BSc (Veterinary Biosciences)

Level 1

Basic Mammalian Body Plan - 1 (2008-09)

10 Credits

Acting Course Co-ordinator: Dr Mike Purton

Position in Course: Year 1 Semester 1

Course prerequisites: None

Course corequisites:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 1 (402B) (Chemistry)</td>
<td>40</td>
</tr>
<tr>
<td>Biology 1A (Animal biology) (KNPU) (FBLS)</td>
<td>20</td>
</tr>
<tr>
<td>Biology 1B (Cell biology) (KNMU) (FBLS)</td>
<td>20</td>
</tr>
<tr>
<td>Animal Production and Management 1 (FVM)</td>
<td>10</td>
</tr>
<tr>
<td>Comparative vertebrate morphology 1 (FVM)</td>
<td>10</td>
</tr>
<tr>
<td>Body systems physiology 1 (FVM)</td>
<td>10</td>
</tr>
</tbody>
</table>

Excluded courses or course combinations: None
Basic Mammalian Body Plan
(Level 1: 10 credits)

Course Information Document
Faculty of Veterinary Medicine
**2008-2009**

**Course Aims & Intended learning Outcomes**

**Aims of the course**

The aims of this course are to:

- introduce you to the use of basic anatomical and histological terminologies and techniques
- provide you with a broad-based knowledge and understanding of the structure and organisation of the mammalian body, stressing the interactions between structural and functional characteristics
- illustrate how such knowledge will be used as a preparation for future studies
- stimulate you to develop skills relating to the systematic acquisition of factual information and data
- provide you with opportunities to practise and improve written and oral communication skills

**Intended Learning Outcomes of the course**

On completion of the course you should be able to:

- explain the basic anatomical and histological terminologies and techniques used when describing the basic body plan of mammals
- define the different levels of structural organisation in mammals, *viz.* cellular, tissue, organ, system and body.
- describe how structure correlates with function in the tissues and organ systems of mammals, and how organ systems are interrelated.
- describe the basic functional anatomy of the major organ systems constituting the mammalian body, *viz.* integumentary system, musculoskeletal system, respiratory system, cardiovascular system, digestive system, urogenital system, nervous & endocrine system.
- illustrate the topographical relationships of the organ systems within the mammalian body

**Outline of the course content**

This Level 1 course consists entirely of core material, and as such is undertaken by all students.

**Course Co-ordinator**

Tba.

**Lecturing Staff**

Tba.
Course structure

This Level 1 course consists of a series of lectures, related laboratory work and self-directed learning assignments.

Lectures
The lecture component will comprise 2 lectures per week during the first semester. Attendance at lectures is compulsory, as it is only by attending lectures that you can learn a particular lecturer’s viewpoint and the emphasis given to a specific topic. Lectures function to provide you with the central facts of the subject, and act as a guide through the enormous quantity of published scientific literature in this area.

Laboratory classes
The laboratory classes are designed to reinforce the knowledge gained from lectures. The classes are organised primarily around demonstration material, although a number of hands-on practical labs will provide an opportunity for self-directed practical examination of cadaverous specimens, and allow the opportunity to develop basic skills in anatomical techniques.

<table>
<thead>
<tr>
<th>Laboratory class</th>
<th>Nature of practical</th>
<th>Topic</th>
<th>Duration of class (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Demonstration (dog &amp; cat)</td>
<td>Mammalian musculoskeletal system</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Demonstration (dog &amp; cat)</td>
<td>Head &amp; body cavities</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Dissection (dog)</td>
<td>Whole cadaver dissection</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Demonstration (comparative material)</td>
<td>Comparative body systems</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Revision dissection (cat/rabbit)</td>
<td>Whole cadaver dissection</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Demonstration (comparative material)</td>
<td>External features; revision specimens</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Histology class</td>
<td>Preparatory procedures. Practical use of microscope. Visit to working diagnostic laboratory (in groups)</td>
<td>3</td>
</tr>
</tbody>
</table>

All laboratory classes are held in the Veterinary School, and are based around relevant laboratory guides or worksheets. Laboratory demonstration and dissection classes based on the examination of gross anatomical specimens will be held in Teaching Laboratory 1, whilst practical microscopy classes will be held in Teaching Laboratory 2.

