or tissue caused by injury or disease. Lesions can be sub-classified into "focal" (localised), "multifocal" and "diffuse" (an abnormality of the entire organ or tissue). An example of a focal lesion is a tumour in the lower part of femur. You should describe focal lesions as you would describe a lump in a surgical patient, e.g. "There is a mass lesion 5 cm in diameter above the knee, pushing the periosteum and extending to the overlying muscle. The mass is predominantly solid and whitish in colour, with focal areas of brown-red discolouration (haemorrhage) and softening (necrosis)."

3) Identification of the major pathological process

Once you obtain a basic knowledge of the classification of disease, it is possible to categorise abnormalities in tissue as traumatic, inflammatory (acute or chronic), vascular (thrombosis, embolism, infarction, haemorrhage), disorders of growth (atrophy, hyperplasia, hypertrophy, hamartoma, neoplasia - benign or malignant, primary or metastatic), metabolic or degenerative. For example, the qualities of the bone lesion described above are typical of a primary malignant tumour - a single, abnormal, invasive mass that has overgrown the surrounding tissue, with areas of necrosis and haemorrhage (indicative of rapid growth).

4) Related lesions and complications

It is important to integrate your description with your theoretical knowledge of disease causation and complications. For example, wrinkled skin (solar elastosis) surrounding a skin cancer on the back of the hand is caused by the same agent as the tumour - ultraviolet radiation. In the above example, it is important to note whether the bone tumour has been complicated by invasion to the blood vessels and or spread to other bones (as osteosarcomas often do), because this has prognostic implications.

5) Anatomical diagnosis

The diagnosis is no longer a guessing game once you become aware of the basic pathological principles - your description justifies the selection of which pathological process(es) are operative, which you then relate to the anatomy and to your knowledge of the natural history of disease to formulate a tissue diagnosis. In the above example, the diagnosis is "primary osteosarcoma of the lower femur, complicated by metastases to the vertebrae".

Remember: Your descriptive skills will only improve with practice. It is recommended that students work through the Museum in pairs or small groups - one student is armed with a textbook, lecture notes and Museum catalogue, while the other(s) act as "the guinea pig" and are required to describe and identify the specimens. **Be warned: it is useless for you to look at a number on a specimen, refer to that number in the Museum catalogue and learn it by rote.** That is not an approach befitting thoughtful prospective professionals. It is much better to look carefully at a specimen, attempt to identify the disease process, justify your diagnosis, and only then refer to the catalogue, textbook and lecture notes. In the event that you are unable, even after careful thought and referral to the text, to work out why a particular diagnosis was made, then you should ask your tutor at a convenient time.

A simple guide to writing histopathological descriptions

Haematoxylin and eosin are used for staining all routine sections, and special stains are used only to confirm or refute the presence of a particular substance in the tissue. In addition, histochemistry, immunohistochemistry and electron microscopy may be used extensively in the hospital situation to confirm a clinical diagnosis. Haematoxylin is preferentially taken up by nucleic acids and stains them blue, hence any highly cellular tissue will appear blue (basophilic). Other sources of basophilia include hyaline cartilage, calcium salts and bacterial colonies. Eosin is preferentially taken up by proteins, hence any proteinaceous tissue will appear pink (eosinophilic). Clear spaces may be caused by fat (washed out by aqueous fixatives), water or air. If you have an atlas of histology you may find it useful at these classes. We assume that you are acquainted with the normal histological appearances of human tissues - if not, revise this prior to examining the histopathology slides.

Armed with the basics outlined above, it is possible to write a histopathological description, which should possess the following components:

1) Anatomical and General Description

- **Draw a simple sketch of the main features** to remind you of these areas when you look at the screen or look down at the microscope. This can be used to clarify your description, e.g. area A in the sketch is strongly eosinophilic and is an area of haemorrhage, B is palely eosinophilic and is an area of fibrosis, etc.
- **Make a general statement that both identifies the tissue and indicates whether the lesion is focal or diffuse.** For example, "*Slide 44 is a 2 X 2 cm section of peripheral lung tissue (i.e. it contains no major bronchi) including one pleural surface that contains a focal basophilic lesion labelled area A. The surrounding normal lung tissue is labelled area B." Or "Slide 25 is a section through the left ventricle measuring 2 X 1.5 cm including pericardium, myocardium and endocardium. The tissue is diffusely abnormal."*

