



UNSW
AUSTRALIA

Medical Sciences
Medicine

Department of Pathology

PATH3207
Musculoskeletal Diseases

Course Outline
2015

CRICOS Provider Code 00098G

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Please read this outline in conjunction with the following pages on the

[School of Medical Sciences website](#)

- [Advice for Students](#)
- [Learning Resources](#)

Course Outline

Campus Based Course staff

Dr Mark Dziegielewski, Dr Betty Kan, Professor Rakesh Kumar, Dr Matthew Meerkin, A/Professor Nicodemus Tedla (Course convenor), A/Professor Patsie Polly, A/Professor Gary Velan

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.

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/>

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 in basic Histology (ANAT 2511) and Anatomy (ANAT 2111, ANAT 1521 or ANAT 2241) are prerequisites for enrolment in the course. Molecular basis of inflammation and infection in third year (PATH 3205) is highly recommended. Attendance at all tutorials, practical classes and to more than 80% of the lectures is mandatory.

Course Objectives

PATH3207 comprises teaching current concepts of musculoskeletal diseases including arthritis, metabolic bone diseases, neoplasms in bone, causes of musculoskeletal pain and limitations of movement and neuromuscular 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 pathogenic 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, molecular and biological research related to the 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.

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 topics 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. A midsession written exam with group and individual feedback aimed at familiarising students with the end of the year practical and written exams and providing students with tailored feedback.
6. Two sessions of group discussion/feedback on homework tasks, the midsession exam and specific student questions.
7. Learning is supported via a [Moodle](#) module: announcements, timetables, lecture slides and other resources will be made available during the course.
8. The PATH3207 Student Manual contains specific learning objectives for tutorials and practical classes, together with the course timetable and useful background information.

Recommended Text

You are expected to use the following text available online via the UNSW library Sirius website at <http://sirius.library.unsw.edu.au> (zID and zPass required). Search for the database MD Consult, then search for Robbins Basic Pathology. *Robbins Basic Pathology*. 9th edition. V. Kumar, A.K. Abbas, & J.C. Aster (2012). Saunders & Co. Philadelphia PA; Elsevier Saunders.

Robbins and Cotran Pathologic Basis of Disease 9th edition. V. Kumar, A.K. Abbas & J.C. Aster (2013) Elsevier Saunders is highly recommended for students wishing to study the molecular biology or clinical features of diseases in greater depth. That text is also available via MD Consult.

Research Opportunities

Opportunities exist for all students wishing to undertake undergraduate and postgraduate research program within the School of Medical Sciences. Information can be accessed via the Faculty of Medicine directory for the School of Medical Sciences at: <https://medicalsciences.med.unsw.edu.au/research>

Students are also encouraged to communicate with invited guest lecturers that are active in research and clinical practice.

Course Evaluation and Development

Periodically student evaluative feedback on the course is gathered, using UNSW's Course and Teaching Evaluation and Improvement (CATEI) Process and an in-house course evaluation questionnaire. This questionnaire is included in the manual to be completed by all students during Practical Class 11 (week 11) to provide feedback on the course. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback.

