

# ANAT 3411 NEUROANATOMY 1

## COURSE OUTLINE 2013

**Course convenor:** Dr. Liz Tancred - Rm 109, 30 Botany St, Randwick  
([e.tancred@unsw.edu.au](mailto:e.tancred@unsw.edu.au))

**Lecturers:** Dr. Liz Tancred  
A/Prof Pascal Carrive (Room 417, Wallace Wurth)  
([p.carrive@unsw.edu.au](mailto:p.carrive@unsw.edu.au))

### Course Information

ANAT3411 Neuroanatomy is a 6UoC course. It is offered as component of the Anatomy major in the BSc and BMedSc or as a year 3 elective in other BSc and BMedSc programs. It is also a compulsory part of the Neuroscience major in the BSc (Adv) program. It builds on the basic knowledge of the nervous system, previously obtained in either ANAT2111, ANAT1551 or ANAT2511 and provides the background (prerequisite) for NEUR3421 Research Topics in Neuroscience (offered in Session 2). It also provides a useful (though not compulsory) basis for NEUR3221 Neurophysiology (offered in Session 2). We try to put student learning in context, with reference to the latest developments in research and discussion of relevant clinical cases and scenarios. Students will also have the opportunity to extend their understanding of a chosen area and to develop skills in self-directed learning and critical evaluation by doing a short research project.

### Course Aim

The aim of this course is to provide students in the BSc and BMedSc programs with a basic understanding of the structural organisation of the human central nervous system in sufficient depth to form the basis for further clinical or research studies of the nervous system.

### Specific Objectives of the Course

- (i) To provide an overview of the topography and structural organisation of the brain and spinal cord.
- (ii) To describe the basic features of development of the nervous system and to understand how and why common malformations occur in the nervous system.
- (iii) To understand the ultrastructure of neurons and glia and the major cytoarchitectural features of the brain and spinal cord.
- (iv) To obtain a basic understanding of the techniques used to investigate morphology and connections of neurons to provide the basis for further research into the nervous system.
- (v) To obtain an understanding of the functional anatomy of sensory and motor processing and higher cerebral functions such as language and emotions and to be able to apply this knowledge to the clinical situation.
- (v) To understand the principles of the blood supply and venous drainage of the nervous system and to be able to deduce the effects of rupture or occlusion of the major vessels.

## Learning Outcomes

By the end of the course students will be able to identify the major features of the brain and spinal cord (using prosected specimens, models and cross-sectional images), to describe the structural and functional relationships between these structures and to apply this knowledge to further research and clinical studies.

## Course Relationships

ANAT3411 is offered as component of the Anatomy major in the BSc and BMedSc or as a year 3 elective in other BSc and BMedSc programs and in the BExPhys program. It is also a compulsory part of the Neuroscience major in the BSc and BSc (Adv) programs. It builds on the basic knowledge of the nervous system, previously obtained in either ANAT1521, ANAT2111 or ANAT2511 and provides the background (prerequisite) for NEUR3211 Research Topics in Neuroscience (offered in Session 2). It also provides a useful (though not compulsory) basis for NEUR3221 Neurophysiology also (offered in Session 2).

## Changes since 2012

- The course will start in week 1 and end in week 13. This is because we have to make up for the prac classes and lectures that will be lost because of ANZAC Day and Good Friday
- There will be a Review lecture on long tracts for the first lecture of week 7. There will be no lecture on the second lecture slot of that week, since the spot test is scheduled for the following prac class.
- Two lectures (Reticular Formation and Chemical Systems) have been added that were not in last year's program, (but on previous years' programs).
- Minor changes have been made to the learning activities in some practical classes.

## Teaching Strategies

The course involves 6 hours per week of instruction - 2 lectures and 2 x 2 hour practical classes. In practical/tutorial classes, students working in small groups under the guidance of their tutor will identify key structures in prosected specimens, models and on sections and MRI images of the brain using computer software (BrainStorm). Students will also participate in tutorial discussion on relevant functional and clinical aspects.

## Lectures

Wednesday	1-2 p.m.	Biomed F
Thursday	11a.m. -12 p.m.	Biomed E

## Tutorial/Practicals

Thursday	9-11 a.m.	Dissecting Room (101)
Friday	12-2 p.m.	Dissecting Room (101)

Rm 106-108 will also be used for practical classes involving activities on computers.

