UNSW SYDNEY | Australia's Global University

Faculty of Medicine
School of Medical Sciences

PHSL2201 · 2221 · 2502

2nd year Physiology

COURSE OUTLINE

Term 2, 2019

CRICOS Provider Code 00098G

CONTENTS

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 medicalsciences.med.unsw.edu.au)

COURSE INFORMATION

EXAMINER AND COURSE CO-ORDINATOR

Course Convenor:	**Dr. Lesley Ulman** **l.ulman@unsw.edu.au**	**Room 204 West Wing Wallace Wurth** **(ph: 9385 3601)**
Co-convenor:	**Dr. Nicole Marden** **n.marden@unsw.edu.au**	**Room 204 West Wing Wallace Wurth** **(ph: 9385 3601)**

If you need to consult with either, appointments can be set up through email.

LECTURERS IN THIS COURSE

Dr K.Gibson	**k.gibson@unsw.edu.au**
Dr V.Birzniece	**v.birzniece@unsw.edu.au**
Dr N.Marden	**n.marden@unsw.edu.au**
Dr M. Le Nedelec	**m.lenedelec@unsw.edu.au**
Dr T. Murphy	**tim.murphy@unsw.edu.au**
Prof M.Morris	**m.morris@unsw.edu.au**

If you require to consult with any of these staff, appointments can be made via email.

The teaching staff involved in the running of this course are located on the second and third floors of the west wing of the Wallace Wurth building. These areas are not accessible by students so if you wish to contact one of us you will need to do so by email and we can organize to meet with you if necessary.

OBJECTIVES OF THE COURSE

This course is offered to second year students and follows on from the first session course. The major aims of this course are to provide students with a basic understanding of the fundamental processes and mechanisms that serve and control the various functions of the body. It should be noted that, although introductory, this course in Human Physiology is comprehensive in scope. Areas treated in detail include Endocrine Physiology, Reproductive Physiology, Respiration, Kidney & Body Fluids and Gastrointestinal Physiology.

It should also be noted that, where appropriate, subject areas are treated quantitatively as well as qualitatively, an approach that requires students to have at least a basic knowledge of mathematics and chemistry.

COURSE STRUCTURE

This is a 6 unit of credit course. There are 3 one hour lectures per week (Monday 2-3, Tuesday 9-10 and Wednesday 9-10). Lectures will provide you with the concepts and theory essential for understanding the fundamental processes of body function.

There are also online tutorials relating to all the major topic areas. These are designed to complement and enhance your understanding of the lecture material.

The practical classes are a major component of the course. You will be divided into small working teams of approximately 6 students within your practical group at the beginning of the term and you will remain in these teams throughout the term. There will be 5 timetabled face-to-face practical sessions. These comprise a fortnightly 3 hour laboratory session during which you will work in your teams and carry out the laboratory exercises outlined in this practical manual. These sessions will give an insight into how knowledge is obtained, and how the results of experiments depend not only on what we measure but how we measure it. There are also two self-directed computer classes which can only be accessed using the computers in the physiology laboratories on level 1 or in the ground floor computer labs in the Wallace Wurth Building. There is also one online self-directed practical class which you will complete in your own time. This can be accessed from any computer.

These classes are clearly outlined in your practical timetable. Although all self-directed classes are unsupervised, the material is still examinable.

APPROACH TO LEARNING AND TEACHING

Although the primary source of information for this course is the lecture material, effective learning can be enhanced through self directed use of other resources such as textbooks and Moodle. Your practical classes will be directly related to the lectures and it is essential to prepare for practical classes before attending by completing the online pre-laboratory modules (accessed through Moodle) and reading the practical notes. The self-directed online tutorials (also accessed through Moodle) have been carefully designed to enhance and test your understanding of the lecture material. It is up to you to ensure you perform well in each part of the course: attending lectures, engaging with the tutorials, making full use of the pre and post laboratory modules, studying for exams and seeking assistance to clarify your understanding. Online feedback quizzes and past exam questions are provided to assist you in preparing for examinations.

UNSW LEARNING OUTCOMES

UNSW aims to provide an environment that fosters students achieving the following generic graduate attributes:

1. the skills involved in scholarly enquiry
2. an in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context
3. the capacity for analytical and critical thinking and for creative problem-solving
4. the ability to engage in independent and reflective learning
5. information literacy - the skills to appropriately locate, evaluate and use relevant information
6. the capacity for enterprise, initiative and creativity
7. an appreciation of, and respect for, diversity
8. a capacity to contribute to, and work within, the international community
9. the skills required for collaborative and multidisciplinary work
10. an appreciation of, and a responsiveness to, change
11. a respect for ethical practice and social responsibility
12. the skills of effective communication.

Not every course addresses all these attributes evenly. In second year physiology, attributes 1-4 are most relevant.

ASSESSMENT

Mid-term Theory Exam (40 min duration) 20%

The mid-term exam will be held on Tuesday 2nd July 2019 and will consist of the following:

- 9 multiple choice questions on material covered in Temperature Regulation, Endocrine Physiology and Reproductive Physiology lectures and tutorials.
- Two 10 minute short answer questions: one on Endocrine Physiology and one on Reproductive Physiology.