Course Schedule

Week	Date	Time	Location	Lecturer	Title
1	28/7/2015	12	LG02	de Permentier	Lecture - Revision of Bone and Joint Histology
	29/7/2015	13	LG02	Kumar	Lecture - Pathological Basis of Bone/Joint pain and limitation of movement
	31/7/2015	9	WW G6/G7 WW G16/G17	Doolan/Isaac Brette/Zarzour	Tutorial - Anatomy of Bone and Joints
	31/7/2015	10	WW G6/G7	Tedla/ Doolan/Isaac Brette/Zarzour	Practical - Histology of Bone and Joints
2	04/8/2015	12	LG02	Tedla	Lecture - Fracture Healing I
	05/8/2015	13	LG02	Tedla	Lecture - Fracture Healing II
	07/8/2015	9	WW G6/G7 WW G16/G17	Doolan/ Isaac Brette/Zarzour	Tutorial - Fracture Healing and Complications
	07/8/2015	10	WW G6/G7	Tedla/Doolan/ Isaac Brette/Zarzour	Practical - Histopathology of Fractures
3	11/8/2015	12	LG02	Tedla	Prelude to evidence-based symposium
	12/8/2015	13	LG02	Kan	Lecture – Differential diagnosis of back pain
	14/8/2015	9	WW G6/G7	Kan/Doolan/ Isaac Brette/Zarzour	Combined Tutorial and Practical - Back pain
4	18/8/2015	12	LG02	Dziegielewski	Lecture - Bone Tumours I
	19/8/2015	13	LG02	Dziegielewski	Lecture - Bone Tumours II
	21/8/2015	9	WW G6/G7 WW G16/G17	Doolan/ Isaac Brette/Zarzour	Tutorial - Primary and Secondary Bone Tumours
	21/8/2015	10	WW G6/G7	Tedla/Doolan/ Isaac Brette /Zarzour	Practical - Histopathology of Bone Tumours
5	25/8/2015	12	LG02	Di Girolamo	Lecture – Prelude to postgraduate research training
	26/8/2015	13	LG02	O'Neill	Lectures - Arthritis I and Arthritis II
	28/8/2015	9	WW G6/G7 WW G16/G17	Doolan/ Isaac Brette/Zarzour	Tutorial - Arthritis
	28/8/2015	10	WW G6/G7	Tedla/Doolan/Isaac Brette/Zarzour	Practical - Histopathology of Arthritis and Clinical correlations
6	01/9/2015	12	LG02	Vu	Lecture – Strains, Sprains and Dislocations
	02/9/2015	13	LG02	Morris	Lecture - Diagnostic Imaging of Musculoskeletal Diseases
	04/9/2015	9	WW G6/G7		MIDSESSION EXAM
7	08/9/2015	12	LG02	Stanford	Lecture - Orthopaedic surgery: Joint Replacements
	09/9/2015	13	LG02	McFarland	Lecture - New approaches in Musculoskeletal Repair
	11/9/2015	9	WW G6/G7 WW G16/G17	Doolan/Isaac Brette/Zarzour	FEEDBACK – MIDSESSION EXAM
	11/9/2015	10	WW G6/G7	Tedla/Doolan/ Isaac Brette/Zarzour	Revision – Homework Tasks

Week	Date	Time	Location	Lecturer	Title
8	15/9/2015	12	LG02	Duflou	Lecture: Forensic pathology of musculoskeletal system
	16/9/2015	13	LG02	Tedla/ Di-Girolamo	Evidence-based symposium
	16/9/2015	13	LG03	Polly/Herbert	Evidence-based symposium
8	18/9/2015	9	LG02	Tedla/Herbert	Evidence-based symposium
	18/9/2015	9	LG03	Polly/ Di-Girolamo	Evidence-based symposium
	18/9/2015	10	LG02	Tedla/Herbert	Evidence-based symposium
	18/9/2015	10	LG03	Polly/ Di-Girolamo	Evidence-based symposium
Midsession Break					
9	22/9/2015	12	LG02	Meerkin	Lecture – Metabolic Bone Diseases
	23/9/2015	13	LG02	Moorhouse	Lecture – Neuromuscular transmissions and their disorders
	25/9/2015	9	WW G6/G7 WW G16/G17	Doolan/Isaac Brettle/Zarzour	Tutorial – Metabolic Bone Diseases
	25/9/2015	10	WW G6/G7	Meerkin/Doolan/Isaac Brettle/Zarzour	Practical – Clinico-pathological correlations of metabolic Bone Diseases
Midsession Break					
10	06/10/2015	12	LG02	Polly	Lecture – Normal and abnormal muscle histology
	07/10/2015	13	LG02	Buckland	Lecture – Pathological basis of neuromuscular diseases
	09/10/2015	9	WW G6/G7	Polly/Doolan/Issac Brettle/Zarzour	Combined Tutorial and Practical - Muscle Diseases
Online Revision Quiz with Automated Feedback Opens on 06/10/2015					
11	13/10/2015	12	LG02	Dziegielewski	Lecture - Head Injury
	14/10/2015	13	LG02	Bowring	Lecture - Rehabilitation of Neuro-Musculoskeletal Diseases
	16/10/2015	9	WW G6/G7	Tedla/Doolan/Isaac Brettle/Zarzour	Combined Tutorial and Practical - Head injury
12	20/10/2015	12	LG02	Birznieks	Lecture – Pathological Basis of Upper and Lower Motor Neuron Lesions
	21/10/2015	13	LG02	Velan	Lecture – Pathogenesis of shock
	23/10/2015	9	WW G6/G7	Tedla	Revision - Homework Tasks
	30/10/2015	9	WW G6/G7	Tedla/ Brettle	Practical Examination
Online Revision Quiz with Automated Feedback Closes on 27/10/2015					

