ANAT3141

Functional Anatomy of the Limbs

Course Outline

Term 3, 2022

School of Medical Sciences

Faculty of Medicine & Health

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1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Dr Daina Sturnieks	limbs@unsw.edu.au	By appointment	9065 0367
Co-convenor	Dr Stanley Serafin	limbs@unsw.edu.au	By appointment	

2. Course information

Units of credit: 6

Pre-requisite(s): ANAT2111 or ANAT1521 or ANAT2511

Teaching times and locations: http://timetable.unsw.edu.au/2022/ANAT3141.html

2.1 Course summary

This course follows on from ANAT2111 and ANAT2511 and complements the other level III anatomy courses (ANAT3121 and ANAT3131). The course aims to provide a detailed understanding of the anatomy of the limbs and the functional principles underpinning limb movement including an understanding of the functional aspects of muscle, joints and the mechanics of movement. Lectures focus on the musculoskeletal anatomy of joints and joint movement of the limbs. This is correlated to movement as it is related to exercise conditioning, clinical case applications and surface anatomy. Laboratory classes involve the study of prosected and plastinated specimens, models, X-rays and surface anatomy. Tutorials focus on the anatomy of the limbs using the applications of clinical cases and muscle conditioning exercises - these use online learning tools.

2.2 Course aims

The course aims to:

1. provide students with an understanding of the organisational structure of the upper and lower limbs, and its embryological and evolutionary development
2. develop students understanding of the functional principles underpinning joint movements and muscle actions of the upper and lower limbs
3. develop students understanding of the variations in limb anatomy and its application to medical imaging
4. apply organisational structure of limb anatomy to develop an understanding surface/living anatomy

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Demonstrate knowledge of the anatomy of the upper limbs, and apply this to understand the principles related to joint movement and biomechanics
2. Demonstrate and apply knowledge of the anatomy of the lower limbs and apply this to understand the principles related to joint movement and biomechanics
3. Demonstrate an understanding of the development of the limbs, and their evolutionary adaptations for function
4. Apply knowledge of limb organisation to interpretation of medical imaging data
5. Demonstrate an understanding of the surface/living anatomy of the limbs

2.4 Relationship between course learning outcomes and assessments

Course Learning Outcome (CLO)	**LO Statement**	**Related Tasks & Assessment**
CLO 1	Demonstrate knowledge of the anatomy of the upper limbs, and apply this to understand the principles related to joint movement and biomechanics	1,2,3,4
CLO 2	Demonstrate and apply knowledge of the anatomy of the lower limbs and apply this to understand the principles related to joint movement and biomechanics	1,2,3,4
CLO 3	Demonstrate an understanding of the development of the limbs, and their evolutionary adaptations for function	1,2,3,4
CLO 4	Apply knowledge of limb organisation to interpretation of medical imaging data	1,2,3,4
CLO 5	Demonstrate an understanding of the surface/living anatomy of the limbs	1,2,3,4

3. Strategies and approaches to learning

3.1 Learning and teaching activities

Student interaction and engagement with the content of the course underpins all learning activities. Students are initially introduced to the anatomical region in the form of lectures incorporating multimedia-learning tools. With this knowledge in hand, students engage in learning activities during the laboratory sessions where the teacher/tutor guides the student and encourages each student to actively participate in their learning. Students are always encouraged to question, observe and share knowledge and experiences that help their learning and that of their peers. The anatomy laboratory is a wonderful and fascinating environment for discovery and students are given every opportunity to explore the cadaveric specimens, participate in active discussions and find answers for themselves.

Lectures: Lectures are used to present relatively large amounts of information within a given time on specific topics throughout the course. Lectures provide a preliminary overview of the region that is being studied. They will focus on the arrangement of the muscuoloskeletal elements that underpins the movement of the joints in the upper and lower limbs. The lectures will be based predominantly on the functioning of joints and movement. Aspects relevant to clinical situations and muscle conditioning, as well as surface anatomy will also be addressed. The lecturer will also try to allow some time for interaction and activities in each lecture to provide an opportunity to clarify or reinforce the ideas that have been presented.

Laboratories: Laboratory sessions complement the lectures and tutorials. The purpose of the practical components is to give students first-hand experience of the content covered. The laboratory sessions allow student to explore the functional mechanism of joints and the factors that stabilise it. Access to the anatomy laboratory is an awesome privilege and an essential part of reinforcing learning with first-hand exploration of human specimens. These sessions are conducted in small groups and involve active learning by studying human bones, prosected and plastinated specimens, models and radiographs. It is the student's responsibility to make sure that all the aims and activities for that laboratory class are fully understood at the end of the session.