End of term Exam (2 hours duration) 60%

The end of term exam will consist of the following:

- 20 multiple choice questions on all Respiration, Kidney & Body Fluids and Gastrointestinal Physiology lectures and tutorials.
- Three 10 minute short answer questions: one on Respiration, one on Kidney & Body Fluids and one on Gastrointestinal Physiology lectures

and tutorials. • 30 multiple choice questions on material pertaining to the face-to-face and computer practicals in Term 2. You will **not** be able to take your prac book into the exam.
Tutorials **10%** There will be 5 online tutorials over the term that relate to each of the major lecture topics. These tutorials will require you to interact and provide answers to questions. You can attempt these tutorials as many times as you wish but need to score 90% or more within 2 weeks of the completion of the lecture topic to attain the 2% course credit assigned to each of the online tutorials. Once you do get your 2% or if the deadline date is reached, this grading version of the tutorial will no longer be available but an identical non-graded revision module will be available.
Post-laboratory revision modules **10%** There will be 5 post-laboratory revision modules, one for each of the face-to-face practical classes. These must be completed after the respective practicals and have been designed to aid your understanding of the practical material. You can attempt these revision modules as many times as you wish but need to score 90% or more within 2 weeks of completing the relevant practical class to attain the 2% course credit assigned to each revision module.

Formative Online Feedback Quizzes

There will be a series of 5 online feedback quizzes throughout the term covering each topic. These quizzes will be available online throughout the term but are best attempted after completion of the corresponding lectures. These quizzes are to be used as a study aid and you will receive immediate detailed feedback after submitting your answers. The quizzes are to be attempted in your own time and there is no course credit assigned to them. You may attempt these quizzes as many times as you wish.

WHILE THERE IS NO COURSE CREDIT ASSIGNED TO THE ONLINE FEEDBACK QUIZZES, ALL MULTIPLE CHOICE QUESTIONS EXAMINING LECTURE AND TUTORIAL MATERIAL IN THE MIDTERM AND END OF TERM EXAMS WILL BE DRAWN FROM THE BANK OF QUESTIONS USED IN THE THESE QUIZZES.

PLEASE NOTE THAT THIS DOES NOT APPLY TO MULTIPLE CHOICE QUESTIONS BASED ON PRACTICAL CLASS MATERIAL – THESE QUESTIONS WILL NOT HAVE BEEN SEEN BY YOU PRIOR TO THE END OF TERM EXAM.

Please note that online feedback quizzes are intended to motivate your study, provide feedback on your progress and to stimulate your learning. There is published data which demonstrates that students who participate in online feedback assessments perform significantly better than their peers in end of course examinations.

When attempting each online feedback assessment, it is recommended that you complete it under exam conditions (by exam conditions, we mean you should do it by yourself, don't look up the answers as you do it, and commit yourself to an answer), at least the first time you attempt it. This will provide the most realistic appraisal of your performance.

Give yourself plenty of time and attempt the feedback assessment in a place where you won't be interrupted. If you are attempting to simulate exam conditions, you should allow up to 2 minutes per question.

Write down items that you are not sure about as you go. Even if you get the question right you should still read further about anything that is unclear to you.

If you don't agree with, or can't understand the reason for an answer, ask the appropriate member of academic staff. If you are not sure who that is, ask your colleagues or the course convenor.

TEXTBOOK

PRINCIPLES OF HUMAN PHYSIOLOGY by Cindy L. Stanfield, Global Edition (6th edition), 2016, published by Pearson Education. Books are available from the UNSW bookshop.

This textbook comes with an online platform called Mastering A&P and within this are some interactive modules. We have selected some of these which provide a good supplement to the lecture and tutorial material and will help with revision of this material. You will not be examined on this material specifically as it really serves to clarify and consolidate your lecture content. There is no set time allocated for these suggested self -study sessions. You are encouraged to work through these sessions in your own time. Please refer to the section on self-study sessions for further details, including how to access to the self- study sessions.

STUDENT REPRESENTATIVES

We are seeking student representatives for term 2 2019. Ideally we would like to have two representatives from each of our different cohorts (Science, Medical Science, Engineering, Optometry and Exercise Physiology). In terms of commitment it is expected that we would meet with student representatives about twice during the session. During these meetings representatives will have the opportunity to report on any feedback relating to the course that has been gathered from peers either verbally or via email. Being a student representative gives you the opportunity to provide a voice for your student cohort and is a role that can be listed on your CV. Please email Dr Nicole Marden (N.Marden@unsw.edu.au) if you would like to be a student representative or if you would like any further information. Student representatives will be selected on a first come first serve basis.

GENERAL INFORMATION

The Department of Physiology is part of the School of Medical Sciences and is within the Faculty of Medicine. It is located on the 2nd and 3rd floors of the West Wing of the Wallace Wurth Building. General inquiries can be submitted via the UNSW Student Portal Web Forms http://unsw.to/webforms

Professor Gary Housley is Head of Department and appointments to see him may be made through email (G.Housley@unsw.edu.au).

There is an honours program conducted by the School. The Honours program is co-ordinated by Dr. Cristan Herbert (c.herbert@unsw.edu.au). Any students considering an Honours year should discuss the requirements with him. Outstanding students may be considered for scholarships offered by the University and School and these are offered annually.

Postgraduate research degrees
The Department of Physiology offers students the opportunity to undertake a Doctorate *(Ph.D)*. For further information contact the co-ordinator, A/Prof Pascal Carrive (P.Carrive@unsw.edu.au).

