

Physiology

Physiology is the study of how the body works: the ways in which cells, organs and the whole body functions, and how these functions are maintained in a changing environment.

Physiology is very suitable to be taken as a double major with anatomy, biochemistry, cell biology (botany), genetics, microbiology, pathology, pharmacology and zoology.

Students may take a double major or take the balance of their subjects from other areas.

Suggested subjects

100-level subjects

Two semesters of three of the following:

- chemistry: 610-141 and 610-142; or 610-121 and 610-122;
- physics: 640-141 and 640-142; or 640-121 and 640-122; or 640-161 and 640-162;
- biology: 650-141 and 650-142 (or prior to 2004: 600-141 and 600-142);
- mathematics and statistics: 620-141 and 620-143; or 620-121 and 620-123; or 620-161 and 620-160; or 620-151 and 620-152.
- psychology: 512-120 and 512-121.

Note: Combined course students who take a full year's course load and only two of the science subjects listed above will be eligible for selection into 200-level physiology.

200-level subjects

Some combination of:

- physiology 536-201, 536-211, 536-222, 536-233;
- biochemistry 521-211, 521-212; 521-220, 521-221;
- anatomy 516-201;
- a selection of microbiology 526-201 or 526-205, 526-221; pharmacology 534-201; chemistry 610-221 or 610-220; genetics 652-214, 652-215; zoology 654-202, 654-203 or 654-212.

Physiology 536-201, 536-211, 536-222 and 536-233 are recommended for students considering taking physiology in third year.

Physiology 536-201, 536-211 and 536-202 are the minimum requirements for acceptance into third year. However, students taking only 536-201 and 536-211 who wish to take third-year physiology must seek exemption from the Head of Department. Students must have taken at least 72 hours of practical work in second year subjects.

The aim of physiology subjects 536-201, 536-211, 536-222 and 536-233 is to introduce the student to the investigation of body systems and their control at the cellular and systemic levels, with emphasis on quantitative aspects of physiology studied as an experimental science. They are intended to provide an adequate background for all third-year physiology units, and to stand alone as the physiological components for students with majors in other disciplines.

On completion of these subjects a student should have an understanding of cellular physiology, concerned with both those properties that characterise all living cells, and those that are unique to special cell types such as neurones and muscle fibres; and systemic physiology, in which the activity of different tissues and organs subserving the various coordinated functions of the human body (eg. the cardiovascular, respiratory and nervous systems) are considered. The emphasis is on the functions of the human body, although the foundations of this knowledge commonly depend on observations and experiment in other animals; the skills required to observe physiological responses; and the skills to record and analyse data accurately.

300-level subjects

- For students undertaking a major in physiology a minimum of 50 points of 300-level physiology subjects is required. However, less than 50 points of 300-level physiology subjects may be appropriate for students undertaking other majors such as neuroscience.
- Selections from the following: anatomy and cell biology, biochemistry and molecular biology, pathology, pharmacology and zoology.

Third-year physiology is offered as a group of seven subjects. Subjects 536-301, 536-302, 536-303, 536-308 and 536-311 encompass basic physiology teaching and the other two subjects (536-304 and 516-307) offer practical research experience in physiology. These latter two subjects cannot be taken without the necessary corequisite or prerequisite subjects. The department strongly recommends that physiology students taking these subjects do so in combination with other subjects.

Students can complete a research project within the Department of Physiology as part of the subject 516-307 Research Project which is administered by

the Department of Anatomy and Cell Biology, and completed in either semester 1, semester 2 or summer semester.

On completion of 300-level physiology subjects, a student should have attained specialised knowledge in the areas of physiology of interest to the student; a precise and detailed knowledge of specialist areas in physiology; an appreciation of how areas of physiology integrate to give overall control of body function; the ability to generate and test hypotheses in an area of interest to the student; and a strong background in current approaches and technology used to test concepts in physiology.

Students who have completed anatomy, biochemistry, physics, psychology or zoology without physiology at the 200-level may be admitted to individual 300-level subjects. Students should consult with subject advisers in the department during the second semester of their second year.

Bachelor of Science (Degree with Honours)

For information about faculty and departmental entry requirements for honours, please refer to *Bachelor of Science (Degree with Honours) and Bachelor of Information Systems (Degree with Honours) (p.1)*. These requirements should be considered when planning your course.