NOTE: Any changes in timetable will be announced on [Moodle](#).

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 remodelling
Pathological bases of bone/joint pain and limitation of movement	RKK	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
Prelude to evidence-based symposium	NT	Introduction to the protocols and guidelines of the symposium, selection of topics and outline of timetable.
Differential diagnosis of back pain	BK	Aetiology and pathogenesis back pain: Comparison of intervertebral disc diseases, degenerative, and inflammatory joint diseases and non-skeletal causes of back pain.
Bone Tumours I	MD	Types of bone tumours, macro and microscopic features, clinical features and complications
Bone Tumours II	MD	Metastases to bone; sources of metastases, histopathological features; Involvement of the bone in haematological malignancies
Prelude to postgraduate research training	ND	Outline the major fundamentals required for a successful honours year in pathology and discussion on career pathways post-honours
Arthritis I	SO'N	Polyarthritis with special emphasis on aetiology, pathogenesis, clinical features, diagnosis and complications of rheumatoid arthritis, and brief outline of spondyloarthropathy and mixed connective tissue diseases as relevant differential diagnoses
Arthritis II	SO'N	Oligoarthropathies: causes; pathogenesis and clinical features of osteoarthritis, crystal arthropathies and septic arthritis
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.
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
New approaches to musculoskeletal repair	CM	Summary on a cutting edge research on new approaches in treatment of musculoskeletal damages
Forensic pathology of musculoskeletal system	JD	Medico-legal relevance of investigation of death; Comparisons of coronial and hospital autopsy; Forensic investigation of musculoskeletal injuries
Metabolic bone disease	MM	Classification; macroscopic, microscopic, radiological and clinical features; complications
Neuromuscular transmissions and their disorders	AM	Structures of neuromuscular junctions, processes of neuromuscular transmission and pathophysiology of common neuromuscular disorders
Normal and abnormal muscle histology	PP	Basic description of skeletal muscle structure, physiology and histology; Genetic, biochemical and structural abnormalities of muscular dystrophies.

Lecture Title	Lecturer	Content outline
Pathological basis of neuromuscular diseases	MB	Clinical and histo-pathological features of myopathy, myasthenic disorders, and neurogenic disorders resulting in muscle disease; investigation of muscle diseases and indications for muscle biopsy.
Rehabilitation of musculoskeletal diseases	GB	Outline indications, general approaches and effectiveness of rehabilitation programs in common Neuro-Musculo-Skeletal diseases; Discuss cost effectiveness of rehabilitation.
Head injury	MD	Intracranial haemorrhage-epidural, subdural, subarachnoid, intracerebral: causes and effects
Upper and lower motor neuron lesions	IB	Pathological basis of UMN and LMN lesions, compare and contrast clinical manifestations and discuss underlying aetiology
Pathogenesis of shock	GV	Definition, pathophysiology, causes and effects of shock

KEY:

Bowring	Dr Greg Bowring	Senior lecturer, FAFRM (RACP), UNSW; Staff Specialist, POWH
Buckland	A/Prof Michael Buckland	MBBS PhD FRCPA, Head Neuropathology, Royal Prince Alfred Hospital, SydU
Di Girolamo	A/Prof Nick Di Girolamo	A/Professor, SOMS, Department of Pathology, UNSW
Duflou	Prof Jo Duflou	Professor, Chief Forensic Pathologist, Sydney South West Area Health Service
Dziegielewski	Dr Mark Dziegielewski	Lecturer, SOMS, Department of Pathology, UNSW
Kan	Dr Betty Kan	Senior lecturer, SOMS, Department of Pathology, UNSW
Birznieks	Dr Ingvar Birznieks	Senior lecturer, SOMS, Department of Physiology, UNSW
McFarland	A/Prof Clive McFarland	A/Professor, Graduate School of Biomedical Engineering, UNSW
Meerkin	Dr Mathew Meerkin	Senior lecturer, SOMS, Department of Pathology, UNSW
Moorhouse	A/Prof Andrew Moorhouse	A/Professor, SOMS, Department of Neurophysiology, UNSW
Morris	Dr Sarah Morris	Senior lecturer, Department of Radiology, POWH
Polly	A/Prof Patsie Polly	A/Professor, Department of Pathology, UNSW
Tedla	A/Prof Nicodemus Tedla	A/Professor, Department of Pathology, UNSW
Stanford	A/Prof Ralph Stanford	A/Professor, UNSW and Staff specialist Orthopaedics, POWH
Velan	A/Prof Gary Velan	A/Professor, SOMS, Department of Pathology, UNSW
Vu	Dr Dzung Vu	Senior Lecturer, SOMS, Department of Anatomy, UNSW

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 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 1 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 2 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 osteomyelitis 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 of 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 to all of 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 mark.

The names in each tutorial group and team will be posted on [Moodle](#). 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 in week 3, **Tuesday 11th August 2015**. On this day teams will be allocated a random topic by a lottery from a pool of relevant topics.

Students will submit a 400 word Abstract by e-mail to n.tedla@unsw.edu.au in week 6, no later than 5 pm on **4th September 2015**. This abstract will outline each team's forthcoming presentation in week 8. *Please follow the strict Abstract format outlined below.* Late submission and/or inappropriately formatted abstracts will not be accepted.

In week 8, each team of students will give a 12-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, YouTube, 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 overall score. The presentation will need to be supported by a thorough literature review. At the end of the presentation, questions can be asked of any member of the group by students and members of academic staff.

15% of the final mark for the course is allocated for this task, of which **2.5%** will be determined by members of the group, who will provide their collective score for 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 the following pages). Attendance at all of the presentations is mandatory. Students will lose 1% for each day they do not attend and will lose an additional 2% if they do not attend their own group presentation.

The timetable for the Evidence Based Symposium will be posted on [Moodle](#).

Format for Evidence Based Symposium Written Abstract

Time New Roman, font 12, justified

Title and headings in Bold → **Joints Replacement - The Advances and Pitfalls of Current Research Aimed at Improving Duration:** Smith J, Kane SL, Lim K, Kwok J and Krishnan G.
School of Biomedical Engineering, University of NSW, 2052 Australia ← **Address in Italics**

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 prosthetics. The other information was obtained through the UNSW Sirius application. Search engines such as Science Direct, Compendex, MEDLINE and Pub Med provided abstracts on journal articles relative to our presentation 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 importance of good surgical technique in prolonging duration, while 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 duration of joint replacements. It appears that with any new breakthrough in material, 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. **Submitted by e-mail to n.tedla@unsw.edu.au**

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.

400 words

Margins 2.2 cm all around

Adaptive tutorials

These consist of 5 online adaptive tutorials focusing on learning outcomes 1, 2, 3 and 4. These highly integrated on-line tutorials are excellent means for students to revise some of the key concepts in the course. The aim of these tutorials is to provide students with prompt feedback on their progress that will assist their preparation for the exams. They will allow independent learning and provide a guide to each student's strengths and weaknesses for a given topic. Each adaptive tutorial will be first attempted under the guidance of your tutor, and will then be accessible via [Moodle](#) throughout the course.

