



Faculty of Medicine  
School of Medical Sciences

# ANAT341

## NEUROANATOMY

COURSE OUTLINE

TERM 1, 2019

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It is your responsibility to make sure that you read and sign the **Student Risk Assessment Form** included in this outline before you attend your first prac in the dissecting room. Keep the signed form in your prac manual and bring it to classes with you. It is not necessary to give it to your tutor or Course Convenor).

Please read this outline in conjunction with the following pages on the [School of Medical Sciences website](#):

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

(or see "STUDENTS" tab at [medicallsciences.med.unsw.edu.au](http://medicallsciences.med.unsw.edu.au))

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## **COURSE STAFF**

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## **COURSE INFORMATION**

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ANAT3411 Neuroanatomy is a 6 UoC (unit of credit) course.

The course consists of 7 hours per week of face-to-face teaching (3 x 1 hr lectures and 2 x 2 hours practical classes).

ANAT3411 Neuroanatomy is an advanced neuroscience course that provides students with an understanding of the development, structure, function and vascular supply of the spinal cord, brainstem and forebrain. Students will acquire an in-depth knowledge of the neural structures and connections that underpin sensory processing and perception, reflexive and voluntary motor control and the emergence of complex higher functions in the cerebral cortex such as language and emotions.

This comprehensive systems neuroscience course equips students with skills directly applicable to brain research and pre-medical training.

### **Course Aim**

The aim of this course is to provide students 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.

### **Student Learning Outcomes:**

- I. To describe the parts of the spinal cord, brainstem and forebrain and their vascular supply.
- II. To relate the neuroanatomical organisation of the central nervous system to its functions, including the processing of sensory inputs, control of motor outputs and emergence of higher brain functions.
- III. To apply structure and function knowledge of the central nervous system and its vascular supply to solve elementary neurological problems.
- IV. To engage in a team to collectively produce a report on a neuroscience/neuro-pathology research topic.

See also UNSW Graduate Outcomes and attributes for Science students at <https://medicalsciences.med.unsw.edu.au/students/undergraduate/advice-students#graduate>

### **How the course relates to other courses**

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 key component 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 Term 3). It also provides a useful (though not compulsory) basis for NEUR3221 Neurophysiology also (offered in Term 2).

### **Changes since 2018**

- The program has been formatted to the new 3+ term schedule. An additional weekly lecture has been added to compensate for the change from 12 weeks to 10 weeks.
- Review quizzes/adaptive tutorials are being developed and will be made available through Moodle for formative assessment.

## Teaching Rationale and Strategies

The course involves 7 hours per week of instruction – 3 x 1-hour lectures and 2 x 2-hour practical classes. Practical classes are preceded by lectures which usually introduce the topic for the practical class. Lecture slides and notes are uploaded to Moodle prior to the beginning of each lecture.

For some lectures given by Drs Carrive and Potas, lecture notes and diagram outlines will also be uploaded, and students are encouraged to bring these to the lecture with either in hard copy or on a tablet. Students will have the opportunity to develop and label these during the lectures.

In practical/tutorial classes, students working in small groups under the guidance of their tutors 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. BrainStorm is available to use on-line so students can prepare and consolidate their learning outside of formal classes.

We encourage students to question, observe and share knowledge and experiences with their peers and teachers. We endeavour to make the material interesting to stimulate an enthusiasm for the fascinating subject matter that is covered in this course. Interaction and engagement are essential to facilitate learning.

Practical classes are compulsory. Students are also strongly encouraged to attend the lectures rather than just view them online. If unable to attend the lectures for some reason students MUST ensure that they view or listen to the lecture PRIOR to attending the practical classes.

## TIMETABLE

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### Lectures

Monday (w 1-9)	10 am -12 pm	LG03 WW
Thursday (w 1-9)	9 -10 am	LG03 WW
Tuesday April 30 (w 11)	9-10 am	LG03 WW

### Tutorial/Practicals\*

#### Cohort 1:

Tuesdays (w 1-10)	1 - 3 pm	Dissecting Rm (101) WW
Thursdays (w 1-9)	1 - 3 pm	Dissecting Rm (101) WW
Tuesday April 30 (w 11)	1 - 3 pm	Dissecting Rm (101) WW

#### Cohort 2:

Tuesdays (w 1-10)	3 - 5 pm	Dissecting Rm (101) WW
Thursdays (w 1-9)	3 - 5 pm	Dissecting Rm (101) WW
Tuesday April 30 (w 11)	3 - 5 pm	Dissecting Rm (101) WW

\*A number of practical classes (involving computers) will also use WW Rm G06-07.