Further information

Department of Physiology
The University of Melbourne
Victoria 3010
Tel: +61 3 8344 5820
Fax: +61 3 8344 5818
Web: <http://www.physiology.unimelb.edu.au>

Subject descriptions

200-level subjects

536-201 Principles of Physiology

Note: Not available for students enrolled in BBiomedSc.

Students seeking a thorough understanding of physiology at second-year level, and seeking entry into third year physiology, will take this subject in combination with 536-211 Physiology:Control of Body Function (p.2) in Semester 2. This lecture combination, together with the practical subject 536-222 Experimental Physiology (p.2), forms the basic requirements for selection into third year physiology (see *300-level subjects (p.1)*)

This subject contains computer-aided learning sessions. Students must attend the department to enrol in the available sessions between 9.00am and 4.00pm during the week **prior** to the start of Semester 1. The enrolment location is in the Physiology Teaching Laboratory, Room N306 (Level 3, North Wing) Medical Faculty Building.

Credit points: 12.5

Coordinator: Prof D Williams; Dr S Gauci

Prerequisites: Two pairs of subjects from: biology (650-141 and 650-142, or prior to 2004: 600-141 and 600-142); chemistry (610-141 and 610-142, or 610-121 and 610-122); physics (640-121 and 640-122, or 640-141 and 640-142; or 640-161 and 640-162); psychology (512-120 and 512-121); mathematics (two of 620-112, 620-113, 620-121, 620-122, 620-123, 620-141, 620-142, 620-143 and 620-160).

Contact: 36 lectures and 24 hours of computer-aided instruction (*Semester 1*).

Description: Physiology is an integrative study of the control of normal body function. Following completion of this subject students should be able to comprehend how the body systems act and interact to maintain a constant internal environment (homeostasis). Students should also be able to describe and understand the function of cellular, subcellular and membrane structures and their importance in fluid distribution, functions of excitable cells (nerve and muscle), information transfer (electrical and hormonal) and metabolism. Students should also develop an understanding of basic cellular physiology as it pertains to all cell types as well as the properties and characteristics of specialised cells such as neurones and muscle cells. Students should also be able to comprehend how such cellular specialisation results in hormonal, neural and organ systems subserving specialised body functions. The specialised organ systems to be studied include the cardiovascular, respiratory gastrointestinal and kidney systems. During this course students should also learn that physiology is an experimental science with many key concepts arising from the qualitative and quantitative observation and analysis of living organisms. In the computer-aided learning sessions associated with this course, students will work in groups on a variety of tasks which should help develop and enhance skills related to team work, analytical reading and the ability to communicate information both concisely and unambiguously (written and verbal).

Assessment: A 45-minute written examination held mid-semester (15%); tasks related to computer-aided learning activities during the semester (10%); a 2-hour written examination in the examination period (75%).

536-206 Physiology (Optometry)

Note: This subject is only available to students enrolled in the Bachelor of Optometry course.

Experiments involving the use of animals are essential to this subject; exemption is not possible.

Credit points: 12.5

Coordinator: Prof D Williams; Dr S Gauci

Prerequisites: Enrolment into the second year of the BOptom course.

Contact: 36 lectures, 15 hours practical work, 12 hours computer-aided instruction (*Semester 1*).

Description: Physiology is an integrative study of the control of normal body function. Following completion of this subject students should be able to comprehend how the body systems act and interact to maintain a constant internal environment (homeostasis). Students should also be able to describe and understand the function of cellular, subcellular and membrane structures and their importance in fluid distribution, functions of excitable cells (nerve and muscle), information transfer (electrical and hormonal) and metabolism. Students should also develop an understanding of basic cellular physiology as it pertains to all cell types as well as the properties and characteristics of specialised cells such as neurones and muscle cells. Students should also be able to comprehend how such cellular specialisation results in hormonal, neural and organ systems subserving specialised body functions. The specialised organ systems to be studied include the cardiovascular, respiratory gastrointestinal and kidney systems. During this course students should also learn that physiology is an experimental science with many key concepts arising from the qualitative and quantitative observation and analysis of living organisms. In the computer-aided learning sessions associated with this course, students will work in groups on a variety of tasks which should help develop and enhance skills related to team work, analytical reading and the ability to communicate information both concisely and unambiguously (written and verbal). Practical experiments will illustrate selected lecture material.