Tutorials: Tutorials provide a more informal learning environment than a lecture. Sessions are structured to encourage student participation in activities and discussions designed to enhance learning. The student will benefit most with some preparation prior to attending the session. The focus of the tutorials in this course will be to apply the principles of functional anatomy of the limbs. Tissues biomechanics, how tissues respond to mechanical loading, including mechanisms of injuries, will also be covered. These tutorials will be supported with video resources on UNSWTV and other online platforms.

Independent study: There is insufficient time in the lectures, tutorials and practicals to develop a deep understanding of the concepts covered in this course. In order to achieve the learning outcomes that will be assessed, the student will need to revise the material presented in the course regularly. Additional reading beyond the lecture materials is encouraged in order to learn effectively. Relevant additional resources, including textbook chapters, will be cited in lecture and practical sessions.

3.2 Expectations of students

Students are reminded that UNSW recommends that a 6 units-of-credit course should involve about 150 hours of study and learning activities. The formal learning activities total approximately 50 hours throughout the term and students are expected (and strongly recommended) to do at least the same number of hours of additional study. Students are expected to engage with the recommended online learning activities to best prepare for

Attendance at laboratory practical classes and tutorials is compulsory and must be recorded in the class roll at the start of each class. Arrival more than 15 minutes after the start of the class will be recorded as non- attendance. It is your responsibility to ensure that the demonstrator records your attendance and no discussions will be entered into after the completion of the class. Satisfactory completion of the work set for each class is essential. It should be noted that non-attendance for other than documented medical or other serious reasons, or unsatisfactory performance, for more than 1 practical class during the session may result in an additional practical assessment exam or ineligibility to pass the course. Students who miss practical classes due to illness or for other reasons must submit a copy of medical certificates or other documentation to the course coordinator.

The laboratory practical class is an opportunity for students to develop graduate attributes by behaving in an ethical, socially responsible and professional manner within the practical class. Students must take due care with biological and hazardous material and make sure all equipment is left clean and functional. In the interests of safety, special attention should be paid to any precautionary measures recommended in this document and the Student Risk Assessment Form (pages 13-15). If any accidents or incidents occur, they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.

Students are responsible for meeting the requirements of entry to the anatomy laboratory, including completion of the Student Risk Assessment Form and wearing the required Personal Protective Equipment, as described on the course Moodle page.

For more details see Advice for Students-Practical Classes

Students are encouraged to use the Moodle discussion forum with queries related to the course and anatomical content. Personal issues can be emailed to the course email account (listed on the Moodle page), which will be attended to by the course convenors. All communications should be presented in a professional and respectful manner.

4. Course schedule and structure

This course consists of 6 hours of class contact hours per week. You are expected to take an additional 6 hours of non-class contact hours per week to complete assessments, readings and exam preparation.

Week [Date/Session]	Topic [Module]	Activity [Learning opportunity]	Related CLO
Week 1	Pectoral and Shoulder Regions: Bones, Joints and Muscles	Pectoral and Shoulder Regions laboratory. Shoulder Tutorial	CLO1 CLO3 CLO4
Week 2	Axilla and Arm Regions: Muscles, Spaces; Elbow Region: Cubital Fossa and Joints	Arm and Elbow Regions laboratory Elbow Tutorial	CLO1 CLO3 CLO4
Week 3	Forearm: Muscles	Forearm Region laboratory Wrist tutorial	CLO1 CLO3 CLO4
Week 4	Wrist Region: Bones, Joints & Spaces; Hand	Wrist and hand laboratory Hand tutorial	CLO1 CLO3 CLO4
Week 5	Upper Limb Innervation and Vasculature	Nerves and Vessels (Upper Limb) laboratory Upper limb tutorial	CLO1 CLO3 CLO4
Week 7	Pelvic Girdle and Gluteal Region: Bones, Joints and Muscles	**Spot Test 1** Gluteal Region & Hip Joint laboratory Hip tutorial	CLO2 CLO3 CLO4
Week 8	Thigh Regions: Bones, Joints and Muscles, Femoral Triangle; Knee Joint	Thigh Region laboratory Knee tutorial	CLO2 CLO3 CLO4
Week 9	Leg Region: Compartments and Muscles; Ankle Joint and Foot	Leg, Ankle and Foot Regions laboratory Ankle tutorial	CLO2 CLO3 CLO4
Week 10	Lower Limb Innervation and Vasculature; Gait	Nerves & Vessels (Lower Limb) laboratory Lower limb tutorial	CLO2 CLO3 CLO4