**Please note:** To accommodate Easter Monday and ANZAC day falling on the Monday and Thursday of week 10, the following arrangements have been made: 1) The Monday lecture of week 10 will be an on-line lecture; 2) the Thursday lecture and pracs of week 10 have been moved to the following week (week 11) on Tuesday April 30.

**ANAT3411 Neuroanatomy – Class Schedule 2019 (weeks 1-5)**

<b>Week</b>	<b>Date</b>	<b>Time</b>	<b>Venue</b>	<b>Activity</b>
1	Mon Feb 18	10-12 pm	LG03WW	Lect: L1 - Neurohistology L2 - General Organisation of the Brain
	<b>Tue Feb 19</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P1 - Gross Anatomy of the Brain &amp; Neurohistology</b>
	Thu Feb 21 <b>Thu Feb 21</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L3 - Development of the Nervous System <b>Prac: P2 - Development of the Central Nervous System</b>
2	Mon Feb 25	10-12 pm	LG03WW	Lect: L4-5 - Spinal Cord 1
	<b>Tue Feb 26</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P3 - Spinal Cord 1: Gross, Nuclei &amp; Reflexes</b>
	Thu Feb 28 <b>Thu Feb 28</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L6 - Spinal Cord 2 <b>Prac: P4 - Spinal Cord 2: Tracts &amp; Clinical Applications</b>
3	Mon Mar 4	10-12 pm	LG03WW	Lect: L7 – Medulla L8 - Pons and Midbrain
	<b>Tue Mar 5</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P5 – Brainstem: Medulla, Pons &amp; Midbrain</b>
	Thu Mar 7 <b>Thu Mar 7</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L9 - Cranial nerves 1 <b>Prac: P6 - Cranial nerves 1: III, IV, VI, XI, XII</b>
4	Mon Mar 11	10-12 pm	LG03WW	Lect: L10-11 - Cranial nerves 2
	<b>Tue Mar 12</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P7 - Cranial nerves 2: V, VII, VIII, IX, X</b>
	Thu Mar 14 <b>Thu Mar 14</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L12 - Reticular formation <b>Prac: P8 - Autonomic Nervous System</b>
5	Mon Mar 18	10-12 pm	LG03WW	Lect: L13 - Revision L14 - Group projects
	<b>Tue Mar 19</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P9 - Revision</b>
	Thu Mar 21 <b>Thu Mar 21</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: <i>-no lecture-</i> <b>Prac: P10 - Spot test 1</b>

## ANAT3411 Neuroanatomy – Class Schedule 2019 (weeks 6-11)

Week	Date	Time	Venue	Activity
6	Mon Mar 25	10-12 pm	LG03WW	Lect: L15 - Auditory System L16 - Vestibular System
	<b>Tue Mar 26</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P11 - Auditory &amp; Vestibular Systems</b>
	Thu Mar 28 <b>Thu Mar 28</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L17 - Visual System <b>Prac: P12 – The Retina &amp; Visual Pathways</b>
7	Mon April 1	10-12 pm	LG03WW	Lect: L18 - Somatosensory systems L19 - Thalamus
	<b>Tue April 2</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P13 – Diencephalon &amp; Thalamus</b>
	Thu April 4 <b>Thu April 4</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L20 - Telencephalon <b>Prac: P14 – Forebrain Topography</b>
8	Mon April 8	10-12 pm	LG03WW	Lect: L21 - Motor Cortex L22 - Cerebellum
	<b>Tue April 9</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P15 - Cerebellum</b>
	Thu April 11 <b>Thu April 11</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L23 - Basal Ganglia <b>Prac: P16 - Basal Ganglia &amp; Cerebellar Disorders</b>
9	Mon April 15	10-12 pm	LG03WW	Lect: L24 - Hypothalamus L25 - Limbic System
	<b>Tue April 16</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P17 - Olfactory &amp; Limbic Systems</b>
	Thu April 18 <b>Thu April 18</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	Lect: L26 - Cerebral Cortex <b>Prac: P18 - Cerebral Cortex</b>
10	Mon April 22	---	---	<i>Easter Monday – <b>ON LINE</b> lecture:</i> L27 - Blood supply, Venous drainage and Meninges
	<b>Tue April 23</b>	<b>1-3 pm or 3-5 pm</b>	<b>Diss Rm</b>	<b>Prac: P19 - Blood Supply to the Brain, Venous Drainage, Meninges &amp; CSF</b>
	Thu April 25 <b>Thu April 25</b>	--- ---	--- ---	Lect: ANZAC – <i>Lecture moved to April 30</i> <b>Prac: ANZAC – Prac moved to April 30</b>
11	Tue April 30 Tue April 30 <b>Tue April 30</b>	9-10 am <b>1-3 pm or 3-5 pm</b>	LG03WW <b>Diss Rm</b>	<b><u>Group projects due at 3 pm</u></b> Lect: L28 - Chemical Systems in the Brain <b>Prac: P20 - Clinical Cases</b>

