Faculty of Medicine and Health
School of Medical Sciences

ANAT3411
NEUROANATOMY

COURSE OUTLINE

TERM 1, 2021
COURSE STAFF

Course convenor/Course Authority:
A/Prof Pascal Carrive
Location: Room 328, Level 3 East, Wallace Wurth Bldg
Email: p.carrive@unsw.edu.au

Course co-convenor:
Dr Teri Furlong
Location: Room 206, Level 2 East, Wallace Wurth Bldg
Email: t.furlong@unsw.edu.au

Guest Lecturer
Dr Annemiek Beverdam (a.beverdam@unsw.edu.au)

Tutor/Demonstrators
Dr Teri Furlong
Dr Reza Shirazi
Mr Mathew Chu/ Mr Thomas Elphic

For any general correspondence concerning the course and course material:
This will go to A/Prof Carrive, Dr Furlong and Dr Shirazi
Email: neuroanatomy@unsw.edu.au

COURSE INFORMATION

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

The course consists of 6.5 hours per week of teaching (3 x 1 hr lectures 1x 2hrs tutorial class and 1 x 1.5 hr practical class). Lectures and tutorials will be delivered online. The practical classes will be delivered face-to-face in the Anatomy labs with social distancing until further advice from NSW health. Practical classes will not be delivered online, except in the event of a lockdown or for individuals having to quarantine because of the pandemic. In this case, practical labs will be converted to some form of online activities.

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.

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. It provides a useful (though not compulsory) basis for NEUR3221 Neurophysiology (offered in Term 2) and a Honours in Neuroscience (NEUR4442 and NEUR4441).

Changes since 2020

- The 3 x 1 hr lectures will be delivered online and on schedule (synchronized) and recorded in Teams. They will be delivered at the beginning of the week on Mondays and Tuesdays.
- There were 2 x 2hrs practical classes last year. The first 2 hr practical class has been changed to a 2 hrs tutorial which will be delivered online and on schedule on Wednesdays and recorded in Teams. The second 2 hrs practical class has been reduced to 1.5 hr and will be delivered face to face by demonstrators in the Anatomy labs.
- The course will be managed with Moodle and Teams.
- The lab manual has been extensively revised with a better integration of BrainStorm resources.
Teaching Rationale and Strategies

The course involves 6.5 hours per week of instruction – 3 x 1hr lectures, 1 x 2hrs tutorial and 1 x 1.5 hr practical class. The lectures will be delivered at the beginning of the week on Mondays and Tuesdays followed by the tutorial on Wednesdays and the practical class on Thursday. Lecture slides and notes will be uploaded to Moodle prior to the beginning of each lecture.

The tutorials will be delivered by one of the lecturers of the course to guide the students through a series of learning activities related to the material presented in the preceding lectures. This will include online activities on Moodle, on the computer software BrainStorm, and Q&As. In practical classes, students working in small groups under the guidance of their demonstrators, will identify key structures in 3D models, prosected specimens and MRI images of the brain. BrainStorm is an internet application designed to help students consolidate their learning at any time 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 online lectures live rather than just view the recordings offline. Students must ensure that they have viewed and studied the material in the lectures PRIOR to attending the tutorial and practical classes.

During Flexi week (week 6), the 2 hrs of lecture on Tuesday will be replaced by an optional online revision session and the practical class will be an optional revision open class in the Anatomy Labs from 12 to 3 pm with your demonstrators. These revisions are in preparation for Spot test 1 which will be on Monday of the following week (week 7).