Assessment: Tasks related to computer-aided learning activities during the semester (5%); a 45-minute written examination held mid-semester (15%); ongoing assessment of practical work during the semester (10%); a 2-hour written examination in the examination period (70%).

536-211 Physiology:Control of Body Function

Note: Not available for students enrolled in BBiomedSc.

This subject builds upon the physiological principles and systems introduced in 536-201 Principles of Physiology (*p.1*). The combination of 536-211, 536-201 Principles of Physiology (*p.1*), and the practical subject 536-222 Experimental Physiology (*p.2*) forms the minimum requirement for selection into third-year physiology (see *300-level subjects (p.1)*). 536-233 Research-based & Integrative Physiology (*p.2*) is also desirable for good preparation for 300-level physiology.

This subject contains computer-aided learning (CAL) sessions. Students must enroll into a CAL session during the week prior to semester. Enrolment can be carried out via the Physiology web page <<http://www.physiology.unimelb.edu.au>> or by using the allocated computers located in the Physiology Teaching Laboratory, Room N306 (Medical Building, Level 3, North Wing) between 10.00am and 4.00pm during that week. As every session has a strictly limited number of places, early enrolment is advisable. If students cannot personally enroll during the allocated time, they must make arrangements for someone else to enroll for them.

Credit points: 12.5

Coordinator: Prof D Williams; Dr S Gauci

Prerequisites: Physiology 536-201.

Contact: 36 lectures, 24 hours of computer-aided learning (*Semester 2*).

Description: Physiology is an integrative study of the control of normal body function. Following completion of this subject students should be able to build on the basic knowledge gained in first semester's 536-201 Principles of Physiology by comprehending how the integrated endocrine, paracrine and autocrine and neuronal processes within the body ultimately controls its function. Students should gain this knowledge through an in-depth consideration of the various processes that together sustain and modulate body function including control of the central nervous, respiratory, renal, reproductive, digestive, muscular and cardiovascular systems. Students should also gain an understanding into the basic structure and function of the brain and its regulatory processes and in particular its interactions with body systems in helping maintain homeostasis. Included will be an introduction to the physiology of vision, hearing and taste and consideration of the processes that control balance, posture and movement. In the computer-aided learning sessions associated with this course, students will work in groups on a variety of tasks which

should help develop and enhance skills related to team work, analytical reading and the ability to communicate information both concisely and unambiguously (written and verbal).

Assessment: Tasks related to computer-aided learning activities during the semester (10%); a 45-minute written examination held mid-semester (15%); a 2-hour written examination in the examination period (75%). The written examination may draw upon materials taught in 536-201.

536-222 Experimental Physiology

Note: Not available for students enrolled in BBiomedSc.

Students who have completed 536-202 Physiology (General Practical) prior to 2006 will not be permitted to enrol in this subject.

This is a practical subject. Students need to enrol separately for the lecture subject 536-201 Principles of Physiology. Physiology 536-201 and 536-222 are both prerequisites for the 2nd semester practical subject 536-233.

Students must enrol into a practical session during the week prior to the start of the semester. Web-generated personal timetables are a guide only, and do not enrol students in a practical session. Enrolment can be carried out via the Physiology webpage (<<http://www.physiology.unimelb.edu.au>>), or by using the allocated computers located in the Physiology Teaching Laboratory, Room N306 (Medical Building, Level 3, North Wing) between 10.00 am and 4.00 pm during that week. As every session has a strictly limited number of places, early enrolment is advisable. If students cannot personally enrol during the allocated time, they must make arrangements for someone else to enrol for them.

Experiments involving the use of animals are essential to this subject; exemption is not possible.

Students must have a white laboratory coat and closed-topped footwear to comply with safety regulations. Also required are dissecting instruments and two note books. A laboratory manual must be purchased and an electronic audience response keypad leased from the Physiology General Enquiries office (Medical Building, Level 2, North Wing).

Credit points: 12.5

Coordinator: A Dantas

Corequisites: 536-201 Principles of Physiology (*p.1*)

Contact: 36 hours of practical work and workshops, 12 hours of compulsory lectures, 12 hours of e-Learning activities (*Semester 1*).