Online Revision Quiz

This quiz consists of 20 questions focusing on learning outcomes 1, 2, 3 and 4. These online questions and subsequent feedback encourage independent and reflective learning. This occurs in a non-threatening environment, without fear of embarrassment for making errors. The aim of this quiz is to provide students with prompt feedback on their progress that will facilitate their preparation for the exams. The online quiz will be available from the 6th to 27th of October 2015.

Assessments

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.
- 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 of 5 individual quizzes and **1%** for each of 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. The recommended pre-readings are only a guide, additional reading on the subject from the prescribed textbooks is highly recommended.
- 3) **Mid-session written exam.** Students will complete a 45 minute written mid-session exam during week 6, on **Friday 4th September 2015 at 9:00am**. The exam consists of 5 multiple choice questions and 3 short answer questions that may include interpretation of diagnostic image(s), describing pathophysiological processes, description and diagnosis of a macroscopic specimen and/or writing histopathological reports. This will constitute **10%** of the final mark of the course. General feedback about the mid-session exam will be provided to each tutorial group during week 7, on **Friday 11th September 2015, 9-10 am**. Students who performed poorly in this exam may receive individual feedback either face-to-face or electronically. The aim of this assessment is to provide timely feedback on your progress and provide you with remedial assistance if needed.
- 4) **A practical examination in week 13.** Students will complete a practical exam on **Friday 30th October 2015, 9-11am in room G6/G7 WW Building**. This will constitute to **20%** of the final mark for the course. The exam will 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) **End of course written examination.** At the end of the session there will be written exam that accounts for **45%** of the final mark for the course. 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 the alternatives provided.

Sample Examination Paper

SAMPLE END OF COURSE EXAMINATION FORMAT FOR 2015

- (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 Emergency 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.

(10 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 metaphysis 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. Duchene 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 synovia
 - (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 use the following text available online via the UNSW library Sirius website at <http://sirius.library.unsw.edu.au> (zID and zPass required). Search for the database MD Consult, then search for Robbins Basic Pathology. *Robbins Basic Pathology*. 9th edition. V. Kumar, A.K. Abbas, & J.C. Aster (2012). Saunders & Co. Philadelphia PA; Elsevier Saunders.

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

1. *ROBBINS AND COTRAN, Pathologic Basis of Disease* 9th edition. V. Kumar, A.K. Abbas & J.C. Aster (2013) Elsevier Saunders. (highly recommended)
2. *ORTHOPAEDIC, Examination, Evaluation and Intervention*. Mark Dutton (2004). McGraw Hill.
3. *DIAGNOSTIC MUSCULOSKELETAL IMAGING*. Theodore T Miller & Mark E. Schweitzer (2005). McGraw Hill.
4. *MUSCULOSKELETAL EXAMINATION*. Jeffrey Gross, Joseph Fetto & Elaine Rosen 3rd Ed (2009). Wiley Blackwell.
5. *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 Moodle course

The PATH3207 [Moodle](#) module will contain information directly related to the course such as tutorial lists, revisions to the lecture timetable, examination timetables, links to lecture slides and iLecture recordings etc. **You are expected to visit this site regularly during your course.**

Online lecture slides

PDF version of most lecture slides will be uploaded to Moodle together with corresponding recorded lectures (Echo360). However, large numbers of lecture slides in this course are images that are not annotated but explained/discussed in during the lecture. Therefore, you are strongly advised to attend lectures in person. Note that no online recordings will be available for lectures that are of sensitive nature and those where intellectual property is protected.

PATH3207 Virtual slide box and images

Students will be able to access microscopic slides to all practical classes at:

<http://vslides.unsw.edu.au/>

Administrative Matters

You may also meet the following members of the School support staff during the course of the year:

Ms Soo Han Chup

Position: Administrative Officer, Department of Pathology

Location: SOMS Administration, Wallace Wurth Level 2

Phone: 9385 2528

E-mail: soohan.chup@unsw.edu.au

Ms Chup is responsible for organising lecture and tutorial timetable, assisting guest lecturers, distribution of Pathology manuals, and printing of teaching materials. Ms Chup will also assist in arranging interviews with academic staff within the Department.