## **Assessment**

Spot Test 1	20 %
Spot Test 2	20%
Assignment (due end of week 10)	15 %
Final exam (3hr written paper)	45%

Practical and theory examinations will be based on the specific objectives, learning activities and recommended reading listed for each class. For practical examinations (Spot tests) you will be expected to be able to identify structures shown in bold type in the class notes and to answer simple theory questions about these structures.

The theory examination will include both multiple choice and written questions and will test understanding of the structural organization of the brain, spinal cord and cranial nerves and its relationship to function according to the Specific Objectives defined earlier.

The 2000 word assignment is a compulsory component of the course. It will provide an opportunity for students to develop their critical thinking skills by undertaking a literature review of current research on a topic of their interest. This report should be handed in to **Rm G27 in the BioSciences Bldg by 4.30 p.m. on Monday May 21 (beginning of Week 12)**. Marks will be deducted for assignments that are handed in after this time, unless Special Consideration is granted.

## **Criteria for Assessment of Neuroanatomy Assignment**

These are being revised and will be distributed after the commencement of the course.

## **Resources**

### **Text Book:**

John Nolte: The Human Brain: An Introduction to its Functional Anatomy, 6<sup>th</sup> ed. C.V. Mosby, 2008. This is a comprehensive text.

OR

Crossman, A.R. and Neary, D. Neuroanatomy An Illustrated Colour Text, 4<sup>th</sup> ed. Churchill Livingstone, 2010. This text is adequate but covers just the essentials.

### **Recommended**

E.Tancred and G. Coppa: BrainStorm: Interactive Neuroanatomy 3.6 (for both PC and Mac computers) available from UNSW Bookshop (online) or from Marie Kwok, Rm G3 Wallace Wurth Bldg.

### **Good Reference Books Available in Library**

M.F. Bear, B.W. Connors and M.A. Paradiso. Neuroscience – Exploring the Brain, 3<sup>rd</sup> ed., Lippincott Williams and Wilkins, 2007.

Waxman, S, G., Clinical Neuroanatomy, 26th ed. McGraw Hill, 2010.

M.J.T. Fitzgerald, J. Folan-Curran. Clinical Neuroanatomy and Related Neuroscience, 4<sup>th</sup> ed., W.B.Saunders, 2001.

J.A. Kiernan: Barr's The Human Nervous System. An anatomical Viewpoint, 9th Edition. J. B. Lippincott, 2008.

D. E. Haines: Neuroanatomy. An Atlas of Structures, Sections and Systems: 7<sup>th</sup> Edition. Urban and Schwarzenberg, 2007.

E.R. Kandel, J.H. Schwartz, T.M. Jessell, S.A. Seigelbaum, and A.J. Hudspeth. Principles of Neural Science, 5<sup>th</sup> ed. Elsevier, 2013

C. Watson, M. Kirkcaldie, and G. Paxinos, The Brain. Elsevier, 2010

### **Revision Facilities**

BrainStorm is available on all student computers in the Wallace Wurth Building, including those in 106-108 and G2/G4. Models and dissections of anatomical structures are available in the Anatomy Museum (Rm 107). The Anatomy Museum is open from 8 a.m. – 5 p.m. Monday to Friday

### **Supplementary Exams**

It is intended that the supplementary exam for ANAT3411 in Semester 1, 2013 will be held in the week commencing **Monday 22<sup>nd</sup> July, 2012**. Please note that applications for special consideration sought outside the 3 day time period **WILL NOT** be accepted except in **TRULY** exceptional circumstances.”

### **Official Communication by email and Blackboard**

All students in ANAT3411 Neuroanatomy 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](mailto: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 email at least every other day. Facilities for checking email are available in the School of Medical Sciences and in the University Library.

Official announcements relating to the course will also appear on the ANAT3411 page in Blackboard, so please make sure that you check this regularly.

### **Academic Honesty & Plagiarism**

The School of Medical Sciences will not tolerate plagiarism in submitted written work. The University regards this as academic misconduct and imposes severe penalties. Evidence of plagiarism in submitted assignments, etc. will be thoroughly investigated and may be penalised by the award of a score of zero for the assessable work. Flagrant plagiarism will be directly referred to the Division of the Registrar for disciplinary action under UNSW rules.