2) Description of the Major Lesion and Identification of the Major Pathological Process

- These elements require a thorough appreciation of the entirety of the section. Such an appreciation cannot be achieved by using only the 40X objective, which will result in failure to see the forest for the trees. Remember the following maxim: Use a low-power objective and a high-powered mind (not *vice versa*)!
- Avoid the trap of describing each abnormal feature in the order that you discover it, without any regard to its relationship to the totality of the lesion. That is, your description requires prior thought, interpretation and planning. By all means jot down your observations on scrap paper, but then order them (so as to exhibit your understanding of "the big picture"). The major pathological process (e.g. acute inflammation, malignant neoplasia) should then become obvious to the informed reader even before you have named it.

3) Identification of Related Lesions

- Sections may contain abnormalities that either share a common aetiology with or predispose to the major lesion (e.g. solar damage to dermal collagen in skin adjoining a melanoma), or else complicate the main lesion (e.g. invasion of dermal lymphatic vessels by melanoma cells). Linking of these elements requires an alert mind (which we hope you already possess) and an understanding of the natural history of disease (which you will acquire with study). Some complications are so important that it is necessary to comment on their absence (e.g. lymphatic or venous invasion by malignant neoplasms).

4) Tissue Diagnosis

- This should bring together the anatomy, major lesion and any related lesions in a concise fashion with the use of all relative descriptive adjectives (e.g. chronic osteomyeilits with multiple areas of acute inflammation and bacteria).

Team based learning

At the commencement of this course you will be divided into four tutorial groups and each tutorial group will be subdivided into four teams, each consisting six students. Each team will have a mixture of abilities and backgrounds. The aim of this teaching approach is to enhance your learning experience through the use of individual and team quizzes and peer-teaching and discussions.

The role of the tutor is not to give you another lecture; but to facilitate your interactive discussions and assist you clarify some challenging concepts presented in your lectures, practical classes and/or text books. You are therefore strongly urged to make adequate preparation for these tutorials and encouraged to participate. Attendance at all these tutorials is mandatory and is assessable.

Pre-reading will be allocated prior to each tutorial. Each tutorial will commence with a quiz (based on the pre-reading), which will first be attempted individually and the answers submitted to your tutor. The same quiz questions will then be attempted in teams, with each team submitting their consensus answers. The tutor will guide you through the answers, encourage discussion and provide clarifications regarding of the challenging questions and concepts. Some of the tutorials will have additional tasks to be completed on a worksheet in your course manual. *Please bring your course manual to all the tutorials and practical classes.*

You will receive a maximum of **2%** towards your final course mark for each tutorial quiz, comprising **1**% for your individual performance and **1%** for your group's performance. Over the course of 5 tutorials, this will contribute to **10%** of your final marks.

The names in each tutorial group and team will be posted on Blackboard at http://lms-blackboard.telt.unsw.edu.au/. The same teams will work together to develop presentations for the Evidence-Based Symposium.

Evidence based symposium

The evidence based symposium is a collection of group presentations on cutting-edge topics in musculoskeletal diseases. These presentations are aimed to enhance students' skills in team work, effective communication and peer-review processes in line with learning outcomes 5, 6 and 7 described in the Course Outline.

The selection of topics will take place on week 4**, Monday 8th August 2011.** On this day teams will be allocated a random topic by a lottery from a pool of relevant topics.

On week 7, no later than the **2nd of September 2011 before 5:00pm**, students will submit a 400 word Abstract by e-mail to n.tedla@unsw.edu.au. This abstract will outline their upcoming presentations on week 10. *Please follow the strict Abstract format outlined below.*