Description: This subject aims to develop student understanding of the principles of experimental design appropriate for investigating underlying mechanisms of physiological responses. The subject will use the latest computer-based recording systems to investigate the biological responses to various challenges.

Experiments may include investigations on nerve communication, muscle contraction, blood pressure, electrocardiograms, respiration and maintenance of body fluids. The format of the subject allows every experimental topic to be covered in depth over three sessions. This comprises (i) a preparatory session, (ii) the experimental session, and (iii) a lecture and discussion workshop session, based on the experimental results and underlying theory as well as approaches for experimental design.

Being a practical subject it is very skills orientated. Individual skills will concentrate on developing critical thinking, problem solving and research skills including devising experimental physiological methods, data collection, recording and analysis, appropriate interpretation of and conclusions from data, writing clear and concise reports, and developing physiological laboratory practices (including safety, ethics) and skills (tissues or whole organisms). Group skills include working collaboratively, group communication and information presentation.

Assessment: Five written reports of up to 1500 words each due during the semester (40%); class participation during the semester (5%); ongoing assessment of e-Learning activities - 20 submissions of less than 500 words each due during the semester (15% total); a 2-hour written examination in the examination period (40%).

536-233 Research-based & Integrative Physiology

Note: Not available for students enrolled in BBiomedSc.

Students who have completed 536-203 Integrative Physiology prior to 2005 will not be permitted to enrol in this subject.

This is a practical subject. Students need to enrol separately for the lecture subject 536-211 Physiology:Control of Body Function (*p.2*).

Students must enrol in a practical session during the week prior to the start of semester. Web-generated personal timetables are a guide only, and do not enrol students in a practical session. Enrolment can be carried out via the Physiology webpage (<<http://www.physiology.unimelb.edu.au>>) or by using the allocated computers located in the Physiology Teaching Laboratory, Room N306 (Medical Building Level 3, North Wing) between 10.00 am and 4.00 pm during that week. As every session has a strictly limited number of places early enrolment is advisable. If students cannot personally enrol during

the allocated time, they must make arrangements for someone else to enrol for them.

Experiments involving the use of animals are essential to this subject; exemption is not possible.

Students must have a white laboratory coat and closed-topped footwear to comply with safety regulations. Also required are dissecting instruments and two note books. A laboratory manual must be purchased and an electronic audience response keypad leased from the Physiology General Enquiries office (Medical Building, Level 2, North Wing).

Credit points: 12.5

Coordinator: A Dantas

Prerequisites: Physiology 536-201 and 536-222.

Corequisites: 536-211 Physiology:Control of Body Function (p.2).

Contact: 36 hours of practical work and laboratory workshops; 12 hours of compulsory lectures; 12 hours of e-Learning activities; 36 hours of report writing (*Semester 2*).

Description: The aim of this subject is to reinforce and extend student learning of experimental design from 536-222. Students undertake an assignment completed over several weeks, which requires them to identify a physiological problem, formulate a suitable hypothesis, select and test suitable techniques, design appropriate experimental protocols to test their hypothesis, collect and analyse their data, and write a scientific report on their findings. This aims to develop research skills for an enquiring graduate, which will be reinforced in 3rd year physiology and Honours. It also reinforces experimental research-led teaching approaches in lecture courses and not only prepares students for research-based literature reviews and writing in 3rd year physiology but also develops their investigative skills for lifelong learning.

Furthermore this subject will use the latest computer-based recording systems to investigate body responses to various challenges that may involve exercise physiology, sensory function, nerve reflexes and acid-base balance. These experimental topics are covered in depth over three sessions: a preparatory session; the experiment; a discussion on the experimental results and underlying theory. Students will also complete some work on-line before and after experiments.

Individual skills will concentrate on developing critical thinking, problem solving and research skills including: experimental design, physiological methods for investigating interacting body systems, data analysis (including statistics), appropriate interpretation of and conclusions from data and writing of scientific reports, developing physiological laboratory practices (including safety, ethics) and skills.

Group skills include extended collaborative investigations, group communication and information presentation.

