

**The University of New South Wales
School of Medical Sciences
Department of Anatomy**

ANAT 2241

Histology: Basic and Systematic

Semester 1, 2011

Laboratory Handbook

Edited by

P. de Permentier

Course Convenor

ANAT2241 Histology: Basic and Systematic

COURSE CONVENOR: Patrick de Permentier,

Room 112, First Floor,
30 Botany St, Randwick.

Telephone: 9385 2465

Email: p.depermentier@unsw.edu.au

TUTORS:

Dr Thomas Fath and Mr Colin Yeo.

COURSE INFORMATION

ANAT2241 Histology: Basic and Systematic is a 6UOC course. It is offered in the Anatomy major in the BSc and BMedSc programs. As a pre-requisite to PATH2201 Processes in Disease, it provides a vital link to the study of disorders when examined microscopically. Students need to understand normal histological morphology of cells, tissues and organs before they can appreciate pathological conditions of tissues under the virtual microscope.

COURSE AIM AND LEARNING OUTCOMES

The aim of this course is to provide students with a thorough understanding of the microscopical appearance and function of normal structures in the human body. This allows students to integrate this information with other disciplines such as Gross Anatomy, Pathology, and Physiology.

The **Basic Histology component** of the course will concentrate on the microanatomy of the **four basic tissues**, namely: epithelial tissue, including glandular tissue, connective tissue, muscular tissue, and nervous tissue. **Lectures** will give you the outline of the topic, but you are expected to supplement the information with private study. The **laboratory sessions** are directly linked to the lectures. At the end of each laboratory class, make sure you have covered, and understand, the specific objectives. Discussion during the class is encouraged. Each laboratory class may have one or more questions to be answered. These questions are meant to promote enquiry and discussion. The tutors act as facilitators, to guide you.

The **Systematic Histology component** of the course will investigate how these basic tissues combine to form **organs**, which operate together to maintain homeostasis. By convention, organs, which work together to achieve a particular function are grouped together as **systems** (e.g. respiratory system, etc.). The interactive computer program called **The Fabric of Life** has been installed on the laboratory computers. You are encouraged to use the computers during class and for private revision. In addition, external virtual microscopy databases are continually being installed in the computers to allow greater access to a variety of microscopic material.

GENERAL INFORMATION ABOUT HISTOLOGY

Anatomy is the study of the structure of organs and tissues at the **MACROSCOPIC (or gross) level**. Histology is the study of organ and tissue structure at the **MICROSCOPIC level** - it can be considered as microanatomy. Histology provides an insight into how cellular components are structurally and

functionally related. It draws its foundations in Biochemistry, Molecular Biology and Physiology as well as Gross Anatomy. Histology provides valuable information on why tissues and organs are shaped as they are. Histology is one of the bases of biomedical sciences. Modern histological techniques allow us to explore and gain understanding of biochemical and physiological processes and how these are changed when structure is changed, as occurs, for instance, in many disease processes. By the end of this course, students should have a thorough understanding of the tissues and systems of the body by microscopic examination and to apply their knowledge to functional states examined in Physiology and diseased states examined in Pathology.