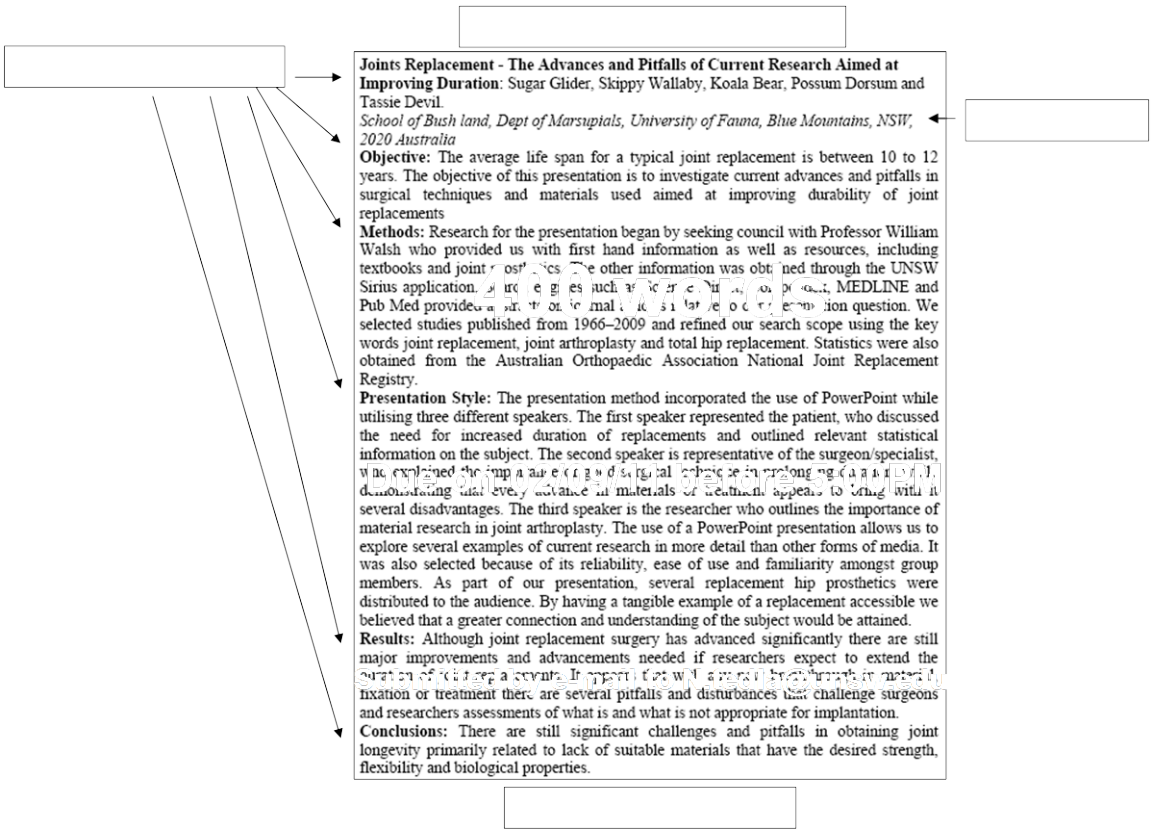
On weeks 10 and 11, students will make a 10 minute (maximum) group presentation followed by an additional 5 minutes for question time as part of a symposium. Several one hour sessions will be set aside for students to present their work to the rest of the group. Presentation style is at the discretion of each group (examples include PowerPoint presentations, Video, You Tube, role play, Interview, etc.). Groups can choose their spokesperson beforehand, although all students are expected to contribute equally and the performances of each individual may affect the group's results. The presentation will need to be supported by a thorough literature review. At the end of the presentation, questions relating to the presentation can be asked to any member of the group by students and members of academic staff.

15% of the total final mark is allocated for this assignment of which **2.5%** will be determined by members of the group that will provide their collective score of each group member at the end of their presentation. **2.5%** will be determined by peers in the audience and **10%** will be allocated by academic staff (see assessment criteria on pages 12-14).

Attendances to all of these presentations are mandatory. Students who fail to attend will lose 1 mark for each day they did not attend and will lose 2 marks if they did not turn up for their own group presentation.

The timetable for the Evidence Based Symposium will be posted on Blackboard at http://lms-blackboard.telt.unsw.edu.au/

Format for Evidence Based Symposium Written Abstract



Joints Replacement - The Advances and Pitfalls of Current Research Aimed at Improving Duration: Sugar Glider, Skippy Wallaby, Koala Bear, Possum Dorsum and Tassie Devil.

School of Bush land, Dept of Marsupials, University of Fauna, Blue Mountains, NSW, 2020 Australia

Objective: The average life span for a typical joint replacement is between 10 to 12 years. The objective of this presentation is to investigate current advances and pitfalls in surgical techniques and materials used aimed at improving durability of joint replacements

Methods: Research for the presentation began by seeking council with Professor William Walsh who provided us with first hand information as well as resources, including textbooks and joint [illegible] The other information was obtained through the UNSW Sirius application. [illegible] MEDLINE and Pub Med provided [illegible] ion question. We selected studies published from 1966–2009 and refined our search scope using the key words joint replacement, joint arthroplasty and total hip replacement. Statistics were also obtained from the Australian Orthopaedic Association National Joint Replacement Registry.