Assessment: Five written reports of up to 1500 words each due during the semester (25%); class participation during the semester (5%); a written report on an assignment or extended experiment totalling up to 2000 words due during the semester (30%); ongoing assessment of e-Learning activities - 15 submissions of up to 400 words each due during the semester (10%); a 2-hour written examination in the examination period (30%).

516-209 Introductory Neuroscience

See full subject details on page 2.

300-level subjects

536-301 Cardiovascular Health: Genes & Hormones

Note: This subject is recommended for BSc students undertaking a physiology major or BBiomedSc students undertaking a specialisation in Physiological Genomics or Biotechnology and Therapeutics or BE(Biomed) students undertaking bioengineering.

The material covered in this subject provides an appropriate background for those students wishing to undertake 536-304 Seminars and Experimental Physiology.

Formerly known as 536-301 Integrative Physiology: Heart & Kidney.

Credit points: 12.5

Coordinator: A/Prof L Delbridge; A/Prof M Wlodek

Prerequisites: Physiology 536-201, 536-211, and 536-222.

BBiomedSc students: 521-213 and 536-250.

BE(Biomed) students: 521-225 and 536-225.

The Head of Department will consider exemptions for students who passed 536-201 and 536-211 but have not completed 536-222.

Contact: 30 hours of lectures, 12 hours of collaborative learning, multimedia workshops and assignments (*Semester 1*).

Description: This subject focuses on the physiology of cardiovascular health with an emphasis on cardiac, vascular, renal and endocrine homeostasis. Studies will follow the programmed development of the cardiovascular system from gene to cell and organ. Students should develop an understanding of

how genes and environment interact in early development and at maturity to shape cardiovascular health in populations and individuals.

Themes of study include principles of endocrine action; factors controlling heart, kidney and vascular growth and function; interaction of genetic and environmental influences; adaptations in pregnancy and human pathophysiology. Students will be introduced to experimental approaches and models in physiology and current controversies in cardiovascular research. Disturbances in physiological function will be studied to gain insight into the molecular and cellular bases of disease processes. These disturbances include hypertension, cardiac hypertrophy and arrhythmia, diabetes and pre-eclampsia. The role of early developmental influences in programming later disease states will be considered together with the cardiovascular health impacts of post-natal nutrition and adult dietary interventions.

In this subject the lectures are supplemented with group discussions where assignment tasks are explored with the assistance of specialist tutors. Multimedia activities to support lecture themes are incorporated. Students will be introduced to the primary research literature and will select articles of current interest to analyse for their assignments.

On completion of this subject students should have:

- established a sound factual understanding of cardiovascular structure, function and development at both organ and cellular levels;
- developed the skills to consider the role of genes and environment in shaping cardiovascular health;
- gained knowledge of the important endocrine bases for maintenance of cardiovascular homeostasis; and
- achieved proficiency in reading, analysing and evaluating current scientific literature in the field of cardiovascular pathophysiology.

Assessment: Three written assignments/reports of up to 1500 words each due during the semester (30%); a 3-hour written examination in the examination period (70%).

536-302 Molecular Neurophysiology

Note: This subject is recommended for both BSc and BBiomedSc students specialising in neuroscience, molecular and cell biology, integrated systems biology or reproductive and developmental biology.

Formerly known as 536-302 Molecular Physiology of Neurons and Muscle and 536-302 Mammalian Cellular Physiology.

Credit points: 12.5

Coordinator: A/Prof G Barrett

Prerequisites: Physiology 536-201 and 536-211.

BBiomedSc students: 521-213 and 536-250.

Either biochemistry 521-211, 521-212, and 521-221, or cell biology 606-205 and 606-206 are recommended. The Head of Department will consider other students on application.

Contact: 24 hours lectures, 18 hours interactive workshops (*Semester 2*).