TIMETABLE

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Monday (w 1-5, 8-9)</th>
<th>2 - 3 pm</th>
<th>online, synchronised</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tuesday (w 1-10)</td>
<td>9-11 am</td>
<td>online, synchronised</td>
</tr>
<tr>
<td>Tutorial</td>
<td>Wednesday (w 1-5, 7-10)</td>
<td>10am - 12 pm</td>
<td>online, synchronised</td>
</tr>
<tr>
<td>Practical</td>
<td>Cohort 1: Thursdays (w 1-10)</td>
<td>12 – 1:30 pm</td>
<td>Anatomy Lab D26 Level1</td>
</tr>
<tr>
<td></td>
<td>Cohort 2: Thursdays (w 1-10)</td>
<td>1:30 - 3 pm</td>
<td>Anatomy Lab D26 Level1</td>
</tr>
</tbody>
</table>
## ANAT3411 Neuroanatomy – Class Schedule 2021 (weeks 1-6)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
<th>Activity</th>
</tr>
</thead>
</table>
| 1    | Mon Feb 15 | 2-3 pm | Online | L1 - Neurohistology  
|      | Tue Feb 16 | 9-11 am | Online | L2 - Development of the Nervous System  
|      | Wed Feb 17 | 10-12 pm | Online | L3 - General Organisation of the Brain  
|      | Thu Feb 18 | 12-3 pm | Diss Rm | T1 - Neurohistology & Development of the Nervous System  
|      |           |       |       | P1 - Development of the Nervous System & General Organisation of the Brain |
| 2    | Mon Feb 22 | 2-3 pm | Online | L4 - Spinal Cord 1  
|      | Tue Feb 23 | 9-11 am | Online | L5 - Spinal Cord 2  
|      | Wed Feb 24 | 10-12 pm | Online | L6 - Spinal Cord 3  
|      | Thu Feb 25 | 12-3 pm | Diss Rm | T2: Spinal Cord: Gray and White Mater  
|      |           |       |       | P2 - Spinal Cord: Gray and White Mater |
| 3    | Mon Mar 1  | 2-3 pm | Online | L7 - Medulla  
|      | Tue Mar 2  | 9-11 am | Online | L8 - Pons and Midbrain  
|      | Wed Mar 3  | 10-12 pm | Online | L9 - Reticular formation |
|      | Thu Mar 4  | 12-3 pm | Diss Rm | T3 - Brainstem: Medulla, Pons & Midbrain  
|      |           |       |       | P3 - Brainstem: Medulla, Pons & Midbrain |
| 4    | Mon Mar 8  | 2-3 pm | Online | L10 - Cranial nerves part 1  
|      | Tue Mar 9  | 9-11 am | Online | L11 - Cranial nerves part 2  
|      | Wed Mar 10 | 10-12 pm | Online | L12 - Cranial nerves part 3  
|      | Thu Mar 11 | 12-3 pm | Diss Rm | T4 - Cranial nerves  
|      |           |       |       | P4 - Cranial nerves |
| 5    | Mon Mar 15 | 2-3 pm | Online | L13 - Auditory System  
|      | Tue Mar 16 | 9-11 am | Online | L14 - Vestibular System  
|      | Wed Mar 17 | 10-12 pm | Online | L15 - Visual System  
|      | Thu Mar 18 | 12-3 pm | Diss Rm | T5 – Auditory, Vestibular & Visual Systems  
|      |           |       |       | P5 – Auditory, Vestibular & Visual Systems |
| 6    | Mon Mar 22 | 2-3 pm | Online | No lecture  
|      | Tue Mar 23 | 9-11 am | Online | L16 – Revision (optional)  
| Flexi week | Wed Mar 24 | 10-12 pm | Online | L17 – Revision (optional)  
|      | Thu Mar 25 | 12-3 pm | Diss Rm | No tutorial  
|      |           |       |       | P6 - Revision (optional) |
## ANAT3411 Neuroanatomy – Class Schedule 2021 (weeks 7-10)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Time</th>
<th>Venue</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Mon Mar 29</td>
<td>2-3 pm</td>
<td>Online</td>
<td>SPOT TEST1</td>
</tr>
<tr>
<td></td>
<td>Tue Mar 30</td>
<td>9-11 am</td>
<td>Online</td>
<td>L18 Thalamus</td>
</tr>
<tr>
<td></td>
<td>Wed Mar 31</td>
<td>10-12 pm</td>
<td>Online</td>
<td>L19 Telencephalon</td>
</tr>
<tr>
<td></td>
<td>Thu April 1</td>
<td>12-3 pm</td>
<td>Diss Rm</td>
<td>T7 – Thalamus &amp; Telencephalon</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P7 – Thalamus and Telencephalon</td>
</tr>
<tr>
<td>8</td>
<td>Mon April 5</td>
<td>2-3 pm</td>
<td>Online</td>
<td>L21 - Motor Cortex (Easter Monday)</td>
</tr>
<tr>
<td></td>
<td>Tue April 6</td>
<td>9-11 am</td>
<td>Online</td>
<td>L22 - Basal Ganglia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-12 pm</td>
<td>Online</td>
<td>L23 - Cerebellum</td>
</tr>
<tr>
<td></td>
<td>Wed April 7</td>
<td>12-3 pm</td>
<td>Diss Rm</td>
<td>T8 - Basal Ganglia and Cerebellum</td>
</tr>
<tr>
<td></td>
<td>Thu April 8</td>
<td></td>
<td></td>
<td>P8 - Basal Ganglia &amp; Cerebellar Disorders</td>
</tr>
<tr>
<td>9</td>
<td>Mon April 5</td>
<td>2-3 pm</td>
<td>Online</td>
<td>L24 - Cerebral Cortex</td>
</tr>
<tr>
<td></td>
<td>Tue April 6</td>
<td>9-11 am</td>
<td>Online</td>
<td>L25 - Hypothalamus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10-12 pm</td>
<td>Online</td>
<td>L26 - Limbic System</td>
</tr>
<tr>
<td></td>
<td>Wed April 7</td>
<td>12-3 pm</td>
<td>Diss Rm</td>
<td>T9 - Cerebral cortex &amp; Limbic system</td>
</tr>
<tr>
<td></td>
<td>Thu April 8</td>
<td></td>
<td></td>
<td>P9 - Cerebral cortex &amp; Limbic system</td>
</tr>
<tr>
<td>10</td>
<td>Mon April 12</td>
<td>2-3 pm</td>
<td>Online</td>
<td>– No lecture -</td>
</tr>
<tr>
<td></td>
<td>Tue April 13</td>
<td>9-11 am</td>
<td>Online</td>
<td>L27 - Blood Supply to the Brain, Venous Drainage, Meninges &amp; CSF</td>
</tr>
<tr>
<td></td>
<td>Wed April 14</td>
<td>10-12 pm</td>
<td>Online</td>
<td>T10 – Clinical cases</td>
</tr>
<tr>
<td></td>
<td>Thu April 15</td>
<td>12-3 pm</td>
<td>Diss Rm</td>
<td>P10 - Blood Supply to the Brain, Venous Drainage, Meninges &amp; CSF</td>
</tr>
</tbody>
</table>