ATTENDANCE REQUIREMENTS

Attendance at ALL practical classes is compulsory FOR ALL STUDENTS and must be recorded in the class roll ON THE DAY OF THE CLASS. It is your responsibility to ensure that the demonstrator records your attendance and no discussions will be entered into after the completion of the class. Satisfactory completion of the work set for each class is essential and **IS A REQUIREMENT FOR PASSING PHYSIOLOGY**. Non-attendance for other than documented medical or other serious reasons may make you ineligible to successfully complete this course. At the very least you may be required to pass an additional oral examination on the practical classes, as

well as undertaking the normal practical exam. Students who miss practical classes due to illness or for other reasons must submit a medical certificate to academic staff during lab time or leave it with a member of the technical staff located in room 118 East Wing Wallace Wurth Building **WITHIN 7 DAYS (practical classes only)** of missing a class. If received after this time, no consideration will be given and the student will be marked absent from that class. **The following details must be attached: Name, Student number, Course number, Group number, Date of the class, Name of class missed.**

The practical component of the final exam is compulsory FOR ALL STUDENTS.

PLEASE NOTE that missing any examination requires lodging a medical certificate via Online Services in myUNSW within **3 working days** of the assessment or period covered by the supporting documentation (further details on how to do this are linked from the SoMS Student advice page: medicalsciences.med.unsw.edu.au/students/undergraduate/advice-students).

OFFICIAL COMMUNICATION BY EMAIL

All students in courses PHSL2201, 2221 and 2502 are advised that e-mail is the official means by which the School of Medical Sciences at UNSW will communicate with you. All e-mail messages will be sent to your official UNSW e-mail address (e.g., z1234567@unsw.edu.au) and, if you do not wish to use the University e-mail system, you MUST arrange for your official mail to be forwarded to your chosen address. Email correspondence with the University should be from your UNSW email address in order to reduce identity confusion.

The University recommends that you check your mail at least every other day. Facilities for checking e-mail are available in the School of Medical Sciences and in the University library. Further information and assistance is available from the IT Service Centre (02) 9385 1333.

NOTICES

All current timetables, notices and information relevant to you will be available on Moodle. It is your responsibility to check Moodle regularly.

All lectures are recorded by the Lecture Recording+ system and can be accessed via Moodle. Textbooks and some reference materials are available through open reserve.

TEACHING RESOURCES IN PHYSIOLOGY

Moodle: https://moodle.telt.unsw.edu.au/login/index.php
Information about the course and a number of electronic study resources can be accessed via the UNSW Moodle learning management system. Lecture notes, online modules, access to your grades, course documents and reference material can be found on the course Moodle site.

For System Requirements for Moodle refer to:
https://student.unsw.edu.au/moodle-system-requirements

Lecture Recording+
Lecture Recording+ provides digital audio-visual recordings of lectures that can be accessed via streaming media over the web or as a podcast. Links are provided via Moodle. Please note that this is not guaranteed as from time to time we expect that there will be some IT issues with these.

HANDWRITING

Students whose writing is difficult to understand will disadvantage themselves in their written assessments. Make every effort to write clearly and legibly. Do not use your own abbreviations.

APPLICATIONS FOR SPECIAL CONSIDERATION FOR MISSED ASSESSMENTS / EXAMS

If you believe that your performance in a course, either during the term or in an examination, has been adversely affected by sickness or for any other reason, you should ask for special consideration in the determination of your results. Such requests should be made as soon as practicable after the problem occurs.

Special consideration for exams

If you fall ill:

Prior to an exam: If you determine you are not fit to sit an exam, you can apply for Special Consideration. Where illness or misadventure has prevented you from sitting for an assessment, applications must be made within **three** working days of the assessment or the period covered by the supporting documentation.

During an exam: If you determine you are not well during an exam, alert the exam invigilator, and you can apply for Special Consideration. You must provide medical evidence dated within **24 hours** of the exam with your application. If a student does not declare themselves unfit before the "pens down" instruction at the end of the test, they forfeit their right to apply for special consideration except for the most exceptional circumstances, which will be looked at on a case by case basis by the central team.

After an exam: You are no longer able to apply for Special Consideration if you have sat the exam. Exceptions will be dealt with on a case-by-case basis where it is clear that illness prevented you from making an informed decision.

UNSW now has a Fit to Sit / Submit rule, which means that if you sit an exam or submit a piece of assessment, you're declaring yourself fit to do so and cannot later apply for Special Consideration.

An application for special consideration must be made via Online Services in myUNSW. **You must obtain and attach Third Party documentation (e.g. medical certificates) before submitting the application. Failure to do so may result in the application being rejected.** Log into myUNSW and go to My Student Profile tab > My Student Services channel > Online Services > Special Consideration. In addition to this, you should also inform the course convenor that you have applied for special consideration.

If you miss an assessment and have applied for Special Consideration, this will be taken into account when your final grade is determined. You should note that marks derived from completed assessment tasks may be used as the primary basis for determining an overall mark e.g. by extrapolating from your percentile rank on those tasks. Where appropriate, supplementary examination may be offered. **These will be held between the 9th-13th September 2019 so please make sure you are available any time in that week.**

Normally, if you miss an exam (without medical reasons) you will be given an absent fail. If you arrive late for an exam no time extension will be granted. It is your responsibility to check timetables and ensure that you arrive with sufficient time.

Please refer to student.unsw.edu.au/special-consideration for further details regarding special consideration.

REPEATING STUDENTS

Practical class exemptions may be granted to repeat students but students **must** check with the course convenor whether they have exemption **prior** to their first practical class. All students must be familiar with the material covered in the practical classes. All students must do the practical component of the final exam.

CONTINUAL COURSE IMPROVEMENT

Periodically student evaluative feedback on the course is gathered, using among other means, UNSW's MyExperience process. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback. Significant changes to the course will be communicated to subsequent cohorts of students taking the course.