## What is plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.\*

Examples include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

[www.lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism)

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

\* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

† Adapted with kind permission from the University of Melbourne.

Appropriate citation of sources therefore includes surrounding any directly quoted text with quotation marks, with block indentation for larger segments of directly-quoted text. The preferred format for citation of references is an author-date (APL) format with an alphabetically arranged bibliography at the end of the assignment. Note that merely citing textbooks or website URLs is unlikely to yield a bibliography of satisfactory standard. The internet should be avoided as a primary source of information. Inclusion of appropriate journal articles, both primary research publications and reviews, is usually expected.

## **Attendance**

Students are expected to attend **at least 80% of all scheduled learning activities. Attendance at practical classes will be recorded** and students who do not attend at least 80% of practical classes may be prevented from undertaking examinations in this course. Please note that absences due to illness or misadventure will be factored into the 20% of allowable absences.

**Guidelines on extracurricular activities affecting attendance** can be found at: <http://medicalsciences.med.unsw.edu.au/sites/soms.cms.med.unsw.edu.au/files/Extra-curricularActivitiesSOMS.pdf>

## **Applications for Special Consideration**

The School of Medical Sciences follows UNSW guidelines when you apply for special consideration on the basis of sickness, misadventure or other circumstances beyond your control. For further information, see:

<https://my.unsw.edu.au/student/atoz/SpecialConsideration.html>

Please note the following:

1. Applications must be submitted online to UNSW Student Central. It would also be appropriate for you to inform the course convenor that you have lodged an application.
2. You must submit the application as soon as possible and certainly within three working days of the assessment to which it refers. Late applications will only be considered in exceptional circumstances.
3. Submitting a request for Special Consideration does **not** automatically mean that you will be granted additional assessment or awarded an amended result.
4. Your application will be assessed by the course convenor on an individual basis. Note that UNSW Guidelines state that special consideration will not be granted unless academic work has been hampered to a substantial degree (usually not applicable to a problem involving only three consecutive days or

a total of five days within the teaching period of a semester). Under such circumstances, the School of Medical Sciences reserves the right to determine your result on the basis of completed assessments.

5. You should note that if you are granted additional assessment or a supplementary examination (which is **not** guaranteed), that assessment may take a different form from the original assessment. Furthermore, the results of the original assessment may then be overridden by the results of the additional assessment, at the discretion of the course convenor. Also be aware that a revised mark based on additional assessment may be greater or less than the original mark.

## **Applications for Review of Results**

If you wish to make an application for a review of results go to:

<https://my.unsw.edu.au/student/academiclife/assessment/Results.html>

## **Equity and Diversity issues**

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or [www.studentequity.unsw.edu.au/](http://www.studentequity.unsw.edu.au/) )

Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements.

## **Grievance Officer**

In case you have any problems or grievance about the course, you should try to resolve it with the Course Organizer. If the grievance cannot be resolved in this way, you should contact the Head of Department or the Department's Grievance Officer (Dr. Priti Pandey (Office: 32 Botany St, Randwick; email: [p.pandey@unsw.edu.au](mailto:p.pandey@unsw.edu.au)).

## ***Health and Safety Rules for Students in the Dissecting Room***

***There are some rules that are enforced for the safety of the staff and students, while others are concerned with the need for care and respect of the prosection material.***

### **General courtesy**

- Students are required to attend **each lecture and the assigned tutorial/laboratory class** unless given special permission. Applications for Special Consideration should be submitted online to Student Central (see below).
- You may **enter** and **view** specimens in the Dissecting Room 101 **only** in the presence of your tutor and/or during your designated tutorial/laboratory class hours. You are **not permitted** to take visitors into the Dissection Room.