| Histology of Basic Tissues and Systems | | |
|--|----------------------|--|
| Week | Lecture Dates | Lecture and Laboratory Class Topics |
| 1 A | 28/2 | Virtual microscope, Histological techniques, Stereology. Artefacts, Electron microscopy and cell ultrastructure. |
| 1 B | 3/3 | Covering and Lining Epithelia |
| 2 A | 7/3 | Glandular Epithelia |
| 2 B | 10/3 | Connective tissue I: Components |
| 3 A | 14/3 | Connective tissue II: Types |
| 3 B | 17/3 | Blood and Blood Formation |
| 4 A | 21/3 | Bone, Bone Formation and Joints |
| 4 B | 24/3 | Muscle |
| 5 A | 28/3 | Nervous tissue |
| Mid-Session Practical Examination and Theory Examination (Friday April 1) | | |
| 6 A | 4/4 | Cardiovascular System |
| 6 B | 7/4 | Respiratory system |
| 7 A | 11/4 | Integumentary system |
| 7 B | 14/4 | Gastro-intestinal system I |
| No classes Week 8, then Mid-Session Recess April 25 to May 1 | | |
| 9 A | 2/5 | Gastro-intestinal system II |
| 9 B | 5/5 | Liver, Gallbladder and Pancreas |
| 10 A | 9/5 | Lymphatic tissue and the Immune system |
| 10 B | 12/5 | Endocrine system |
| 11 A | 16/5 | Urinary system |
| 11 B | 19/5 | Female reproductive system |
| 12 A | 23/5 | Male reproductive system |
| 12 B | 26/5 | Eye |
| 13 A | 30/5 | Revision |
| Final Practical Examination (date, time and place to be announced) | | |

COURSE FORMAT

The course involves **6 hours per week** of instruction in two three-hour blocks. Each block involves a 1-hour lecture followed by a 2-hour practical class where students under the guidance of demonstrators will employ a computer to examine virtual slides of microscopic material.

TIMETABLE

Lectures

Monday 9 am – 10 am, **Biomed Theatre A**

AND

Thursday 1 pm – 2 pm, **Biomed Theatre A**

Laboratory Sessions

Wednesday 10 am - 12 noon, Rooms G2, G4, Wallace Wurth Building

AND

Friday 11 am – 1 pm, Rooms G2, G4, Wallace Wurth Building

Thursday 10 – 12 noon, Rooms G2, G4, Wallace Wurth Building (repeat of the Wednesday laboratory class)

AND

Friday 3 pm – 5 pm, Rooms G2, G4, Wallace Wurth Building (repeat of the Friday laboratory class).

Note; Please remain in your allocated laboratory classes.

ASSESSMENTS

1. Practical exams

There will be TWO practical exams, a Mid-Session one (**Friday, April 1**) and a final practical exam at the end-of-Session.

2. Written examinations

There will be TWO written papers. The first one is in Mid-Session (**1 hour in duration, Friday April 1**) and the second one is at the end of the Session.

| | Marks |
|----------------------------|-------|
| Mid-Session Practical Exam | 10% |
| Mid-Session Theory Exam | 20% |
| Final Practical Exam | 30% |
| Final Theory Exam | 40% |

Practical and theory examinations are based on specific objectives, learning activities and lecture material. In practical examinations, you will be expected to be able to identify microscopic structures (cells and tissues) studied during the laboratory sessions as well as provide some brief functions. The end of session (2 hour) theory examination will include 1 long answer, 3 short answers, 2 histological drawings and 2 questions comparing and contrasting tissues in a table format. The examination is designed to test the understanding of the microscopic organisation of the normal tissues of the human body and relate them to their functional importance.

TEXTBOOKS

Several books provide adequate coverage of the material in this course. A number of suggestions have been included on the following list. An atlas on its own will usually only cover the practical part of the course, so you will need access to a textbook to cover the theory part of the course.

Combined Texts and Atlas

Young, B., Lowe, J., Stevens, A. & Heath, J. (2006) *Wheater's Functional Histology. A Text and Colour Atlas* 5th ed. Churchill Livingstone, Edinburgh. ISBN 0-443-06850X.

Junqueira L. (2009) *Basic Histology Text & Atlas* 12th ed, McGraw-Hill, ISBN 9780071630207

Textbook

Kerr, J. B. (2010) *Functional Histology* 2nd ed. Mosby Elsevier. ISBN 9780729538374.

Atlas

Eroschenko, V.P. (2008) *di Fiore's Atlas of Histology*. 11th ed Lippincott, Williams & Wilkins Int., Baltimore. ISBN 9781608314928.

ATTENDANCE

In accordance with University regulations, students must attend at least 80% of all scheduled learning activities (lectures and practicals).