Presentation Style: The presentation method incorporated the use of PowerPoint while utilising three different speakers. The first speaker represented the patient, who discussed the need for increased duration of replacements and outlined relevant statistical information on the subject. The second speaker is representative of the surgeon/specialist, who explained the [illegible] demonstrating that every advance in materials or treatment appears to bring with it several disadvantages. The third speaker is the researcher who outlines the importance of material research in joint arthroplasty. The use of a PowerPoint presentation allows us to explore several examples of current research in more detail than other forms of media. It was also selected because of its reliability, ease of use and familiarity amongst group members. As part of our presentation, several replacement hip prosthetics were distributed to the audience. By having a tangible example of a replacement accessible we believed that a greater connection and understanding of the subject would be attained.

Results: Although joint replacement surgery has advanced significantly there are still major improvements and advancements needed if researchers expect to extend the [illegible] fixation or treatment there are several pitfalls and disturbances that challenge surgeons and researchers assessments of what is and what is not appropriate for implantation.

Conclusions: There are still significant challenges and pitfalls in obtaining joint longevity primarily related to lack of suitable materials that have the desired strength, flexibility and biological properties.

Evidence Based Symposium assessment forms

Marking scheme for member assessment

Student Name: …….

Group number: …….

Assessors names: ……

	0	0.5
Participation in the planning of the presentation		
Execution of allocated tasks effectively and on time		
Attendance to meetings called on by group members		
Contribution to group discussion		
Scientific quality of contribution		
Total		

Justification:…….
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……
……

Signature:……. **Date:**……...

Marking scheme for peer assessment

Presenting group:……

Topic:

Student Assessor: Name…… Group No.

	0	0.5
Originality of presentation		
Clear explanation of the most important aspects of topic		
Evidence of inclusion of recent medical literature		
Evidence of critical evaluation of the literature		
Answering relevant questions		
Total		

Comments:

Signature: ……. **Date:** ……

Marking scheme for assessment by academic staff

Group number: …….

Assessor's name: ……

	0	0.5	1.0
Demonstrate an understanding of the topic and how it fits into the point of discussion			
Demonstrate effective communication of the most important aspect of the topic			
Ability to effectively discuss questions on the topic			
Demonstrate an ability to utilise the current medical literature to support argument			
Clear and justified conclusions			

Comments:……
……
……
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……
……

Signature: ……. **Date:** ……

Off-site visits

On weeks 6 and 7 students will be divided into five groups for visits to Professor Bill Walsh's Orthopaedics laboratory at the Prince of Wales Hospital, the Institute of Forensic Medicine, Glebe, Orthotics and Prosthetics clinics, St George Hospital, Kogarah, Falls and Balances Laboratory, Neuroscience Research Australia Randwick, and Molecular Diagnostics laboratory, Department of Microbiology, St George Hospital, Kogarah. Each randomly selected group will visit two of the five venues. The aim of these visits are to provide students with the opportunity to integrate and apply theoretical knowledge learned throughout the course to the analytical or research-based approaches used to study Musculoskeletal Diseases.

The timetable provided for these visits are **outside the regular timetable for PATH3207** and may be subject to changes at a short notice due to unforeseen circumstances in the host institutions. For those who cannot attend **both** offsite visits due to timetable clashes should contact A/Professor Tedla for alternate assignments on campus.

The visit to the Institute of Forensic Medicine may involve observing autopsies on people who died due to traumatic injuries. However, it is not guaranteed that students will witness an autopsy. If students have the opportunity to view an autopsy, the cause of death might not necessarily be due to musculoskeletal-related conditions. ***This visit is optional*** - students who might find it distressing to witness an autopsy are advised not to attend, and instead to utilise this time to study specimens relevant to this course in the Museum of Human Disease. There will be a pre-visit orientation and post-visit debriefing session for those who attend Institute of Forensic Pathology. Any student who is distressed by their experience at Institute of Forensic Medicine should contact Dr Tedla as soon as possible after the visit.

Students will complete a 'reflective' written piece (750 words) which gives an account of their experience during the practical off-site visits or related activities to be submitted on **14th of October 2011 before 5:00pm** at the Administrative Wing, Ground Floor Wallace Wurth Building Room G3.