Description: This subject is based on the discipline of molecular neuroscience, but it also encompasses the physiology involved in interactions between neurons. Molecular neuroscience examines the molecular and cellular mechanisms that underlie the functioning of the nervous system. Neurons and glial cells are unique and highly specialised cells that use sophisticated molecular mechanisms to interact in a network manner. The main objective of the course is that students master a core program of molecular neuroscience and neurophysiology. Specifically, students will be expected to demonstrate a high degree of knowledge and understanding of the following core topics: the cellular biology of neurons and glial cells, synaptic structure and function at the molecular level, the diverse mechanisms of signalling between cells in the nervous system, channel activity of neurons and muscle cells at the neuromuscular junction, long-term potentiation and its role in memory, axonal transport, neuronal plasticity, and neurodegeneration and regeneration. Additionally, the role of neurons in networks will be considered. Some of the lectures will be given by research scientists from the fields of neural control and circuitry. Another objective of the course, in parallel with mastery of the key concepts, is to equip students with the knowledge and ability to assess scientific reports insightfully and critically. These skills are required to keep abreast of new developments, as reported in the lay press and in the scientific literature. The scope and growth of molecular neuroscience is such that this is something that will be important for all, not only those who choose to do research in the field. On completion of the course, students should also have developed competencies of the transfer of skills to unfamiliar problems, and in strengthening their understanding via oral and written communication. Students will gain experience in analysing, evaluating and discussing key topics in neuroscience through the workshops.

Assessment: Ongoing assessment of workshop participation and performance (25%); a 1-hour written examination held mid-semester (15%); a 2-hour written examination in the examination period (60%).

536-303 The Brain: Neurophysiology of Behaviour

Credit points: 12.5

Coordinator: Prof J Bornstein

Prerequisites: Physiology 536-201, 536-211 and 536-222, or the Anatomy/Physiology subject 516-209.

BBIomedSc students: 521-213 and 536-250.

Students who do not have a background in physiology, but who have strong background in psychology or zoology, may seek exemption by writing to the Head of Physiology.

Contact: 36 lectures (*Semester 1*).

Description: On completion of this subject, students should understand the theoretical and functional mechanisms involved in the formation and recall of memory. Students should also have explored the mechanisms underlying at least one other major brain function, which may include the neurophysiology of music, the neurophysiology of exercise, addictive behaviour, appetite, colour vision, neurological disease or pain. Students should comprehend the relationships between membrane events, neuronal architecture, neural circuits and final behaviours; as well as the methods used to study them (e.g. functional imaging, electrophysiology and psychophysics). In the course of a short library-based research project, students should develop skills in working in groups to integrate data from original scientific papers to understand a specific mechanism in depth. Students should develop skills in critical analysis of the data and conclusions presented in original articles and in identifying differences in approaches, results and interpretation within the literature. Students will also develop oral communication skills in discussions with their project group members and written skills in writing their final reports. Students should be able to evaluate original scientific material, to justify opinions on the basis of this and to detect where current information is unable to provide definitive conclusions about how the brain controls behaviour.

Assessment: A 3000-word project report due during the semester (50%); two 300-word journal article summaries due during the semester (10% each); a 45-minute written examination held mid-semester (20%); ongoing assessment of participation and communication in group activities throughout the semester (10%).

536-304 Advanced Experimental Physiology

Availability: This subject is likely to be quota-restricted this year, see *Quota subjects (p.9)*.

Credit points: 12.5

Coordinator: Prof M Hargreaves

Pre or Corequisites: Physiology 536-301 or 536-302 or 536-303 or 536-308.

Contact: One lecture, 15 hours of assignment and literature work, 42 hours of practical work and seminars (*Semester 2*).

Description: This subject provides practical experience in experimental physiology within a 'work-experience' research environment. Emphasis is given to communication (oral and written) and to work as a team in interactive small group research. The assignments will concentrate on developing skills associated with scientific writing and critical appreciation of the literature. In the research component, students will learn group management skills including timetabling and negotiation, use group discussion/debate and reason to explore experimental approaches, learn about scientific conduct, working cooperatively in small groups with a member of staff actively investigating a specific physiological problem. Students will be expected to use their training in scientific writing undertaken in physiology 536-301, 536-302, 536-303 or 536-308 as a basis for writing their reports. The range of topics offered varies from year to year, and includes cardiac physiology, brain function, foetal physiology, vascular function and skeletal muscle physiology.

Assessment: Assessment is dependent on the nature of the individual project undertaken and is comprised of the following: a scientific writing assignment or a laboratory report totalling up to 2500 words (ranging from 60% to 100% of the subject's total assessment). Additional assessment may involve laboratory performance during the semester (from 10% to 40%); and/or a seminar presentation/discussion of process and results (from 5% to 25%). The exact assessment details including relative component weightings and the timing of assessment components will be advised after a student selects an area of investigation.