STUDENT SUPPORT SERVICES

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 Disability Advisor in the Disability Support Services (formally known as SEADU 9385 4734 or https://student.unsw.edu.au/disability). 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.

ACADEMIC SKILLS

The Learning Centre provides substantial educational written materials, workshops, and tutorials to aid students, in academic skills such as:

- 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.

Citation of references

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.

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? **STUDENT.UNSW.EDU.AU/PLAGIARISM**

Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own. Examples include:

Copying	Using the same or very similar words to the original text or idea without acknowledging the source or using quotation marks. This includes copying materials, ideas or concepts from a book, article, report or other written document, presentation, composition, artwork, design, drawing, circuitry, computer program or software, website, internet, other electronic resource, or another person's assignment, without appropriate acknowledgement.
Inappropriate paraphrasing	Changing a few words and phrases while mostly retaining the original structure and/or progression of ideas of the original, and information without acknowledgement. This also applies in presentations where someone paraphrases another's ideas or words without credit and to piecing together quotes and paraphrases into a new whole, without appropriate referencing.
Collusion	Presenting work as independent work when it has been produced in whole or part in collusion with other people. Collusion includes ▪ students providing their work to another student before the due date, or for the purpose of them plagiarising at any time ▪ paying another person to perform an academic task and passing it off as your own ▪ stealing or acquiring another person's academic work and copying it ▪ offering to complete another person's work or seeking payment for completing academic work. This should not be confused with academic collaboration.
Inappropriate citation	Citing sources which have not been read, without acknowledging the 'secondary' source from which knowledge of them has been obtained.
Self-plagiarism	'Self-plagiarism' occurs where an author republishes their own previously written work and presents it as new findings without referencing the earlier work, either in its entirety or partially. Self-plagiarism is also referred to as 'recycling', 'duplication', or 'multiple submissions of research findings' without disclosure. In the student context, self-plagiarism includes re-using parts of, or all of, a body of work that has already been submitted for assessment without proper citation.

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. *student.unsw.edu.au/plagiarism* is the central University online resource for information on plagiarism and academic honesty.

GRIEVANCE RESOLUTION OFFICER

In case you have any problems or grievance with the course, you should try to resolve it with the Course Convenor (Dr Lesley Ulman 9385 3601). If the grievance cannot be resolved in this way, you should contact the School of Medical Sciences Grievance Officer, Prof Nick di Girolamo (n.digirolamo@unsw.edu.au).

TIMETABLES

PHYSIOLOGY
PHSL2201, PHSL2221, PHSL2502

TERM 2 2019 LECTURE TIMETABLE

Week No. Starting	LECTURE 1 Monday 2pm Clancy Auditorium	LECTURE 2 Tuesday 9am Clancy Auditorium	LECTURE 3 Wednesday 9am Mathews A	ONLINE LECTURE
1 3-June	**Introduction** ULMAN	**Temperature Regulation** GIBSON	**Endocrine 1** BIRZNIECE	
2 10-June	**PUBLIC HOLIDAY**	**Endocrine 2** BIRZNIECE	**Endocrine 3** BIRZNIECE	
3 17-June	**Endocrine 4** BIRZNIECE	**Endocrine 5** BIRZNIECE	**Reproduction 1** MARDEN	
4 24-Jun	**Reproduction 2** MARDEN	**Respiration 1** LE NEDELEC	**Respiration 2** LE NEDELEC	**Reproduction 3&4** ONLINE LECTURES
5 1-July	**Respiration 3** LE NEDELEC	**MID SESSION EXAM**	**Respiration 4** LE NEDELEC	
6 8-July	**Respiration 5** LE NEDELEC	**Kidney & Body Fluids 1** GIBSON	**Kidney & Body Fluids 2** GIBSON	
7 15-July	**Kidney & Body Fluids 3** GIBSON	**Respiration 6** LE NEDELEC	**Kidney & Body Fluids 4** GIBSON	
8 22-July	**Kidney & Body Fluids 5** GIBSON	**Kidney & Body Fluids 6** GIBSON	**Kidney & Body Fluids 7** GIBSON	
9 29-July	**Gastrointestinal Tract 1** MURPHY	**Gastrointestinal Tract 2** MURPHY	**Gastrointestinal Tract 3** MURPHY	
10 5-August	**Gastrointestinal Tract 4** **Appetite control** MORRIS	**Gastrointestinal Tract 5** GIBSON	**Gastrointestinal Tract 6** MURPHY	
11 12-August	**Gastrointestinal Tract 7** MURPHY			

Practical class information

The practical component of the course will consist of 5 face to face practicals and 3 online computer practicals.

All practicals are examinable in the final examination.

The first self-directed practical is the Renal Endocrine practical. This should be completed towards the end of the Kidney & Body Fluids lectures and can only be accessed in the Wallace Wurth labs.

The second online practical consists of 3 modules related to Renal Physiology. These should be done alongside the Kidney & Body Fluids lectures. These can be done on any computer.

The third online practical is the Gastrointestinal one. This is best attempted in conjunction with the GIT lectures and can only be accessed in the Wallace Wurth labs.

No rolls will be taken for the computer classes and completion of these will NOT be monitored. Timetabled access has been allocated for these classes but they can be completed any time as long as the labs are free. Please see the technical officers in lab 118 for computer access if the labs are locked.