Course work assignments
In mid-course, and again at the end of the lecture course, you will be required to complete a specified essay assignment (essay assignments 1 & 2). Formal instruction, in tutorial form, will be provided before undertaking these assignments. You will then be expected to undertake independent self-directed research of a selected topic in your own time, and submit a written
essay on this topic by the closing date for submission. Essays will be marked by the lecturing staff, with the mark contributing to the overall course mark, as detailed below. The deadlines for submission of coursework will be listed in the timetables and posted on Moodle.

Summary of course structure

<table>
<thead>
<tr>
<th>Course component</th>
<th>Hours per student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>20</td>
</tr>
<tr>
<td>Practicals</td>
<td>18</td>
</tr>
<tr>
<td>Tutorials</td>
<td>2</td>
</tr>
<tr>
<td>Self directed learning &amp; course assessments</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
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</tbody>
</table>

Items of summative assessment

Your overall performance will be based on your performance in the coursework assignments (as detailed above) and the end-of-course examination.

Contribution made by coursework assignments

The two coursework assignments (essay assignments 1 & 2) will together account for 30% of your final overall course mark. Your coursework marks will also count towards your final grade should you have to resit the end-of-course examination. Consequently, it is vital for you to obtain a decent grade for your coursework, which means you must hand in all the required assignments.

End-of-course examination

The end-of-course examination will account for 70% of your final mark, and will consist of a one-hour written paper covering all course topics (accounting for 45% of your total mark) and a 30 minute spot practical exam (accounting for 25% of your total mark). The formats will be provided in advance, and you will have an opportunity to practise example questions. Normally you must sit the end-of-course examination at the first set (diet) of examinations following the end of the course. For Basic Mammalian Body Plan, the first diet of examinations will be held in end of first semester examination period. Examination timetables are published on the Registry website.

<table>
<thead>
<tr>
<th>Item of assessment</th>
<th>Completed during (teaching week)</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay assignment 1</td>
<td>Week 6</td>
<td>15%</td>
</tr>
<tr>
<td>Essay assignment 2</td>
<td>Week 11</td>
<td>15%</td>
</tr>
<tr>
<td>End-of-course examination: Written</td>
<td>End of Semester 1 examination</td>
<td>70% (in total):</td>
</tr>
<tr>
<td>(1 hour duration)</td>
<td>period</td>
<td>45% (written)</td>
</tr>
</tbody>
</table>
Study Guide

For each lecture, make sure that you have taken down a useful and accurate set of lecture notes. Identify points that are not clear, and use the recommended textbooks to source any additional information you need. Ask the lecturer if you need help. You are encouraged to read around each topic, and for this reason a list of recommended textbooks is provided. In addition, as both the anatomical and veterinary sciences represent fast moving disciplines in which advances are constantly being made, you are also encouraged to get into the habit of reading original research papers and review articles in the scientific journals. Evidence of wider reading will be taken into account when course assignments are submitted for marking, and where appropriate in the written exam.

Recommended General Texts

There are no specific books that need to be purchased for this course. However, you may find it useful to refer to one or more of the following books during the course:


Epp, C.D. The 10 most important things about cells. Pacific Press. 1998. This book is well worth searching out. It provides a really good introduction to the central concepts of cell biology. And how could you not love a book that includes sections entitled “Cells can be used to make money” and “Genetic engineering of cells can make even more money”!
Intended Learning Outcomes and Lecture Synopses

Cells, tissues and organs

Lecture 1  Anatomy and histology: terminology and practical procedures
Lecture 2  Cells, tissues and organs
Lecture 3  Techniques in microscopy

Intended learning outcomes
• develop a familiarity with basic anatomical terminology
• appreciate the commoner techniques employed in anatomical studies
• appreciate that cells have diverse structures which adapt them to different functions
• list the levels of structural organisation from cells to organs
• list the four types of tissues described in histology; epithelial, connective, muscle and nervous
• illustrate the diversity of structure and function in at least two tissue types
• introduction to the different methodologies employed in research and diagnostic microscopy

Synopsis
An understanding of anatomical terminology. An awareness of the commoner anatomical techniques and their uses. Introduction to the various levels of structural organisation at the microscopic and macroscopic level; cells, tissues and organs. Illustration of the diversity of structure and function of cells. Introduction to the four types of tissues: epithelial, connective, muscle and nervous, and the relationship between their structures and functions. The development of tissues into organs. Study of research and diagnostic microscopical techniques.