536-308 Physiology of Muscle & Exercise

Note: This subject is recommended for BSc students taking a physiology major or BBIomedSci students undertaking a specialisation in molecular and cell biology or integrated systems biology.

The experimental approaches taught in this course are further implemented in 536-304 Advanced Experimental Physiology (*p.4*).

Credit points: 12.5

Coordinator: A/Prof G Lynch

Prerequisites: Physiology 536-201, 536-211 and 536-222.

BBIomedSc students: 521-213 and 536-250.

A waiver of the prerequisite 536-222 may be considered for students who passed 536-201 and 536-211. Written requests should be made to science coordinator, Department of Physiology.

Contact: 34 hours of lectures, 15 hours of practical work and computer-aided learning (*Semester 1*).

Description: This subject will enable students to comprehend aspects of normal muscle development and growth, neuromuscular transmission, the control of human movement as well as the adaptation of skeletal muscle to interventions such as acute and long-term endurance and resistance training. Students will study exercise metabolism, cardiovascular and respiratory responses to exercise, intracellular signalling, and the underlying bases of muscle fatigue. Students will study how ageing affects muscle structure and function, the underlying cellular mechanisms involved in disuse atrophy, muscle damage and repair, as well as how muscle responds to different pharmacological interventions, including anabolic steroids. Students will undertake two practical experiments that will develop their abilities to design and plan experiments, and work in small teams to develop their analytical and critical skills to evaluate data. The practical components will also develop skills for writing scientific manuscripts and concise laboratory reports.

On completion of this subject students will have:

- established a sound factual understanding of skeletal muscle structure and function and how muscle properties are changed during growth, development, exercise and ageing. The lecture series will also provide a strong understanding of cardiovascular and respiratory physiology and the response to acute and long-term exercise;
- developed skills to predict how skeletal muscle will adapt to altered functional demands, including those with clinical application;
- developed skills in reading, analysing and evaluating current scientific literature in the field of skeletal muscle and exercise physiology; and
- awareness of current directions in skeletal muscle and exercise physiology research, especially in relation to health and disease.

Assessment: Two written reports of up to six pages each on practical classes due during the semester (15% each); a 3-hour written examination in the examination period (70%).

536-311 Molecular/Cellular Basis of Physiology

Note: This subject is recommended for BSc students taking a physiology major or BBIomedSci students undertaking a specialisation in molecular and cell biology, integrated systems biology or reproductive and developmental biology.

The subject matter taught in this subject is supported by the experimental investigations presented in 536-304 Advanced Experimental Physiology (*p.4*). It is a recommended companion subject.

Credit points: 12.5

Coordinator: Prof D Williams

Prerequisites: At least one of Physiology 536-301, 536-303, 536-308.

Contact: 31 lectures, 24 hours of assignments (*Semester 2*).

Description: The subject will provide a detailed understanding of how molecular and cellular mechanisms control the functional interactions of whole body systems, the integration and coordinated control of physiological systems, homeostasis and adaptations to change. Students will explore the most recent advances in select areas of physiology. Students select among a number of areas of study that reflect the dynamic nature of physiology and research focuses of the department. These include ion and channels and disease; the specialised role of calcium in cell control; genesis and treatment of muscle and injury/disease; gastrointestinal physiology and computational biology; signalling in neuronal cells; perinatal physiology; and stress proteins and skeletal muscle function.

Students develop theoretical background in part using graduate skills in planning, communication, qualitative and quantitative critical analysis in using molecular, biological, biochemical and physiological approaches to investigate physiological processes. Students will be introduced to new technologies that enable the understanding of selected areas of study to be advanced. The assignment is designed to extend teamwork experiences and the ability to read critically and to evaluate and to communicate physiological information. Several of the units offered will be supported with a small group practical investigation in 536-304 Advanced Experimental Physiology (*p.4*).

Assessment: Two equally weighted 1-hour written examinations, one mid-semester and one late-semester (total 65%); a group poster assignment and presentation due during semester (25%); an individual assignment of not more than 500 words due during semester (10%).

516-307 Research Project

See full subject details on page 3.