**Please note:** Lecture L21 falls on Easter Monday. This lecture will be pre-recorded and made available online.

**Attendance**

Students are strongly advised to keep up to date with lectures, tutorials and attend practical classes. Pre-tut/prac quizzes which contribute to 20% of the final mark will be conducted at the beginning of each tutorial and practical classes.
RESOURCES

See also Learning Resources.

Online

- **BrainStorm Interactive Neuroanatomy**
  - URL: [https://brainstormneuro.net](https://brainstormneuro.net)
  - BrainStorm is now hosted by BEST. Please note that a login authentication step will be introduced at a later stage during the term. Brainstorm is free for UNSW students and staff.

Text Book


OR


Library References


Revision Facilities

*BrainStorm* is available on all student computers in the Wallace Wurth Building, including those in rooms G06/07 of the Wallace Wurth building.

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

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot Test 1 (50 min)</td>
<td>20%</td>
</tr>
<tr>
<td>Spot Test 2 (50 min)</td>
<td>20%</td>
</tr>
<tr>
<td>Pre-tut/prac quizzes (2x4 min, weekly)</td>
<td>20%</td>
</tr>
<tr>
<td>Theory exam (2hr)</td>
<td>40%</td>
</tr>
</tbody>
</table>

Spot Tests and theory examinations will be based on the specific objectives, learning activities and recommended readings 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. You are expected to be able to identify structures shown in bold type in the practical class Lab Manual and to answer fundamental theory questions about these structures. The Spot Tests are computer based and running from Moodle. Typically, they present 15 questions and will not last more than 50 min. More information will be provided at a later stage on the conditions in which the spot test will be conducted.