Exam Period: 25 November – 8 December
Supplementary Exam Period: 9 January – 13 January

5. Assessment

5.1 Assessment tasks

Assessment task	Length	Weight	Due date and time
Assessment 1: Continuous assessment	See task description for details	20	Weeks 2-10
Assessment 2: Spot test 1 – upper limb	1 hour	20	Week 7
Assessment 3: Spot test 2 – lower limb	1 hour	20	Exam Period: 25 November – 8 December
Assessment 4: Final examination	2 hours	40	Exam Period: 25 November – 8 December

Further information

UNSW grading system: https://student.unsw.edu.au/grades

UNSW assessment policy: https://student.unsw.edu.au/assessment

5.2 Assessment criteria and standards

Assessment 1: Continuous assessment

Continuous assessments are usually in the form of short tests consisting of multiple-choice questions (MCQ), and in the form of team activities involving applied anatomy problems during the tutorial sessions.

In these assessments, you will need to:

- demonstrate a thorough knowledge of the anatomical features of the limbs
- analyse and evaluate the involvement of muscles and other anatomical features in movement and stability
- understand links between functional anatomy, biomechanics and clinical conditions related to the limbs
- demonstrate practical laboratory skills in anatomy and an understanding of the ethics of working with human remains questions.

During group activities, all team members must actively contribute to the work submitted for assessment to be eligible for the assigned mark. Those absent or not contributing will be assigned no marks for that assessment.

Assessment 2&3: Spot tests

Two spot tests will assess your ability to identify significant structures and their relations and answer short theory questions related to these. In a spot test, students will be presented with prosected human specimens, models and radiographs and will be asked to identify labelled structures on the specimen and answer questions related to these structures. Your course convener will provide you with information on the number of stations and time allowed at least two weeks before the assessment. Spot test 1 will be conducted in week 7 and cover all of the upper limb. Spot test 2 will be conducted in the final exam period and cover all of the lower limb.

Assessment 4: Final examination

The purpose of this exam is to test your understanding of the concepts covered in the ENTIRE COURSE and to assess deeper learning (i.e. the ability to inter-relate information and concepts) and critical thinking. This is one 2-hour paper written during the examination period (25 November – 8 December 2022). The final examination will consist of multiple-choice questions and short answer questions.

5.3 Submission of assessment tasks

Late Submission

UNSW has standard late submission penalties as outlined in the UNSW Assessment Implementation Procedure, with no permitted variation. All late assignments (unless extension or exemption previously agreed) will be penalised by 5% of the maximum mark per day (including Saturday, Sunday and public holidays). For example, if an assessment task is worth 30 marks, then 1.5 marks will be lost per day (5% of 30) for each day it is late. So, if the grade earnt is 24/30 and the task is two days late the student receives a grade of 24 – 3 marks = 21 marks.

Late submission is capped at 5 days (120 hours). This means that a student cannot submit an assessment more than 5 days (120 hours) after the due date for that assessment.

Special Consideration

If you experience a short-term event beyond your control (exceptional circumstances) that impacts your performance in a particular assessment task, you can apply for Special Considerations.

You must apply for Special Consideration **before** the start of your exam or due date for your assessment, except where your circumstances of illness or misadventure stop you from doing so.

If your circumstances stop you from applying before your exam or assessment due date, you must **apply within 3 working days** of the assessment, or the period covered by your supporting documentation.

More information can be found on the Special Consideration website.

5.4. Feedback on assessment

This is a challenging course. The course conveners will endeavour to make this course interesting, relevant and a rewarding learning experience for you. Problem based questions have been included at the end of each practical in your laboratory manual – you are encouraged to work through these to provide yourself with feedback on your progress through the course.

During the practical sessions, you will also have an opportunity to try some practice spot-test- style questions. Answers for these will be provided as feedback to you on your progress. The continuous assessment multiple choice question quizzes are designed to give you continuous feedback on your

progress. Answers to these will be discussed immediately following the assessment. In addition, the virtual adaptive anatomy tutorials will be made available via a link in Moodle. These will provide you with immediate feedback and are to be used as a formative assessment tool.

More information is available on the Teaching Gateway:

- Grading and Giving Feedback
  http://teaching.unsw.edu.au/grading-assessment-feedback
- Giving Assessment Feedback
  https://teaching.unsw.edu.au/assessment-feedback

6. Academic integrity, referencing and plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism. Please use Vancouver or APA referencing style for this course.