There is no specific format for the reflective writing. A successful completion of the visits and submission of reflective assay will account to **5%** of your final marks.

The timetable for the Off-site visits will be posted on Blackboard at http://lms-blackboard.telt.unsw.edu.au/

Assessment

Students will undertake multiple forms of assessment during the session

1) **Evidence based symposium** is a group presentation that comprises **15%** of the final mark. Of the **15%** total mark, **2.5%** will be determined by members of the group, **2.5%** by peer assessment and **10%** will be allocated by academic staff on the basis of content, presentation, use of relevant literature and ability to answer questions on the topic (see assessment forms on pages 12-14).
2) **Tutorial quizzes** are **weekly** individual and group assessments in a form of multiple choice questions and will comprise **10%** of the final mark (**1%** for each 5 individual quizzes and **1%** for each 5 group quizzes). Each tutorial will commence with a quiz which will first be attempted individually and the answers submitted to your tutor. The same quiz questions will then be attempted in teams, with each team submitting their consensus answers. The tutor will guide you through the answers, encourage discussion and provide clarifications regarding of the challenging questions and concepts. Some of the tutorials will have additional tasks to be completed on a worksheet in your course manual. *Please bring your course manual to all the tutorials and practical classes.* Each quiz is primarily based on the two lectures given during same week and a pre-reading that will be allocated prior to each tutorial. You are therefore strongly advised to attend and review the lectures and perform the allocated pre-reading before you come to the tutorial.
3) **Two online progress assessments in week 9 and week 12** (**5%** of the final mark), each consisting of 10 questions focusing on learning outcomes 1, 2, 3 and **4** described in the Course Outline. These on-line assessments encourage **independent and reflective learning. This occurs in a** non-threatening environment, without fear of embarrassment for making errors. These assessments are to be completed during the 10 days in which each is available (students will be notified in lectures when this will be). Students may attempt the assessments as often as they wish within the time allowed until they receive a satisfactory score (>90%). The aim of these assessments is to provide students with feedback on their progress rather than to rank students. Students will receive **2.5%** of the total mark for satisfactory completion of **each** of the assessments.
4) **A practical examination in week 13.** Students will complete a practical exam during the final week of term (scheduled in normal teaching time) **con**stituting **20%** of the final mark for the course. Th**is w**ill consist of a series of 10 stations, each with questions based on material presented during term focused on learning outcomes 2, 3, 4 and 5 described in the Course Outline. Students will rotate around the stations, spending 3 minutes per station.
5) **Reflective report on off-site visits.** Students will be asked to complete a 'reflective' written piece (750 words) which gives an account of their experience during the practical off-site visits or related activities. This written reflection will be due on the **14th of October 2011 before 5:00pm** at the Administrative Wing, Ground Floor Wallace Wurth Building Room G3. The aim of this assessment is to provide students with the opportunity to integrate and apply theoretical knowledge learned throughout the course to the analytical or research-based approaches used to study Musculoskeletal Diseases. Students will receive **5%** of the final mark for satisfactory completion of this assessment. Late submissions will not be accepted.
6) **End of course written examination.** At the end of the session there will be written exam that accounts for **45%** of the final mark. The questions assess all the learning outcomes and encourage an in-depth understanding of the pathology of musculoskeletal diseases in a clinical and research context. Marks will be weighted as follows: Short answer questions 25% and Objective items 20%. The short answer questions vary in style, but are intended to provide you with the opportunity to demonstrate your understanding of the topic and your ability to integrate ideas rather than simple "regurgitation of facts". The objective items consist of 20 multiple choice questions where the best or most appropriate answer is chosen from among alternatives.

Sample Examination Paper

SAMPLE EXAMINATION FORMAT FOR 2011

(1) TIME ALLOWED: 1.5 HOURS.

(2) ANSWER ALL QUESTIONS.

(3) ANSWER **PART A** QUESTIONS 1 AND 2 IN SEPARATE BOOKS. WRITE LEGIBLY IN INK.

(5) ANSWER **PART B** USING THE GENERALISED ANSWER SHEET PROVIDED.

(6) THIS PAPER MAY NOT BE RETAINED BY THE CANDIDATE.

PART A (25 Marks)

1. Explain to a healthy 20-year-old female how she might be able to prevent herself from developing osteoporosis later in life.