TERM 2: 2019

PRACTICAL TIMETABLE

week	day & time	date	group	Supervised practical Wallace Wurth East Wing LAB 115	group	On-line / Self-directed computer class Wallace Wurth East Wing LAB 116
1	Tues 10-1 Tues 2-5 Wed 10-1	4/6 4/6 5/6	1 2 3	**TEMPERATURE REGULATION**		
2	Tues 10-1 Tues 2-5 Wed 10-1	11/6 11/6 12/6	4 5 6	**TEMPERATURE REGULATION**		
3	Tues 10-1 Tues 2-5 Wed 10-1	18/6 18/6 19/6	1 2 3	**THYROID PHYSIOLOGY**		
4	Tues 10-1 Tues 2-5 Wed 10-1	25/6 25/6 26/6	4 5 6	**THYROID PHYSIOLOGY**		
5	Tues 10-1 Tues 2-5 Wed 10-1	2/7 2/7 3/7	1 2 3	**ENDO/REPRO PHYSIOLOGY**		
6	Tues 10-1 Tues 2-5 Wed 10-1	9/7 9/7 10/7	4 5 6	**ENDO/REPRO PHYSIOLOGY**		
7	Tues 10-1 Tues 2-5 Wed 10-1	16/7 16/7 17/7	1 2 3	**RESPIRATORY GAS EXCHANGE**	4 5 6	**Self-directed Renal Endocrine and Renal Physiology Online practical**
8	Tues 10-1 Tues 2-5 Wed 10-1	23/7 23/7 24/7	4 5 6	**RESPIRATORY GAS EXCHANGE**	1 2 3	**Self-directed Renal Endocrine and Renal Physiology Online practical**
9	Tues 10-1 Tues 2-5 Wed 10-1	30/7 30/7 31/7	1 2 3	**CONTROL OF RESPIRATION**	1 2 3	**Self-directed GIT computer practical**
10	Tues 10-1 Tues 2-5 Wed 10-1	6/8 6/8 7/8	4 5 6	**CONTROL OF RESPIRATION**	4 5 6	**Self-directed GIT computer practical**

COMPULSORY LAB COATS REQUIRED FOR "SHADED" CLASSES

LECTURE OBJECTIVES

LECTURE OBJECTIVES TERM 2 2019

TEMPERATURE REGULATION

1. Temperature Regulation

1.1 Indicate the "normal" body temperature in humans and understand that this varies according to the site of measurement, circadian fluctuation and phase of the menstrual cycle.
1.2 Explain the concept of core and shell in relation to temperature regulation and how heat is transferred within the body.
1.3 Understand that body temperature is determined by the balance between heat production and heat loss, and express heat balance in the form of an equation, defining all terms.
1.4 Describe the factors that contribute to heat production.
1.5 Describe the processes of conduction, convection, radiation and evaporation and their contributions to heat loss/gain.
1.6 Describe the role of the hypothalamus in regulating body temperature, as well as the afferent and efferent mechanisms involved.
1.7 Describe why exercising in hot environments threatens cardiovascular homeostasis.
1.8 Explain the key features of heat acclimatization.
1.9 Describe the mechanism of fever.

ENDOCRINOLOGY

1. Mechanisms of hormone action

1.1 Know the endocrine glands and common structural features
1.2 Understand the importance of hormones in maintaining homeostasis
1.3 Understand how hormones are synthesized, stored, transported and how they have their action
1.4 Understand autocrine, paracrine and endocrine action
1.5 Understand the concept of negative feedback
1.6 Understand how hormones are able to have specific actions via specific receptors

2. Simple feedback loop endocrine systems

2.1 Understand the structure and function of the pancreas
2.2 Know the hormones secreted by the pancreas and the control mechanisms
2.3 Understand type I and type II diabetes
2.4 Understand the role of erythropoietin, vitamin D and renin secreted by the kidneys
2.5 Understand the role of atrial natriuretic peptide secreted by the heart
2.6 Appreciate the role of the thymus and pineal gland

3. The hypothalamus and pituitary gland

3.1 Know the basic structure of the hypothalamus and pituitary gland
3.2 Understand the interactions between the hypothalamus and pituitary
3.3 Know the hypothalamic releasing hormones
3.4 Know the anterior and posterior pituitary hormones
3.5 Understand the control of secretion and actions of pituitary hormones
3.6 Understand the hypothalamic-pituitary feedback loops

4. The thyroid and parathyroid glands

4.1 Know the location and structure of the thyroid gland and parathyroid glands
4.2 Know how the thyroid hormones are synthesized
4.3 Understand how thyroid secretion is controlled
4.4 Know the function of thyroid hormones

4.5 Have an appreciation for hyperthyroidism and hypothyroidism
4.6 Understand parathyroid hormone and calcitonin

5. Adrenal gland
5.1 Know the structure of the adrenal gland; the adrenal cortex (three layers) and medulla
5.2 Know the synthesis and secretion of adrenal steroids from the cortex
5.3 Understand the function of mineralocorticoids
5.4 Have an appreciation for metabolic actions of glucocorticoids and dysfunction
5.5 Know the synthesis and secretion of catecholamines from the medulla

REPRODUCTION

1. Lecture 1: Male Reproductive System
1.1 Know the basic structure of the male reproductive tract.
1.2 Describe the events and location of spermatogenesis.
1.3 Describe hormone production in the testes and the role of these hormones in spermatogenesis.
1.4 Understand the feedback mechanisms that control hormone production and spermatogenesis.
1.5 Describe the composition of semen.

2. Female Reproductive System
2.1 Know the basic structure of the female reproductive tract.
2.2 Describe the process of oogenesis and follicular development.
2.3 Describe the key hormonal changes that occur throughout the ovarian cycle and understand the significance of these hormonal changes.
2.4 Describe the changes that occur in the endometrium during the menstrual cycle (i.e. the uterine cycle).
2.5 Understand the feedback mechanisms that regulate the menstrual cycle.