Ms Carmen Robinson

Position: Student Advisors

Location: Room G27, Biosciences Building

Ms Robinson and Mr Ling are responsible for assistance with general enquiries, enrolment procedures and collection of assignments, special consideration and course timetable.

Phone: 9385 2464

E-mail: Carmen.Robinson@unsw.edu.au

Mr Ryan Ling

Position: Student advisor and Information Manager, SOMS

Location: Room G27, Biosciences Building

Please contact Mr Ling if you have any inquiries related to PATH3207 materials up-loaded to this site including lectures, assignments, timetables and communications. Mr Ling also maintains materials up-loaded to Moodle and serves as student advisor.

Phone: 9385 8301

E-mail: ryan.ling@unsw.edu.au

Mr Derek Williamson

Position: Museum Manager

Location: Room G04 Ground Floor Samuels Building, Building F25

Mr Williamson provides support for all undergraduate teaching programs. He plays a major role in broadening the use of the Museum of Human Disease by introducing an integrated learning program for senior high school students and community interest groups. Mr Williamson Co-ordinates a network of volunteers, who assist with the supervision of visitors from outside the University.

Phone: 9385 2190

E-mail: derek.williamson@unsw.edu.au

Mr David Cutting

Position: Museum Technical Officer/Laboratory Manager

Location: Room G06 Ground Floor Samuels Building, Building F25

Mr Cutting is responsible for the mounting and maintenance of Pathology Museum specimens, both on campus and in the associated teaching hospitals. Contact Mr Cutting immediately if there are any broken or leaking specimens in the Museum.

Phone: 9385 1722

E-mail: davecutting@unsw.edu.au

Ms Julia Kiss

Position: Museum Education Officer

Location: Room G06 Ground Floor Samuels Building, Building F25

Ms Julia Kiss assists Mr Williamson in delivering Museum learning programs and coordinating volunteers.

Phone: 9385 1522

Teaching Laboratories Risk Assessments

Medicine Teaching Laboratory

Student Risk Assessment

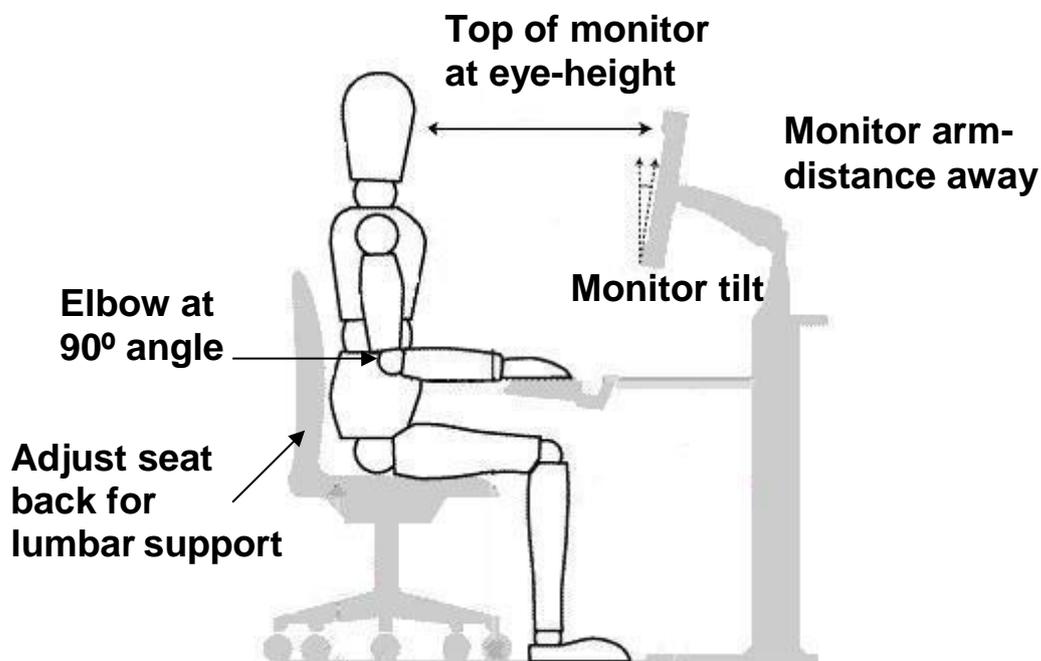


UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Pathology practicals in G6/G7 & G08 & G16/G17 at Wallace Wurth for PATH3207, 2015