(10 marks)

2. A 22-year-old man was brought by ambulance to the Energency Department. One hour previously, he had been driving a car and was involved in a high-speed head-on collision. He had not been wearing a seat belt. Immediately after the accident, he briefly lost consciousness and recovered soon after. On arrival to the hospital he was disorientated and was gradually losing consciousness. Initial examination revealed multiple abrasions to the head, fracture on the left side of the skull and some bleeding from the left ear. What injuries might this patient have sustained? Explain how these might have developed.

(15 marks)

PART B (20 marks)

This part of the examination consists of 20 questions, each containing 5 statements. For each question, select the **BEST or MOST APPROPRIATE** answer (i.e that which is most relevant for the disease and/or its consequences) from among the alternatives, several or all of which may be true. On the supplied generalised answer sheet, **FILL IN** the corresponding circle. **USE PENCIL**.

1. Antibody tests are useful in the diagnosis of:
   - (A) Parkinson disease
   - (B) Multiple sclerosis
   - (C) Segmental demyelination
   - (D) Myasthenia gravis
   - (E) Motor neuron disease
2. Osteosarcomas:
   - (A) May arise in bones affected by Paget's disease
   - (B) Usually metastasise to local lymph nodes
   - (C) May show areas of cartilage formation
   - (D) Commonly arise in the metaphyses of long bones
   - (E) Are associated with exposure to ionising radiation
3. Intervertebral disc herniation:
   - (A) Characteristically occurs at L3/L4

(B) Is commonly associated with facet joint degeneration

(C) Typically leads to spondylolisthesis

(D) Usually results in anterior protrusion of the nucleus pulposus

(E) Affects athletes more frequently than the elderly

4. Duchenne muscular dystrophy:

(A) Dystrophin is present in large quantities

(B) Clinical expression occurs in adolescence and progression inevitable

(C) It is the most common of the X-linked muscular dystrophies

(D) Is commonly associated abnormal muscle and nerve fibres

(E) Pulmonary infection is a rare complication

5. Rheumatoid Arthritis:

(A) Is associated with periarticular osteoporosis and juxta-articular erosions

(B) Is characterised by a florid polymorphonuclear cell infiltrate within hyperplastic vascular synovium

(C) Yields chronic inflammatory cells on aspiration of synovial fluid

(D) Is associated with elevated serum rheumatoid factor in approximately 95% of cases

(E) Typically presents as a chronic, asymmetrical, joint arthropathy

Answers: 1D, 2D, 3E, 4B, 5A

Resources for Students

You are expected to acquire the following text:

Pathologic Basis of Disease, 8th Ed. V. Kumar, R. Cotran & S Robbins (2007), Saunders & Co.

Students wishing to study clinical features of diseases and diagnosis in greater depth might consider the purchase of the following texts:

1. *ORTHOPAEDIC, Examination, Evaluation and Intervention.* Mark Dutton (2004). McGraw Hill.
2. *DIAGNOSTIC MUSCULSKELETAL IMAGING*. Theodore T Miller & Mark E. Schweitzer (2005). McGraw Hill.
3. *MUSCULOSKELETAL EXAMINATION*. Jeffrey Gross, Joseph Fetto & Elaine Rosen 3rd Ed (2009). Wiley Blackwell.
4. *Histology and Cell Biology*. *An Introduction to Pathology*. Abraham L. Kierszenbaum. Mosby (2002).

Additional Learning Resources

In addition, there are many resources available on the web, which vary from simple patient information brochures to on-line pathology courses to information on the latest research. Some general sites you may find useful are:

Medline Plus ('health topics' index of disease with information)

http://www.nlm.nih.gov/medlineplus/healthtopics.html

University of Iowa (on-line histological slides on many of the topics covered)

http://www.medicine.uiowa.edu/pathology/nlm_histology/or

http://www.medicine.uiowa.edu/pathology/uarep_histopathology/

American Arthritis Foundation (Patient information and latest research on arthritis) http://www.arthritis.org