3. Fertilisation and Implantation (Online Lecture)
3.1 Describe the events of fertilisation and implantation.

4. Hormones of Pregnancy (Online Lecture)
4.1 Understand the role of the placenta as endocrine organ.
4.2 Describe the hormonal changes that occur during pregnancy.
4.3 Describe the effects of the hormones that are produced during pregnancy.

RESPIRATORY SYSTEM

1. Introduction and gases
1.1 Understand basic lung-airway anatomy including the relationship to function
1.2 Describe airway and air flow properties in respiration
1.3 Understand the basic physiological process in the pulmonary circulation
1.4 Understand the various mechanisms of airway particle removal
1.5 Understand the gas laws, including Boyle's Law, Charlie's Law, Avogadro's Law and the Universal Gas Law
1.6 Understand the physiological principles of gas solubility and gas tensions, including STPD, BTPS and ATPS conditions
1.7 Describe the composition of air

2. Ventilation

2.1 Define lung volumes and capacities
2.2 Understand spirometry parameters (FVC, FEV_1) including how they are measured
2.3 Describe mechanisms for determining residual volume
2.4 Understand ventilation, including determining alveolar ventilation
2.5 Describe mechanisms for determining dead space
2.6 Understand oxygen uptake/carbon dioxide output and the use of the respiratory exchange ratio

3. Oxygen transport

3.1 Describe the composition of alveolar air at rest
3.2 Understand venous and arterial blood gas tensions
3.3 Describe the process of blood oxygen transport, including oxygen capacity, saturation and content
3.4 Understand the haemoglobin-oxygen equilibrium curve, including the overall shape and the factors that can shift the curve (temperature, 2,3 DPG, Bohr effect)
3.5 Compare and contrast foetal haemoglobin and myoglobin to adult haemoglobin
3.6 Describe the mechanism of carbon monoxide poisoning

4. Carbon dioxide transport and blood buffering

4.1 Describe carbon dioxide transport in blood
4.2 Understand the effect of oxygenation on carbon dioxide transport (Haldane effect)
4.3 Understand the blood-carbon dioxide equilibrium curves
4.4 Describe the fundamental concepts of the acid-base relationship
4.5 Understand the use of the Henderson-Hasselbalch equation
4.6 Describe the physiological processes involved in blood buffering, including the importance of haemoglobin
4.7 Describe simple acid-base disorders

5. Respiratory mechanics

5.1 Describe the muscles used during respiration
5.2 Understand lung compliance, including the elastic properties of the lung, surface tension and the effect of surfactants
5.3 Understand the relaxation pressure-volume curve
5.4 Describe the physiological concepts of airway resistance
5.5 Understand intrapleural and intra-alveolar pressures and gas flow during the respiratory cycle

6. Control of respiration

6.1 Understand the concepts of the respiratory central controller, including the pre-Botzinger complex
6.2 Describe the chemical control of breathing, including the role of the central and peripheral chemoreceptors
6.3 Describe the role of other sensory receptors located in the lungs and upper airways
6.4 Understand the integrated response to oxygen and carbon dioxide
6.5 Describe the effect of exercise on respiration

KIDNEY AND BODY FLUIDS

1. Body fluids and introduction to the kidneys

1.1 Understand the following terms and use them in calculations: mole, molarity, molality, osmolarity, osmolality, osmotic coefficient.
1.2 Describe what is meant by colligative properties and list examples.
1.3 Understand the importance of osmosis, osmotic pressure, and colloid osmotic pressure in the regulation of body fluid compartments.
1.4 Explain the difference between osmolality and tonicity giving examples of isosmotic, hypo-osmotic, hyperosmotic, isotonic, hypotonic and hypertonic solutions.

1.5 Indicate the main body fluid compartments and typical values as a percentage of body weight.
1.6 Explain how body fluid compartments can be measured using indicator dilution technique, giving examples of an appropriate indicator for each compartment.
1.7 Indicate the factors which control total body water and how it is distributed between the various compartments listed in 1.5.
1.8 Describe the composition of the extracellular (plasma and interstitial) and intracellular compartments and how these differences in composition are maintained.
1.9 Indicate the functions of the kidney.
1.10 Describe the basic anatomy of the urinary system.

2. Renal structures, renal blood flow and glomerular filtration

2.1 Indicate the sequence of vessels between the renal artery and renal vein, and explain the features of the renal vasculature which distinguish it from the vasculature of other organs/tissues.
2.2 Indicate the parts of the renal tubule and explain the differences between short and long loops of Henle and between superficial cortical, mid-cortical and juxtamedullary nephrons.
2.3 Define glomerular filtration, tubular reabsorption, tubular secretion and urinary excretion and use these terms appropriately to describe how various substances are handled by the nephron.
2.4 Define renal blood flow, renal plasma flow, glomerular filtration rate (GFR) and filtration fraction and indicate normal values.
2.5 Indicate the typical levels of hydrostatic pressure in blood vessels in the kidney.
2.6 Indicate the formula relating blood flow, pressure and resistance in an organ and use this to explain the effects of alterations in afferent and efferent arteriolar tone on renal blood flow.
2.7 Describe autoregulation of renal blood flow and the consequences on blood flow of perfusion pressures outside the normal autoregulatory range.
2.8 Describe the renin angiotensin system, including the factors that control renin release and the actions of angiotensin II.
2.9 Describe the functional significance of the renal sympathetic nerves.
2.10 Describe the composition of the glomerular ultrafiltrate.
2.11 Describe the forces affecting glomerular filtration rate (GFR) and state the equation for single nephron GFR defining all terms. Use this equation to explain the factors which change GFR.
2.12 Explain the effects of alterations in afferent and efferent arteriolar tone on GFR and filtration fraction.