Further information about referencing styles can be located at
https://student.unsw.edu.au/referencing

Academic integrity *is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits**:** honesty, trust, fairness, respect, responsibility and courage.*[1] *At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.*

Further information about academic integrity and ***plagiarism*** *can be located at:*

- *The Current Students site* https://student.unsw.edu.au/plagiarism*, and*
- *The ELISE training site* https://subjectguides.library.unsw.edu.au/elise

The Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: https://student.unsw.edu.au/conduct*.*

[1] International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

7. Readings and resources

*In addition to the **course manual**, you will need a textbook **AND** a human anatomy atlas.*

Recommended text:

Moore K.L., Dalley A.F. & Agur A. M. R. (2017) **Clinically Oriented Anatomy** (8th ed.). Lippincott Williams & Wilkins: Philadelphia. ISBN: 9781496347213

OR

Vogl, W., Drake, R.L., Mitchell, A.W.M. & Gray, H. (2019). **Gray's Anatomy for Students**. (4th ed.). Elsevier Philadelphia. ISBN: 9780323393041

Recommended Atlas:

Gest T.R. (2019) **Atlas of Anatomy** (2nd ed.). Lippincott, Wilkins & Wilkins: Philadelphia. ISBN: 9781496338228 *(note: This comes as a bundle with Clinically Oriented Anatomy from the UNSW bookshop)*

OR

Abrahams, PH, Spratt, JD, Loukas M, and van Schoor A-N (2013) **McMinns & Abrahams' Clinical Atlas of Human Anatomy**. (7th edition). Elsevier, London. ISBN: 9780723436973

Other useful textbooks:

Hamill, J. Knutzen, K.M. & Derrick, T. (2021). **Biomechanical Basis of Human Movement** (5th ed.). Wolters Kluwer Health, USA. ISBN: 9781975144654

Rohen, J.W., Yokochi, C, Lutjen-Drecoll, E. (2021). **Photographic Atlas of Anatomy** (9th ed). Wolters Kluwer Health, USA. ISBN: 9781975151348

Online resources:

- Virtual Anatomy Adaptive tutorials (VAnAT) – accessed via the course Moodle site
- Anatomy videos – accessed via UNSW Box, links provided in Moodle site
- Acland's anatomy videos – accessed via the university library, links provided in Moodle site
- Arnold's Glossary of Anatomical Terms, link provided in Moodle site

See medicalsciences.med.unsw.edu.au/students/undergraduate/learning-resources

Revision Facilities (on campus):

1. Anatomy Museum is located on the ground floor of the Wallace Wurth East. The museum contains a variety of bottled anatomical dissections. Please do not remove museum jars from shelves. The museum also contains computers loaded with Anatomy software and Internet access. Access to the museum is by swipe card and is restricted to anatomy students only, between 8.30 a.m. and 5.30 p.m. Monday to Friday. NO photography is allowed in the Anatomy Museum.
2. Rooms G06/G07 in Wallace Wurth East contain computers with a variety of anatomical software and can be used to access the Virtual Adaptive Anatomy Tutorials (VAnATs). Students may use them, provided **the rooms are not required for other classes**. Again these are accessible by swipe card only.

8. Administrative matters

Student enquiries should be submitted via student portal https://portal.insight.unsw.edu.au/web-forms/

9. Additional support for students

- The Current Students Gateway: https://student.unsw.edu.au/
- Academic Skills and Support: https://student.unsw.edu.au/academic-skills
- *Student Wellbeing and Health* https://www.student.unsw.edu.au/wellbeing
- UNSW IT Service Centre: https://www.myit.unsw.edu.au/services/students
- *UNSW Student Life Hub:* https://student.unsw.edu.au/hub#main-content
- *Student Support and Development:* https://student.unsw.edu.au/support
- *IT, eLearning and Apps:* https://student.unsw.edu.au/elearning
- *Student Support and Success Advisors:* https://student.unsw.edu.au/advisors
- *Equitable Learning Services (Formerly Disability Support Unit):* https://student.unsw.edu.au/els
- *Transitioning to Online Learning* https://www.covid19studyonline.unsw.edu.au/
- *Guide to Online Study* https://student.unsw.edu.au/online-study

10. Student Risk Assessment for practical classes

Medicine and Science Teaching Laboratory **Student Risk Assessment**	UNSW SYDNEY	Gross Anatomy Practical Classes for Medical and Science Students Bioscience Building Level 1 LAB08A/07