### Compulsory Attendance

Students must attend **at least 80% of practical classes in order to pass the course. Attendance at practical classes will be recorded.** Please note that absences due to illness or misadventure will be factored into the 20% of allowable absences, but appropriate medical certificates or documentation will be required.



## RESOURCES

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See also [Learning Resources](#).

### Online

- **BrainStorm Interactive Neuroanatomy**
  - URL: [brainstormneuro.net](http://brainstormneuro.net)
  - You will be redirected to the BEST network where you will be prompted to sign in. You must sign up first using your UNSW email address, then have your account verified via email.

### Text Book

- T.W. Vanderah, and D.J. Gould. **Nolte's The Human Brain: An Introduction to its Functional Anatomy**, 7<sup>th</sup> ed. C.V. Mosby, 2015. This is a comprehensive text.

OR

- Crossman, A.R. and Neary, D. **Neuroanatomy An Illustrated Colour Text**, 5<sup>th</sup> ed. Churchill Livingstone, 2014. This text is adequate but covers just the essentials.

### Library References

- M.F. Bear, B.W. Connors and M.A. Paradiso. **Neuroscience – Exploring the Brain**, 4<sup>th</sup> ed., Lippincott Williams and Wilkins, 2015. (3<sup>rd</sup> Ed 2007 OK if 4<sup>th</sup> not available)
- Waxman, S, G., **Clinical Neuroanatomy**, 26<sup>th</sup> ed. McGraw Hill, 2010.
- J.A. Kiernan: Barr's The Human Nervous System. **An anatomical Viewpoint**, 9<sup>th</sup> 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 rooms G06/07.

Models and dissections of anatomical structures are available in the Anatomy Museum (Rm G09).

## ASSESSMENT

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Spot Test 1	20%
Spot Test 2	20%
Group Project (due week 11)	15 %
Final exam (2hr written paper)	45%

Spot Test and theory examinations will be based on the specific objectives, learning activities and recommended reading listed for each class.

### Spot Tests

These are practical examinations, based on practical class contents, that assess your ability to identify structures in brain dissections and cross-sections (including MR images) and to answer relevant short theory questions. In each Spot Test you will be presented 15 questions during a computer lab session. You will be expected to be able to identify structures **shown in bold type** in the class notes and to answer fundamental theory questions about these structures.

**Spot Test 1** will be held in Week 5 and will examine material up to and including the Autonomic Nervous System.

**Spot Test 2** will be held during the exam period (6-18 May 2019) and will examine material from the Auditory and vestibular systems onwards.

### Group Project

See below (Neuroanatomy Group Project)

### Theory Examination

The theory exam will be held during the exam period (6-18 May 2019). This 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.

### Failure to complete an assessment

Failure to sit a test without lodgement of an application for Special Consideration with Student Central will lead to automatic failure of the test. A student may be required to sit a supplementary exam or a written assignment in place of a missed test.

See <https://medicalsciences.med.unsw.edu.au/students/undergraduate/advice-students#Special%20Consideration>

### Supplementary Exams

Supplementary exams (if required) for ANAT3411 2019 **will be held at the end of May (27-31 May)**. Please note that applications for Special Consideration for supplementary exams are not usually accepted except in TRULY exceptional circumstances."

## Formative Assessment

(i) **Adaptive tutorials or Moodle quizzes** are currently being prepared and will be made available through Moodle for formative assessment.

(ii) **Review questions** have been included at the end of most practical classes and you are encouraged to work through these after each prac to get some feedback on how you are going. Answers will not be provided for these questions. You should be able to work them out yourself if you have attended the lectures and practical classes. If you can't answer them refer to your lecture notes or text book.

## NEUROANATOMY GROUP PROJECT

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The Neuroanatomy assignment is a compulsory component of the course. It will provide an opportunity for you to develop your research and critical thinking skills by undertaking a literature review of current research on a topic of your interest.