Hazards	Risks	Controls
Ergonomics	Musculoskeletal pain	Correct workstation set-up.
Electrical	Electrical shock/fire	Check electrical equipment in good condition before use. All portable electrical equipment tested and tagged.
Handling pots	Chemical spillage	Instructions on correct manual handling of pots

Workstation set-up



Personal Protective Equipment

All pots contain real human tissue that has been generously donated to medical science and **must be treated with appropriate respect and dignity.**

Specimens are preserved in Perspex and contain a range of preserving chemicals that may be harmful. Chemicals used include **formalin, pyridine, sodium dithionate**. A full list of chemicals and associated MSDS information is available in the H&S Station and on the SoMS website.

MANUAL HANDLING OF POTS

It is recommended that all students wash their hands thoroughly as they leave practical class. Chemical residues may be present on pots.

Carry one pot at a time. Use two hands at ALL TIMES and support the base of pot.

Avoid rough handling and/or tilting of pots. This can cause leaking joints or tear tissue in specimen.

Limit the number of pots on a table at any one time.

SPILLS AND LEAKAGES

If a specimen is leaking or broken, do not attempt to wipe up the spillage. Clear the area and immediately inform the Museum Manager or a member of academic staff. A spill kit will then be used to absorb the fumes.

Emergency Procedures

In the event of an alarm, follow the instructions of the demonstrator. The initial sound is advising you to prepare for evacuation and during this time start packing up your things. The second sound gives instruction to leave. The Wallace Wurth assembly point is in the lawn in front of the Chancellery. In the event of an injury inform the demonstrator. First aiders and contact details are on display by the lifts. There is a first aid kit in the laboratory and the Wallace Wurth security office.

Clean up and waste disposal

Not necessary in these practicals.
No open-toe shoes allowed

Declaration

I have read and understand the safety requirements for this practical class and I will observe these requirements.

Signature:.....Date:.....

Student Number:.....

Reviewed on 04/07/2015



Hazards	Risks	Controls
Physical Sharp plastic	'Stabbing' wound of hand	<ul style="list-style-type: none"> • Use disposable gloves • Do not eat, drink or smoke in the teaching laboratory • Use disposable gloves • Low concentrations of chemicals used • Use disposable gloves
Biological Antibody	Inoculation/Irritant	
Chemical Acrylamide Azide ...PBS	Corrosive/Flammable Irritant/neurotoxic Irritant Mild Irritant	

Pipetting ergonomics: to avoid aches and pain due to repetitive pipetting follow the following guides

- Adjust your chair or stool so that your elbow is at a 90° angle while pipetting.
- Adjust the height and position of sample holders, solution container, and waste receptacle so that they are all approximately the same.
- Try to work with your hands below shoulder height.
- Let go of the pipette from time to time and give the fingers/hand a break
- Do not twist or rotate your wrist while pipetting; Use minimal pressure while pipetting
- Try to switch periodically between different types of work.

For more information on preventing repetitive strain while pipetting click on <http://www.anachem.co.uk/rsi>

Personal Protective Equipment required			
 Closed in Footwear	 Lab. Coat optional	 Gloves	 Safety Goggles optional

Emergency Procedures

In the event of an alarm sounding, stop the practical class and wait for confirmation to evacuate from demonstrators. Then wash your hands and pack up your bags. Follow the instructions of the demonstrators regarding exits and assembly points.

Clean up and waste disposal

- Remove your gloves and dispose in the biowaste bins provided.
- Dispose of all pipette tips in the bin provided.

Ethics Approval

This type of practical does not require ethics approval.

Declaration

I have read and understand the safety requirements for this practical class and I will observe these requirements.

Signature:.....Date:.....

Reviewed on 04/07/2015