3. Evaluating renal function. Mechanisms of reabsorption and secretion.

3.1 Describe the criteria that must be met by a substance so that its clearance can be used to estimate GFR. Give examples of appropriate substances including their advantages and disadvantages.
3.2 Explain the Fick principle and its use to measure renal plasma flow (RPF)
3.3 Explain why the clearance of para-aminohippurate can be used to measure effective renal plasma flow (ERPF) and explain the different between RPF and ERPF.
3.4 Define renal clearance and indicate the formula used to calculate clearance and appropriate units.
3.5 Calculate filtered load, excretion rate, net reabsorption, net secretion, and clearance of any substances given appropriate data.
3.6 Predict whether a substance undergoes net reabsorption or net secretion by the tubule by comparing its clearance with the clearance of inulin and by comparing its rate of filtration with its rate of excretion.
3.6 Understand the extent of tubular modication of the filtrate to produce excreted urine.
3.7 Describe the basic mechanisms of epithelial transport for both reabsorption and secretion, giving examples of substances that are handled via these mechanisms.
3.8 Describe the basic structure of tubular epithelium and differentiate between paracellular and transcellular transport.
3.9 Explain the terms tubular maximum, renal threshold and splay and be able to interpret a titration curve.
3.10 Describe the mechanism of glucose reabsorption by the proximal tubule.

4. Tubular structure and function along the nephron. Water balance.

4.1 Describe the structure and function of the proximal tubule, including how this part of the tubule handles selected substances.
4.2 Explain the changes in solute composition along the proximal tubule and relate this to the transepithelial voltage.
4.3 Describe how filtered protein is reabsorbed in the proximal tubule and why this is important.
4.4 Describe in general terms the mechanism of secretion of organic anions and cations.
4.5 Define glomerulotubular balance and explain it importance. Indicate the possible mechanism responsible for glomerulotubular balance.
4.6 Describe the process of peritubular reabsorption and the forces involved.
4.7 Describe the transport properties of the three segments of the loop of Henle and indicate how the composition of the tubular fluid changes in these segments.
4.8 Describe the transport properties of the distal convoluted tubule and connecting tubule and indicate how the composition of tubular fluid changes in this part of the nephron.
4.9 Describe the transport properties of the collecting duct with reference to the main cell types (principal, alpha intercalated and beta intercalated cells). Iindicate how the composition of tubular fluid changes in this segment both in the presence and absence of antidiuretic hormone (ADH).
4.10 Understand that water homeostasis requires a balance between inputs and outputs and can indicate the main routes of input and loss and typical values.
4.11 Describe the control of thirst.
4.12 Describe the mechanisms by which the kidney makes a dilute urine or a concentrated urine.

5. Urinary concentrating mechanisms; Sodium balance (afferent mechanisms)

5.1 Describe the medullary osmotic gradient and the mechanisms responsible for its generation and maintenance: countercurrent multiplication, urea recycling and countercurrent exchange.
5.2 Describe the structure and production of antidiuretic hormone (ADH) and the factors affecting its release.
5.3 Describe the actions of ADH.
5.4 Understand how water permeability of different segments of the nephron relates to the presence of aquaporins.
5.5 Explain how renal medullary cells are protected from hypertonicity.
5.6 Indicate the body's routes of input and output of sodium and typical values.
5.7 Describe the afferent mechanisms involved in regulating sodium balance.

6. Sodium balance (renal efferent mechanisms); potassium balance

6.1 Describe the hormonal responses to changes in sodium intake and indicate which hormones increase sodium excretion and which hormones decrease sodium excretion.
6.2 Describe the structure, production, control and actions of the three major sodium regulating hormones: angiotensin II, aldosterone, atrial natriuretic peptide.
6.3 Understand why potassium balance is important and how potassium is distributed between different body compartments.
6.4 Indicates the body's routes of input and output of potassium and typical values.
6.5 Describe how the kidney handles potassium, with a particular emphasis on the factors affecting potassium secretion in collecting duct.

7. Renal acid-base balance

7.1 Understand fundamental terminology relevant to acid-base balance including pH, acid, base, pK and buffer.
7.2 Explain why metabolism threatens the maintenance of normal pH.
7.3 Indicate the three processes the body employs to regulate pH, and the time courses over which they act.
7.4 Describe the role of the kidney in maintaining acid-base balance.
7.5 State the equation for net acid excretion defining all terms, and explain why a negligible amount of acid is excreted as free protons in the urine.
7.6 Describe the reabsorption of filtered bicarbonate by the proximal tubule.
7.7 Understand the linkage between excretion of acid and generation of new bicarbonate.

7.7 Explain the concept of titratable acid.
7.8 Describe how phosphate is reabsorbed by the kidney and the role of phosphate in acid excretion.
7.9 Describe the synthesis of ammonium and the role of ammonium in acid excretion.
7.10 Describe the renal response to acidosis.
7.11 Describe the renal response to alkalosis.
7.12 Understand that renal net acid excretion can be altered by factors related to sodium and potassium balance.

