

# ANAT 2241

## Histology: Basic and Systematic



## STAFF

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## UNITS OF CREDIT

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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.

### MODIFICATIONS TO THE COURSE IN 2014-2016

The 2 x 2 hour practical have been condensed into a single 3 hr session and the use of annotation has been refined through the use of the online system SLICE.

## COURSE AIM AND STUDENT LEARNING OUTCOMES

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The aim of this course is to provide students with a thorough understanding of the microscopic 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 provide you with an 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 with the teachers acting 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.). You are encouraged to use the computers during class and also 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.

## **HISTOLOGY BACKGROUND**

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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 an 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.

## **TEXTBOOKS**

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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 usually only covers 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**

*Wheater's Functional Histology. A Text and Colour Atlas* 6th ed. by Young, B., O'Dowd, G. and Woodford, P. (2014)

Junqueira's *Basic Histology Text & Atlas* 14<sup>th</sup> ed, McGraw-Hill by Mesher, A. (2015).

### **Atlas**

*di Fiore's Atlas of Histology with functional correlations.* 13th ed, Eroschenko, V.P. and di Fiore M.S.H. (2017)

## ASSESSMENTS

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### 1. Practical exams

There will be TWO practical exams, a Mid-Session one (**Monday April 10**) 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 immediately before the Mid-Session Practical examination on **Monday April 10** and the second one is at the end of the Session.

ASSESSMENTS	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 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.

## STUDY AND REVISION FACILITIES

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The histology laboratories in rooms G06 and G07 of the Ground Floor of the Wallace Wurth building are generally open from about 8 am to 5.30 pm Monday to Friday.

They 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 permitted in the laboratories.**

Please read this manual/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) )

## GENERAL ADVICE IN HISTOLOGY

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In Histology, you are expected to study the features of histological preparations as virtual images, which were scanned from real stained tissue sections, which were then mounted on glass slides and listed in the Learning Activities. Histological sections are slices of tissue usually from 5-8 $\mu$ m thick (see Dimensions).

**Low power sketches or notes made may help you to remember the main histological features of a section, e.g., which major tissue components are present.**

Note the 2-D shapes in the section and the major tissue components present and try to determine the approximate 3-D 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

**Dimensions:** 1mm = 10<sup>3</sup> micrometres ( $\mu$ m) = 10<sup>6</sup> nanometres (nm)

*Note:* A micrometre is often called a "micron" ( $\mu$ m); 1 $\mu$ m = 10<sup>-6</sup>m

### **Resolving Powers:**

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

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

Electron microscope - approx. 1 nm

### **Virtual Slides**

The virtual histology slides for this and the subsequent practicals can be found at:

[moodle.telt.unsw.edu.au/course/view.php?id=21070](http://moodle.telt.unsw.edu.au/course/view.php?id=21070)

Student Key: Vslides

### **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) Dr Lazer's Histology Drawings
- d) Digital Atlas of Electron Microscopy by J K Brueckner
- e) <http://www.histology-world.com/stains/stains.htm>

## **TIMETABLE**

The course involves **5 hours per week** of instruction.

This involves 2 x 1-hour lectures followed by a 3-hour practical class where students under the guidance of demonstrators will employ a computer to examine virtual slides of microscopic material. Computers are shared between two to three students.

### **Lectures**

**Monday 4 pm – 5 pm, Keith Burrows Theatre**

AND

**Tuesday 9 am– 10 am, Physics Theatre**

**(All lectures are conducted from Weeks 1 to 13).**

### **Laboratory Sessions**

#### **Group A**

Thursday 2–5pm, Rooms G6 & G7, Wallace Wurth Building

(Weeks 1 to 13)

#### **Group B**

Friday 10 am – 1 pm, Rooms G6, & G7, Wallace Wurth Building

(Weeks 1 to 13)

**Group B is repeated material, which was delivered in Group A.**

**NOTE:** You must remain in your allocated Laboratory timeslots.

<b>Histology of Basic Tissues and Systems</b>		
<b>Week</b>	<b>Lecture Dates</b>	<b>Lecture and Laboratory Class Topics</b>
1 A	27/2	Introducing the course
1 B	28/2	Covering and Lining Epithelia
2 A	6/3	Glandular Epithelia
2 B	7/3	Connective tissue I: Components
3 A	13/3	Connective tissue II: Types
3 B	14/3	Bone, Bone Formation and Joints
4 A	20/3	Blood
4 B	21/3	Muscle
5 A	27/3	Nervous tissue (PNS)
5 B	28/3	Nervous tissue (CNS)
6 A	3/4	Cardiovascular system
6 B	4/4	Respiratory system
7		<p>NOTE: There are <b>NO</b> lectures and practicals in Week 7. Instead on <b>Monday April 10</b> there will be the MID-SESSION THEORY and PRACTICAL EXAMS (time and venue yet to be finalized).</p> <p><b>MID-SESSION RECESS April 14 – April 23.</b></p>
8 A	24/4	Integumentary system
8 B	25/4	Liver, Gallbladder and Pancreas ( <b>Due to ANZAC Day, this lecture can be viewed on line via Echo</b> )
9 A	1/5	Gastro-intestinal system I
9 B	2/5	Gastro-intestinal system II
10 A	8/5	Lymphatic tissue and the Immune system
10 B	9/5	Endocrine system
11 A	15/5	Urinary system
11 B	16/5	Female reproductive system
12 A	22/5	Male reproductive system
12 B	23/5	Eye
13		<p><b>REVISION IN THE PRACTICAL TIME SLOTS</b></p> <p><b>Final Practical Examination (date, time and place to be announced)</b></p>