National Institute of Arthritis and Musculoskeletal and Skin Diseases

http://www.niams.nih.gov/

Neuromuscular Disease Centre, Washington University, St Louis, MO USA

http://www.neuro.wustl.edu/neuromuscular/

Muscle Physiology, University of California, San Diego

http://muscle.ucsd.edu

PATH 3207 Web Site

The online module for the Musculoskeletal Disease course can be found by logging in to Blackboard at http://lms-blackboard.telt.unsw.edu.au/, using your student number as the user name (e.g. z1234567) and your zPass as the password. The PATH3207 Blackboard module will contain information directly related to the course such as tutorial lists, revisions to the lecture timetable, links to PDF versions of lecture slides and iLecture recordings, links to online assessments, essay marks, examination timetables etc. **You are expected to visit this site regularly during your course.**

PATH3207 Virtual slide box and images

Students will be able to access microscopic slides to all practical classes at: http://vslides.unsw.edu.au/

Images of Disease CD-ROM

Each student who has done Path 2201 should have a copy of the Images of Disease CD that may be used for some of the practical classes and homework tasks. If you do not have the CD, please contact Ms Soo Han Chup for a copy.

The Museum of Human Disease

The Donald Wilhelm Museum of Human Disease is located on the ground floor of the Samuels Building (Building F25). Originally located on the 5th floor of the Wallace Wurth Building, it was established by Professor Donald Wilhelm, the Foundation Professor of Pathology at this university. Thanks to his foresight, and to the tireless efforts of Dr G. Higgins (the Museum Curator until 2004), the Museum has been meticulously maintained and updated over the years to reflect the changing patterns of disease in our society. The Museum contains over 2,700 specimens (or "pots"), which display diseased human tissue at the macroscopic level, usually preserved in formalin. Specimens are obtained both from organs removed surgically and from tissue

obtained at autopsy, where the natural history of disease is in full view. **Please take note that some specimens of diseases which have become rare, e.g. diphtheria, are over 60 years old, and are irreplaceable.** Each specimen is numbered and is accompanied by a clinical history (when known), a macroscopic description of the abnormalities displayed, and a histopathological description of changes at the microscopic level (where relevant). That information, specific to each of thirty areas (or "bays"), can be found in the Museum catalogues located in a bracket within each bay.

All the specimens in the museum are arranged in one or other of two major groups. One group comprises collections of specimens according to pathological processes such as congenital, inflammation and healing, vascular, neoplasia etc. The second group comprises collections of specimens under organ systems, such as cardiovascular, central nervous, renal etc. As responsible adults, we expect you to maintain decorum in the museum behave with care and respect for the integrity of the specimens, and help to keep the Museum tidy at all times. This means no eating or drinking in the Museum, and always returning specimens and catalogues to their allocated places. **Do not shake the pots!** This activity conveys no useful information, but often damages the specimens. If you discover that a specimen is leaking or broken, follow the instructions listed in the safety notice below. **Remember that the Museum is a precious learning resource, of which you are encouraged to make full use**.

Security in the Museum

It is a crime under the Human Tissue Act to steal or mistreat material preserved in the Museum or practical class laboratories. Anyone who contravenes the Act will be prosecuted.

In order to protect the collection of specimens, access to the Museum is restricted for students during weekdays from 8 a.m. to 8 p.m. The Museum is security locked, and can only be entered by using your student card to enable the doors to be opened. Mr Derek Williamson, Mrs Cato and Mr Strack Van Schijndel play a supervisory role during office hours.

The Museum and practical class laboratories are under constant electronic surveillance.

Safety in the Museum

- Always handle museum specimens with care and respect. All specimens consist of generously donated human tissue.
- The specimens are preserved in fixative solutions which contain a variety of toxic compounds:

Chemical	Percentage Composition
Glycerol	1.6 (v/v)
Saturated Camphor in Ethanol	0.16 (v/v)
Sodium Acetate	0.08 (w/v)
Formalin	0.16 (v/v)
Sodium Dithionate	0.25 (w/v)

- For reasons of hygiene, never take food or drink into the museum.
- Never leave a museum specimen on the floor, or in any precarious position.
- If a specimen is leaking, turn it upside down to prevent further leakage, then immediately inform Mr Vincent Strack Van Schijndel or a member of academic staff.
- If a specimen is broken, do not attempt to wipe up the spillage. Use the kitty litter provided in the central cupboards to absorb the fumes, then clear the area and immediately inform Mr Vincent Strack Van Schijndel or a member of academic staff.
- Remember that the museum is here for your benefit - your cooperation in maintaining neatness and safety at all times is appreciated.

For more information on matters related to occupational and health safety policies of the UNSW visit the following web site. www.riskman.unsw.edu.au/ohs/ohs.shtml