GASTROINTESTINAL SYSTEM

1. Overview

1.1 Describe the basic functions of the GI tract.
1.2 Know the structure of the GI tract wall.
1.3 Appreciate the design of the small intestinal to maximize nutrient absorption.
1.4 Understand that GI tract functions are modulated by the intrinsic enteric nerves and the extrinsic parasympathetic and sympathetic nerves.
1.5 Understand that GI processes are regulated by hormones released from endocrine cells located in the GI tract mucosa.

2. Digestion and Absorption

2.1 Understand the enzymatic processes required for the digestion of nutrients.
2.2 Know the end products of protein, fat and carbohydrate digestion.
2.3 Be able to describe the process of absorption and the transport/carrier mechanisms required for nutrient movement across the gut wall.

3. Secretions

3.1 Describe the composition & function of saliva.
3.2 Understand the neural control of salivary secretion.
3.3 Understand the anatomy of the stomach and the specialised cells of the gastric pit.
3.4 Know the principal components and functions of gastric juice.
3.5 Explain the mechanism by which the parietal cell secretes hydrochloric acid and the role played by H^+/K^+ ATPase.
3.6 Describe the neural and hormonal regulation of gastric acid secretion during the digestive phases.
3.7 Describe the 3 phases of acid secretion associated with digestion.
3.8 Know the principal components and functions of exocrine pancreatic secretions.
3.9 Understand the mechanism of pancreatic HCO3-secretion
3.10 Describe the neural (ACh) and hormonal (CCK, secretin) mechanisms that regulate pancreatic secretions during the digestive phases.

4. Gut Hormones - review of function

4.1 To understand the regulation of food intake in the short & long term
4.2 To understand the role of the brain in appetite control
4.3 To develop an understanding of what goes wrong in obesity

5. Liver and biliary system

5.1 Describe the functional anatomy of the liver.
5.2 Understand that the liver receives two sources of blood supply and describe the differences between them.
5.3 Identify the functions of the liver.
5.4 Describe the formation and secretion of bile.
5.4.1 Describe the production, function and enterohepatic circulation of bile acids.
5.4.2 Describe bilirubin metabolism and excretion.
5.5 Describe the physiology of the gall bladder including the factors that cause gallbladder contraction.

5.6 Describe the factors responsible for the formation of gallstones and understand the physiological basis for the medical treatment of gallstones.

6. Motility

6.1 Understand the basis of gut motility and the role of smooth muscle, ENS and ICC.
6.2 Appreciate that gut motility is controlled by the ENS and modulated by ANS.
6.3 Know the types of enteric neurons & primary neurotransmitters used.
6.4 Describe the main motility patterns present in the GI tract (peristalsis, segmentation, MMC).
6.5 Comprehend the events that involve voluntary and involuntary control of swallowing.
6.6 Understand stomach motility patterns & mechanisms that control gastric filling, churning and emptying.

7. Large Intestine

7.1 Know the anatomical features of the large intestine.
7.2 Be able to describe the major functions of the large intestine.
7.3 Understand the importance of GALT.
7.4 Understand the motility patterns present in the large intestine.
7.5 Appreciate the importance of gut microbiota in health and disease.

LABORATORY REGULATIONS AND BEHAVIOUR

Health and Safety is a primary concern for both students and staff working in any laboratory.

The following regulations MUST be adhered to when participating in Physiology practical classes:

- Each practical class has a student risk assessment (SRA) and a student safe working procedure (SSWP) associated with it.
- The SRA identifies the hazards and risks associated with the particular practical and outlines appropriate controls that must be followed to minimize these risks. The SRA also lists the personal protective equipment (PPE) that students are required to wear for that class, emergency procedures and clean up and waste disposal instructions.
- The SSWP provides background information relating to the class and outlines the procedures to be carried out in that class.
- Each supervised practical class has a pre-laboratory video which will be available in moodle.
- Students must watch the pre-laboratory video, read the practical notes and sign the SRA prior to commencing the class.
- In each laboratory there are also more comprehensive school approved risk assessments, associated safe work procedures and safety data sheets (SDS) for each particular class. You may refer to these if you require further information. First aid kits and specific spill kits are also located in the laboratories.
- If any accidents or incidents occur they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.
- Students are required to wear the appropriate PPE for each class. Enclosed shoes are mandatory for entering any laboratory and you will not be permitted to participate in the practical if you are not wearing appropriate footwear. Most practical classes will also require a lab coat which you must provide. You must regularly wash your lab coat. If you do not bring your lab coat to these classes you will not be able to participate.
- Many classes will require you to wear gloves (which will be provided). Gloves must be removed before writing in lab books and using computers or other electrical equipment.
- You must not wear lab coats or gloves outside the laboratory.
- You must not eat or drink in any laboratory.
- Students are expected to arrive on time. Any student arriving more than 10 minutes late may be refused entry.
- Mobile phones should be turned off before entering the class.
- Laboratory computers may only be used for work relating to the practical class.
- It is expected that students behave appropriately in laboratory classes. In the event of inappropriate behavior students may be asked to leave.
- It is of course vital that animals used in practical classes MUST be treated humanely and with respect. Taking photos is **ABSOLUTELY UNACCEPTABLE** and will result in removal from the class and a referral to the Head of Department.

The procedures used in the laboratory classes involving the use of animals have been approved by the UNSW Animal Ethics Committee on the Use of Animals in Research and Teaching (Approval Number: ACEC 19/67B expiring May 2022).

Experiments in this manual, which involve the use of human subjects, have been considered and approved by the School of Medical Sciences Ethics Committee on Experimental Procedures Involving Human Subjects for teaching. Practical classes involving your participation as a subject may require you to read the Participant information sheet and sign a witnessed, informed consent form.