Hazards	Risks	Controls
Physical Cold temperature (16ºC) Sharp bone/plastic **Biological** Fungi, bacteria (tetanus), hepatitis B and C **Chemical** Formaldehyde Methylated spirits 2-phenoxyethanol	Cold Penetrating wound of foot Infection Corrosive/Flammable Flammable Irritant	• Wear laboratory coat over appropriate warm clothing • Wear enclosed shoes with full coverage of the dorsum of the foot • Wear protective eyewear • Wear face mask (if required) • Have appropriate immunisation • Do not eat, drink or smoke in the Anatomy Lab • Do not place anything (e.g. pens, pencils) into your mouth • Use disposable gloves when handling wet specimens and do not cross-contaminate models or bones with wet specimens • Use disinfectant and wipes for cleaning models • Always wash hands with liquid soap and dry thoroughly with disposable paper towel before leaving (hand sanitisers also available) • Low concentrations of chemicals used • Chemicals used in well ventilated area • Safety Data Sheets for chemicals available

Personal Protective Equipment required

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 (and/or fire wardens) regarding exits and assembly points.

Clean up and waste disposal

- Cover wet specimens with the towels provided. Make sure that towels do not hang over the edge of the table, because this allows fluid to drip onto the floor. Fluids on the floor are a major safety hazard and should be reported to staff immediately.
- Replace stools under the tables in your cubicle (if applicable).
- Remove your gloves and dispose in the biowaste bins provided.
- Wash your hands and instruments thoroughly with the soap and dry your hands with paper towel.
- Remove your laboratory coat when you leave the dissecting room.

Ethics Approval

This type of practical has been previously considered and approved by the UNSW Human Research Ethics Advisory Panel (HC180115).

Declaration

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

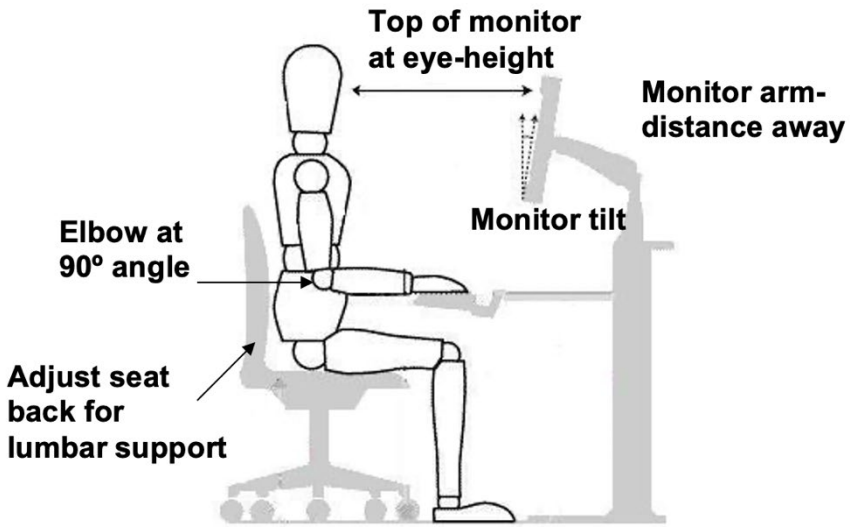
Signature:…… **Date**:……
Student number: .....

ANAT-SRA-Med&SciStudent relates to RA-MED-06. Date for review: 01/02/2022

Medicine and Science Teaching Laboratory **Student Risk Assessment**	UNSW SYDNEY	Anatomy Practical Classes for Medicine and Science Students Bioscience Building Level 1 LAB08B

Hazards		
Ergonomics	Musculoskeletal pain	• Correct workstation set-up • Check electrical equipment is in good condition before use
Electrical	Electrical shock/Fire	• All portable electrical equipment tested and tagged • Disinfectants and wipes available for use before and after the practical
Biological	Infection	

Workstation set-up



Personal Protective Equipment

Face masks may be required. Please following the instructions provided at the time of entry.

Emergency Procedures

In the event of an alarm, follow the instructions of the academic in charge. The initial sound (beep) is advising you to prepare for evacuation. During this time pack up your personal belongings. The second sound (whoop) gives instruction to leave. The assembly point is on the lawn in front of the Chancellery. In the event of an injury inform the academic in charge (and/or lab staff). First aider and fire warden

contact details are on display by the lifts on the floor and in each room. There is a wall mounted First Aid Kit located at the end of the G06 or 08A Laboratory.

Clean up and waste disposal

No apparatus or chemicals used in these rooms.

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

Signature: ……. **Date**: ……

Student number: .....

ANAT-SRA-Med&SciStudent relates to RA-MED-06. Date for review: 01/02/2023