The purpose of this assignment is to help you develop skills in the (UNSW) graduate capabilities listed below (see p. 5 for details):

- Research, inquiry and analytical thinking abilities.
- Communication.
- Information literacy.
- Teamwork, collaboration and management skills.

In week 5, students will be allocated to groups of approximately 4 students. Groups will be able to choose from one of 4 topics that will be announced in week 5. Each topic will include several defined tasks but the final product needs to be a collaboration between groups members. Each group will be expected to submit a written report that is strictly no longer than 2,500 words in length.

This project is a **compulsory** requirement of the course and is worth 15% of your final mark for this course. Of this, 12% will come from the written report and all students in each group will receive the same mark. The other 3% will be determined by members of the group, each of whom will provide a collective score for each team member. Information on the group project, topics and guidance on peer assessment will be provided in a lecture in Week 5.

Your assignment should be **no longer than 2500 words in length** and you are encouraged to use diagrams where appropriate. A **penalty of 5% for every 250 words over the limit will be applied** to the final group project mark. References should be cited in the body of the assignment (see details below). The word limit will not include your reference list, however, it will include the citations in the body of your assignments.

Due Date:

This report should be handed in **on Tuesday April 30 (week 11) at 3 pm at the beginning of the last prac class**. Marks will be deducted for reports that are handed in after this time, unless Special consideration is granted. See:

<https://medicalsciences.med.unsw.edu.au/students/undergraduate/advice-students#Special%20Consideration>

## Criteria for Assessment of the Group Project

### Scientific Content:

- Identifies the major concepts related to the assignment topic
- Demonstrates an understanding of the assignment topic
- Uses peer-reviewed research articles to support stated facts and arguments.

### Effective Communication:

- Clarity (clear, simple, grammatical language, terms explained)
- Logical structure, use of headings and paragraphs
- Appropriate language length, style and format for the intended audience
- Appropriate use of media (illustrations, graphs etc.)

### Self-Directed Learning and Critical Evaluation:

- Sources (range, citation standards, quality, relevance)
- Critical thinking (evidence of awareness of bias in sources, others viewpoints, own views, logical argument)

## Peer Assessment

- Attendance at group meetings
- Participation in planning of the report
- Contribution to group discussion
- Quality of contribution to the report
- Execution of allocated tasks effectively and on time

## Guidelines for referencing in the Neuroanatomy Group Project

Any ideas which are not your own should be cited in the text as per the **Journal of Neuroscience Style**. Find the Journal's Author's instructions from the journal's website: (<http://www.jneurosci.org/content/information-authors>). Use EndNote as your reference manager and install the Journal of Neuroscience output style, which can be found on the EndNote website: <https://endnote.com/downloads/styles/>.

# STUDENT RISK MANAGEMENT PLAN

Medicine Teaching Laboratory Student Risk Management Plan	 <b>UNSW</b> SYDNEY	Gross Anatomy Practical Classes for Medical and Science Students DOC:PHSL-SRA-S&H-01rev1.1
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Hazards	Risks	Controls
<b>Physical</b> Cold temperature (16°C) Sharp bone/plastic  <b>Biological</b> Fungi, bacteria (tetanus), hepatitis B and C  <b>Chemical</b> Formaldehyde Methanol 2-phenoxyethanol	Cold Penetrating wound of foot  Infection  Corrosive/Flammable Irritant/toxic Irritant	<ul style="list-style-type: none"> <li>Wear laboratory coat over appropriate warm clothing</li> <li>Wear enclosed shoes with full coverage of the dorsum of the foot</li> <li>Have appropriate immunisation</li> <li>Do not eat, drink or smoke in the Gross Anatomy Lab</li> <li>Do not place anything (e.g. pens, pencils) into your mouth</li> <li>Use disposable gloves when handling wet specimens and do not cross-contaminate models or bones with wet specimens</li> <li>Always wash hands with liquid soap and dry thoroughly with disposable paper towel before leaving</li> <li>Low concentrations of chemicals used</li> <li>Chemicals used in well ventilated area</li> <li>Safety Data Sheets for chemicals available in the laboratory</li> </ul>

### Personal Protective Equipment required

 <span style="background-color: blue; color: white; padding: 2px;">Closed in Footwear</span>	 <span style="background-color: blue; color: white; padding: 2px;">Lab. Coat</span>	 <span style="background-color: blue; color: white; padding: 2px;">Gloves</span>
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### 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

- 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.

### 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: .....