## Health and Safety Rules

*A detailed risk assessment for student activities in the Dissecting Room is located on the notice board at the front entrance (near 1<sup>st</sup> floor lifts).*

When in the Dissecting Room, you are required to:

- **always put on your laboratory coat** when you enter the lab. If you have forgotten to bring your lab coat, purchase a disposable coat from the ground floor in WW building or the Union shops on campus. Lab coats must not be worn in the hall or anywhere outside the laboratories.
- **wear covered shoes with enclosed heels**, never thongs or sandals.
- **wear latex or vinyl gloves** when touching wet specimens (gloves are available from the Union Shop near CLB theatres).
- **never eat or drink.**
- **never put anything in your mouth.** For example, pens or pencils that you may have picked up from the table.
- **avoid inhaling** preservative solutions for prolonged periods. If you feel in need of fresh air, ask permission to leave the laboratory for a few minutes.
- **report all accidents** or incidents immediately to a staff member for assessment without exception. Injuries involving sharps or needle-stick will require a blood test as soon as possible.

At the end of your laboratory class:

- **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.
- **remove your gloves** and dispose in the biowaste bins provided.
- **wash your hands** and instruments thoroughly with the soap provided and dry your hands with the paper towel.
- **remove your laboratory coat** when you leave the dissecting room.

### Preservative solution

There are 3 main chemicals used as preservation fluids in the Dissecting Room:

**phenoxyethanol** (2% in solution); **methylated spirits** (10%) & **formalin** (5%)

The safety data sheets (SDSs) for these chemicals are located by the lab First Aid Kit and also on the notice board outside the lab. Women of reproductive years, and especially those who know they are pregnant, should note that all of these are suspected human reproductive and developmental toxins and therefore may pose a hazard to the unborn child. In addition, formalin (**formaldehyde** solution) is a human carcinogen. Avoid these chemicals coming into contact with your eyes and skin and they should not be ingested.

Most anatomy specimens are stored in 2% phenoxyethanol, which is classified as relatively non-toxic. You should always wear gloves when handling specimens and must avoid ingestion of this chemical and contact with your skin or eyes.

Formaldehyde is reported to cause allergic skin and respiratory effects. The potential for adverse health effects, however, is markedly reduced at the concentrations used for embalming and storage of specimens in the Dissecting Room, i.e., the “formalin” solution is less than 5% of a 37% solution of formaldehyde. The specimens provided for classes are without any formalin and a combination of air extraction and conditioning continuously changes the air in the Dissecting Room.

### **First Aid**

If assistance is needed during office hours you may approach **Room 101** staff for **First Aid**. **All incidents must be reported**. The First Aid Kit is located on the left wall near the Dissecting Room entrance door. A second First Aid Kit in the east wing on the ledge opposite cubicle E4.

### **Emergency evacuation**

In the case of a fire or other emergency the evacuation alarm will sound. When it sounds for the first time this indicates that everyone should get prepared in case it is necessary to evacuate. When it sounds for the second time, an announcement will be made over the speaker system - **follow these instructions**. Staff will be on hand to supervise any evacuation and the emergency exit is at the south end of the lab, do **not use the lifts**. The evacuation assembly area is the landscaped space immediately to the east of the Chancellery and adjacent to the Clancy Auditorium. **Do not assemble anywhere else** and do not leave this area until instructed.

### **Additional Safety Information**

If additional safety information is required you can ask the course convenor or the Anatomy Dissection Laboratory Manager (Mr Vincent Strack). The latest safety information is always available from the SOMS HS Webpage:

<http://medicallsciences.med.unsw.edu.au/SOMSWeb.nsf/page/Health+and+Safety>

### **Care and respect of prosected material**

You are learning from human material prepared from people who have generously donated their bodies for the benefit of science. Skilled staff members have dissected the specimens to allow you, the student, to see anatomical structures in fine detail. Apart from caring for the specimens, it is important for all students learning Anatomy to have and show **utmost respect** for the specimens at all times, in the Dissecting Room, Room 101, and in the Anatomy Museum Room 105. **Great care** should always be exercised when handling specimens, in order to preserve their delicate structure.

### **Some specific points:**

- **Always use only blunt forceps** to handle specimens and **probes** to point to structures, i.e. **never pull** at any parts of the specimen.
- It is **illegal** for any anatomical material to be removed from the premises of the Department of Anatomy for any purpose whatsoever (except of course, for the funeral). All anatomy specimens are micro-chipped for identification and record keeping.
- Photography and video recording are **not permitted** in the Dissecting Room 101, or the Anatomy Museum 105.