Integument

Lecture 4  The integument

Intended learning outcomes
• appreciate the functional importance of skin as an organ
• ability to recognise the main tissue components of skin, and know how it is renewed
• understand principles of blood supply and innervation to skin
• awareness of regional variations in skin structure
• understanding of hair structure, and awareness of hair growth cycles
• appreciate relationships between sebaceous glands, sweat glands and hair follicles, and understand their respective roles
• understand the defence mechanisms presented by the integumentary system
• appreciate the processes involved in wound repair of the skin

Synopsis
An understanding of functions of skin. Knowledge of the structure of epidermis, dermis and hypodermis, and regional variations in these components. Awareness of hair formation and structure, and of moulting cycles. Knowledge of the structure and function of sebaceous and
sweat glands. Understanding of the defence mechanisms inherent in skin structure. Appreciation of the processes involved in wound healing in the skin.

**Musculoskeletal system**

**Lecture 5  The mammalian skeleton**
**Lecture 6  Joints & muscles**

*Intended learning outcomes*

- know the main features of the development and structure of bony and cartilaginous tissues
- appreciate the differences between the axial, appendicular and splanchnic skeletons
- list the major bones of the axial skeleton
- list the component bones of the appendicular skeleton
- describe the classification of joints, and understand their structure and movements
- list the major articulations of the axial and appendicular skeleton
- appreciate the differences between skeletal, smooth and cardiac muscle tissues
- have a knowledge of the major skeletal muscle groups, including the muscles of the head, and vertebral column, muscles of the thorax and abdomen, and muscles of the forelimb and hind limb, and appreciate the activities of these muscle groups.

*Synopsis*
An introduction to the histology of bone and cartilage, and a review of the development of bone. An examination of the component parts of the mammalian skeleton, and of their articulations. An introduction to the functional histology of muscular tissues. A review of the major skeletal muscle groups of the mammalian body.

**The body cavities**

**Lecture 7  Thoracic, abdominal and pelvic cavities**

*Intended learning outcomes*

- list the principal body cavities, define their boundaries and name the organs associated with them
- knowledge of the serous linings of the cavities
- appreciation of the structure and function of the diaphragm
- awareness of the structure of the pelvic diaphragm

*Synopsis*
Knowledge of the boundaries of thoracic, abdominal and pelvic cavities. Understanding of the structure and distribution of the pleura and the peritoneum. Knowledge of the functional morphology, including attachments, of the diaphragm. Awareness of the supporting structures of the pelvic diaphragm.

**Respiratory system**

**Lecture 8  Upper & lower respiratory tract**
Lecture 9    Respiratory exchange areas

*Intended learning outcomes*
- list the component parts of the respiratory system
- appreciate the difference between the upper and lower respiratory tracts
- describe the course, structure and functions of the conducting airways
- describe the structure of the respiratory components of the tract
- understand the muscles and movements involved in respiration

*Synopsis*
Recognise the difference between external and internal respiration. A study of the main anatomical features of the upper and lower respiratory tracts. An examination of the functional morphology of the respiratory exchange areas. A review of the mechanics of breathing.