**Spot Test 1** will be held on Monday of Week 7 during the lecture slot (2-3 pm) and will examine material up to and including the Visual System (week 5).

**Spot Test 2** and the Theory Exam will be held during the exam period (30 April-13 May 2021) and will examine material from the Thalamus (week 7) onwards. The exact time will be set by Central, later during the term.

Pre-tut/prac quizzes

The pre-tut/prac quizzes ensure students keep up with lecture material and have adequately prepared for the upcoming tutorial and practical classes. They contribute 20% towards their final assessment. The quizzes will be conducted at the beginning of the tutorials and practicals. On each day, students will have 4 minutes to answer 2 multiple choice questions under exam conditions on material from:

i) the preceding lectures (and tutorial) of the week
ii) the current tutorial or practical class

Students who wish to perform well in the quizzes will need to i) attend the lectures (and tutorial) of the week and ensure they can answer basic questions that may arise from the learning objectives; and ii) pre-read the content of the tutorial and practical notes before attending the tutorial and practical class, taking particular note of the class Learning Objectives. There will be a total of 18 quizzes, however, only the best 14 quizzes will be considered for the calculation of the final quiz score. Students late to the tutorial and practical class will not be allowed to sit the quiz unless they have a valid reason. Students can bring their own devices to conduct the quizzes.

Theory Examination

The theory exam will be held online during the exam period (30 April-13 May 2021). This will consist of 40 multiple choice questions (60% of the theory exam mark) and 2 written questions (40% of the theory exam mark). The exam will test understanding of the structural organization of the brain and spinal cord and its relationship to function,
according to the Learning Outcomes defined earlier. It will cover the whole course, integrating knowledge from lectures and practicals.

Failure to complete an assessment

All assessments must be attempted. Failure to sit a spot-test or theory exam without lodgement of an application for Special Consideration with Student Central will lead to automatic failure of the course. A student may be required to sit a supplementary exam or submit a written assignment in place of a missed test. See [https://student.unsw.edu.au/special-consideration](https://student.unsw.edu.au/special-consideration)

Supplementary Exams

Supplementary exams (if required) will be held at the end of May (24-28 May). Please note that applications for Special Consideration for supplementary exams are not usually accepted, except in TRULY exceptional circumstances. For more information about special consideration please refer to [https://student.unsw.edu.au/special-consideration](https://student.unsw.edu.au/special-consideration)

Self-directed learning

Self-directed learning stimulus questions have been included at the end of all tutorial and practical classes. You are encouraged to work through these after each class to help you evaluate your own understanding. They are designed to prompt you to revise your lectures, practical manual and relevant textbook chapters. As such, answers will not be provided for these questions, as they are intended to encourage you to perform your own self-directed learning, i.e. to actively seek the answers and discuss these with your peers in your own time. You are encouraged to use the Moodle discussion forum to debate the answers amongst yourselves. In most cases you should be able to work them out if you have attended the lectures and tutorial/practical classes.

SERVICES

Equitable learning services

If you have a disability, medical condition, learning disability, or are dealing with personal circumstances that affect your study, Equitable Learning Services may be able to provide you with assistance. If you are a student with a registered condition, please let the convenors of the course at the beginning of the course. More information is available from: [https://student.unsw.edu.au/els](https://student.unsw.edu.au/els)

Student Support services

- Transitioning to Online Learning [https://www.covid19studyonline.unsw.edu.au/](https://www.covid19studyonline.unsw.edu.au/)
- Guide to Online Study [https://student.unsw.edu.au/online-study](https://student.unsw.edu.au/online-study)
- UNSW Student Life Hub [https://student.unsw.edu.au/hub#main-content](https://student.unsw.edu.au/hub#main-content)
STUDENT RISK MANAGEMENT PLAN

**Medicine and Science Teaching Laboratory**
**Student Risk Assessment**

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

**Personal Protective Equipment required**

- Lab. Coat
- Closed in footwear
- Safety Glasses
- Gloves
- Mask

**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: .................................................................