STUDY AND REVISION FACILITIES

The histology laboratories in rooms G2 and G4 of the Wallace Wurth building are generally open from about 8 am to 5.30 pm Monday to Friday.

These laboratories may be used by students during these hours, provided the rooms are not required for other classes. The laboratories are closed on weekends and public holidays. Laboratory coats are NOT required in the histology laboratories. Food and drinks are NOT allowed in the laboratories.

OFFICIAL COMMUNICATION BY EMAIL

All students in the course ANAT2241 Histology: Basic and Systematic are advised that email is now 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) 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 mail at least every other day. Facilities for checking email are available in the School of Medical Sciences and in the University library.

Further information and assistance is available from DIS-Connect, Tel: 9385 1777.
Free email courses are run by the UNSW Library.

ACADEMIC HONESTY AND 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 penalized 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

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

- correct referencing practices;
- paraphrasing, summarizing, 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.

OCCUPATIONAL HEALTH AND SAFETY GUIDELINES

Generic Safety rules for the School of Medical Sciences can be found at the following URL:

<http://medicallciences.med.unsw.edu.au/SOMSWeb.nsf/page/Policies%20and%20Procedures>

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 via 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.
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.

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 EADU 9385 4734 or www.equity.unsw.edu.au/disabil.html. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

GRIEVANCE OFFICER

If you have any problems or grievances with the course you should, in the first instance, consult the Course Organiser. If you are unable to resolve the difficulty, you can consult the Head of Teaching in the Department, Professor Ken Ashwell, First Floor, 30 Botany Street, Randwick (Room 113), or the Department of Anatomy's nominated Grievance Resolution Officer, Dr Priti Pandey, Ground Floor, 32 Botany Street, Randwick (Email: p.pandey@unsw.edu.au).

GENERAL ADVICE FOR STUDYING SLIDES

In Histology, you are expected to study the features of histological preparations as virtual images, which were scanned from real stained sections, mounted on glass slides and listed in the Learning Activities. In these classes you may encounter structures and terminology not defined in lectures. **You will need to read about these structures in your textbook(s).** Histological sections, which are slices of tissue usually from 5-8 μ m thick (see dimensions below), can be examined as follows:

1. For each section, use the Slide Catalogue at the end of this manual to determine:
 - a. The animal from which the section is taken (thereby often defining the approximate size of the structure in relation to that of the human structure).
 - b. The stains used (thereby defining the colours of the major tissue components). Note that stains are not examinable.
2. Low power sketches or notes made in relation to your textbook diagrams at this stage may help you to remember the main histological features of each section, e.g., which major tissue components are present.
3. Using the virtual microscope sections, note the 2-dimensional shapes in the section and the major tissue components present and try to determine the

approximate 3-dimensional shape of the whole organ from which the section was taken. Is the section cut randomly through the organ? Is there an obvious lumen in the section?

Abbreviations:

- XS - cross section
- TS - transverse section
- LS - longitudinal section
- LM - light microscope or light micrograph
- EM - electron microscope, or electron micrograph
- 2-D - 2-dimensional

Dimensions: $1\text{mm} = 10^3$ micrometres (μm) = 10^6 nanometres (nm)

Note: A micrometre is often called a "micron" (μm); $1\mu\text{m} = 10^{-6}\text{m}$

Resolving Powers:

Unaided eye - approx. $0.1\text{mm} = 100\mu\text{m}$

Light microscope - approx. $0.1\mu\text{m} = 100\text{nm}$

Electron microscope - approx. 1nm

Useful Histology resources to employ during the practicals or for revision.

After entering the Menu, go to Class Program and then to Anatomy

- a) Fabric of Life
- b) Neocortex Virtual Microscope-Histology-Zurich
- c) Histology Glossary
- d) Dr Lazer's Histology Drawings
- e) Digital Atlas of Electron Microscopy