Cardiovascular system   tba

Lecture 10   Heart & blood vessels
Lecture 11   Lymphatic system

*Intended learning outcomes*
- list the component parts of the mammalian circulatory system
- describe the histological differences between arteries, veins and capillaries
- describe the external and internal features of the mammalian heart
- understand the anatomy of the conducting mechanism of the heart
- list the major arteries and veins of the body
- understand what is meant by a portal vascular system
- recognise the reason for, and functions of, the lymphatic system
- know the structure of lymphatic capillaries, lymphatic vessels and lymph nodes
- know the basic structure of other lymphatic organs, *viz.* spleen, thymus and tonsils
- identify and locate the major lymphatic structures of the body

*Synopsis*
Discussion of the functional morphology of the circulatory system. The histological structure of blood vessels. The anatomy of the heart and major blood vessels. An introduction to the functional anatomy of the lymphatic system. The histology of lymphatic tissue.

Digestive system   tba

Lecture 12    Oral & pharyngeal cavities
Lecture 13    The tubular tract

*Intended learning outcomes*
- list the component parts of the mammalian digestive system and appreciate the general function of each component
- describe the structure of a generalised mammalian tooth
• describe the oral cavity
• describe the location and structure of the salivary glands
• understand the functional anatomical basis of swallowing
• describe the basic structure of the tubular alimentary tract and understand the functional basis of the modifications exhibited by different regions
• describe the structure and locations of the major sphincters
• appreciate the topographical anatomy of the component parts of the tubular tract, *viz.* stomach, small and large intestine, rectum and anal canal
• describe the locations, and gross and histological structure, of the organs associated with the tubular tract, *viz.* liver and pancreas

**Synopsis**
An introduction to the functional morphology of the mammalian digestive system. The anatomy of the oral cavity and pharynx, and associated structures, in the carnivore. The structure of the tooth. The anatomy of swallowing. The topographical anatomy of the tubular tract and associated organs of the carnivore.

**Urogenital system**

**Lecture 14**  Urinary system
**Lecture 15**  Male and female reproductive tracts

**Intended learning outcomes**
• list the structures constituting the urinary system and identify their locations
• describe the macroscopic and microscopic organisation of the kidney
• describe the structure of the ureters, bladder and urethra
• list the structures comprising the male reproductive system
• list the accessory sex glands of the dog
• know the functional anatomy of the canine penis
• appreciate the major differences in the functional anatomy of the male tract in the domesticated species
• name the component parts of the female reproductive tract
• know the main histological and gross anatomical features of the component parts

**Synopsis**
A topographical account of the gross anatomy of urinary system in the dog. The structure of the nephron. The gross anatomy of the male canine reproductive system. The gross anatomy of the female reproductive system. The mammary gland.

**The nervous system and sense organs**

**tba**

**Lecture 16**  Nervous tissue
**Lecture 17**  Brain and spinal cord
**Lecture 18**  The cranial and peripheral nervous systems
**Lecture 19**  The sense organs
Intended learning outcomes
- list the functions of the nervous system
- name the component parts of the nervous system
- identify the general features of a typical multipolar neuron
- name and locate the cell types constituting the nervous system
- identify the main divisions of the brain, and list their main functions
- describe the ventricular system of the brain and spinal cord
- list the cranial nerves, and name at least one function of each
- describe the topographical features of the spinal cord
- list the meninges and describe their relationship to the spinal cord and each other
- describe the origins, and subsequent distribution, of spinal nerves
- name the two divisions of the autonomic system and list the characteristic anatomical features of each
- describe the anatomy of the eyeball
- understand the functional anatomy of the eyelids and lacrimal apparatus
- name the component parts of the external, middle and inner ear, and show an appreciation of how they connect with each other

Synopsis
The histology of nervous tissue. The organisation of the brain and spinal cord. The meninges. The ventricular system of the brain. Cranial and spinal nerves. The autonomic nervous system. The eye and associated structures. The ear.

Endocrine system

Lecture 20   Endocrine organs

Intended learning outcomes
- list the glands constituting the endocrine system
- name the main functions of each
- locate the glands within the body

Synopsis
Discussions of the functional anatomy of mammalian endocrine glands, viz. thyroid and parathyroid, pancreas, adrenal glands pituitary glands, ovary and testis.

Laboratory course

Aims and intended learning outcomes

The aims of the laboratory course are to:
- provide practical experience of functional mammalian morphology at the gross and histological level
- encourage the exploration of comparative vertebrate morphology in greater detail.