**ANAT3411 NEUROANATOMY  
LECTURE SCHEDULE, SESSION I, 2013**

<b>Week</b>	<b>Date</b>	<b>Lecture</b> (Wed 1-2 pm, Biomed F and Thur 11-12 pm, Biomed E)	
<b>1</b>	6 Mar	Introduction	Biomed F
	7 Mar	General organisation of brain	Biomed E
<b>2</b>	13 Mar	Development of the CNS (KA)	Biomed F
	14 Mar	Spinal cord 1	Biomed E
<b>3</b>	20 Mar	Spinal cord 2	Biomed F
	21 Mar	Brainstem 1: Medulla	Biomed E
<b>4</b>	27 Mar	Brainstem 2: Pons, Midbrain	Biomed F
	<b>28 Mar</b>	<b>No Lecture</b>	
<b>Semester break 1 Apr – 7 Apr</b>			
<b>5</b>	10 Apr	Cranial Nerves 1	Biomed F
	11 Apr	Cranial Nerves 2	Biomed E
<b>6</b>	17 Apr	Reticular Formation	Biomed F
	18 Apr	Auditory System	Biomed E
<b>7</b>	24 Apr	Review of Long Tracts	Biomed F
	<b>25 Apr</b>	<b>No Lecture (Anzac day)</b>	
<b>8</b>	1 May	Cerebellum	Biomed F
	2 May	Thalamus	Biomed E
<b>9</b>	8 May	Hypothalamus	Biomed F
	9 May	Visual Pathways	Biomed E
<b>10</b>	15 May	Telencephalon	Biomed F
	16 May	Basal ganglia	Biomed E
<b>11</b>	22 May	Neuroplasticity	Biomed F
	23 May	Limbic System	Biomed E
<b>12*</b>	29 May	Cerebral Cortex	Biomed F
	30 May	Meninges CSF, Venous drainage	Biomed E
<b>13</b>	5 June	Blood supply of brain	Biomed F
	6 June	Chemical Systems in the brain (PC)	Biomed E

**\* Assignments due by 4:30 pm. Monday May 29**

## PRACTICAL CLASS SCHEDULE SESSION I, 2013

<b>Week</b>	<b>Date</b>	<b>Practical Class</b> (Thurs 9 - 11 am, Fri 12-2 pm, Dissecting Rm 101)
<b>1</b>	7 Mar	P1 Neurohistology, research methods
	8 Mar	P2 Gross anatomy of the brain
<b>2</b>	14 Mar	P3 Development of the CNS
	15 Mar	P4 Spinal Cord 1: Gross, nuclei, reflexes
<b>3</b>	21 Mar	P5 Spinal Cord 2: Tracts
	22 Mar	P6 Brainstem 1: Medulla
<b>4</b>	28 Mar	P7 Brainstem 2: Pons, Midbrain
	<b>29 Mar</b>	<b>No Prac (Easter)</b>
<b>Semester break 1 Apr – 7 Apr</b>		
<b>5</b>	11 Apr	P8 Cranial nerves 9 – 12
	12 Apr	P9 Cranial nerves 3 - 7
<b>6</b>	18 Apr	P10 Autonomic nervous system
	19 Apr	P11 Revision
<b>7</b>	<b>25 Apr</b>	<b>No Prac (ANZAC day)</b>
	26 Apr	P12 Spot Test
<b>8</b>	2 May	P13 Auditory & Vestibular systems
	3 May	P14 Cerebellum
<b>9</b>	9 May	P15 Diencephalon
	10 May	P16 Retina and visual pathways
<b>10</b>	16 May	P17 Forebrain 1: Horizontal Slices
	17 May	P18 Forebrain 2: Coronal Slices
<b>11*</b>	23 May	P19 Parkinson's Disease & Basal Ganglia disorders
	24 May	P20 Limbic System
<b>12</b>	29 May	P21 Cerebral Cortex
	30 May	P22 Meninges, CSF & Venous drainage
<b>13</b>	6 June	P23 Blood Supply to the brain
	7 June	P24 Clinical Cases

A Revision Class & Final **Spot Test** will be scheduled during the examination period