

ARTICULATED ANIMAL SCIENCE (& MANAGEMENT) COURSES

*Coursework isare always subject to departmental review upon return. Not all courses listed below may be available when on-site. Additional courses may exist that are not listed here. Refer to the university’s course catalogue for updated course offerings.

*Other programs and universities are available and may offer relevant coursework. You are not limited to the options you see below.

*Check with the Animal Science department on how coursework fulfills your major. All UCEAP programs are UC units and will be posted on your UC Davis transcript regardless of major credit or fulfillments.

*Check with [UC Davis Study Abroad](#) on dates and costs of each program, as well as application process and deadlines

*Learn more about each program at the [UCEAP website](#).

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AUSTRALIA: University of Melbourne

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Language: English

Terms: I: Mid-Feb—Late June (UC Davis Winter + Spring Quarters)

II: Mid-July—Late November (UC Davis Summer + Fall Quarters)

Min GPA: 2.85

Courses:

- BCMB20002-Biochemistry and Molecular Biology (*ANS-ABI 102, ANM-R.E.*)
 - This subject is an introduction to the core of biochemistry, building on chemical principles and relating structure to function. The subject is an approved biochemistry prerequisite for entry to graduate medicine (and kindred vocational study) at the University of Melbourne. The molecular basis of life as discussed in this subject is essential for the understanding of any biological system and is at the core of all degrees in life science that use molecular techniques. The content includes an introduction to the molecular architecture of cells and the structure of biological building blocks (amino acids, nucleic acids, carbohydrates, lipids). The coverage includes the structure and function of proteins, including the properties of enzymes, their regulation and kinetic behavior. How nucleic acids replicate information and serve as a template for the synthesis of RNAs and proteins (i.e. molecular biology). The structure of lipids is examined to show their major biological roles, particularly as components of cell membranes. Metabolic pathways (glycolysis, gluconeogenesis, oxidative phosphorylation and fat storage) will complete this core coverage of essential biochemistry. The subject is designed to complement the laboratory experiences in the subject BCMB20005.
- DASC20010-Applied Animal Physiology (*ANS-ANS 100, ANM-R.E.*)
 - Physiology is the integrative study of the control of normal body function. This subject will examine the functions of different cell types and their interactions in organs and tissues; mechanisms by which organs are controlled and their functions are regulated; thermoregulatory processes and fluid balance; they physiology of the nervous system, of digestion, circulation, respiration, and excretion; the processes of growth and development, reproduction and lactation, and factors that can be manipulated to alter animal performance under normal conditions.

- DASC20011-Companion Animal Biology (*ANS-ANS 142, ANM-R.E.*)
 - Animals such as dogs, cats and horses were once predominantly working animals but increasingly they are seen now as companion animals. This change in relationship has brought benefits and challenges to both owner and animal alike. Alongside traditional companion animal species, more exotic animals are also becoming popular in society. These may include reptiles, amphibians and even native Australian species. Given the almost complete control we have over companion animal species, it is important that we understand how to care for them correctly. Housing, nutrition, health and behaviour all interlink and impact on the welfare and value of our “companions”.
- DASC20012-Comparative Nutrition and Digestion (*ANS-NUT 115, ANM-R.E.*)
 - This subject allows students to develop an awareness of the major physiological processes and metabolic basis of nutritional requirements; to understand the nutritional qualities of food, and develop skills to ensure a balanced diet can be formulated for a range of mammals; to be familiar with the impact of dietary imbalances; and to understand the role of food in behavioural, psychological and social contexts.
- DASC30014-Animal Performance (*ANS-Specialization, ANM-R.E.*)
 - The aim of this subject is to enable students to develop skills and knowledge in exercise and environmental physiology in domestic and companion animals and to be able to apply this knowledge in management of the environment for improved animal performance. The content includes a comparative overview of basic physiological processes important in exercise physiology and environmental adaptation such as circulation, gas exchange, electrolytes and water balance, heat production and thermoregulation; physiological and metabolic adaptations during exercise and training, including environmental effects on training management; diversity in environments and the nature of stress, including physical, psychological and nutritional factors; animal health specifically related to animal performance; and management of the environment including aspects of housing.
- PHYS20008-Human Physiology (*ANS-NPB 101, ANM-R.E.*)
 - Physiology is an integrative study of the control of normal body function. The specialised organ systems to be studied include the nervous, cardiovascular, muscular, respiratory, kidney and digestive systems. During this subject students will learn that physiology is an experimental science with many key concepts arising from qualitative and quantitative observation and analysis of living organisms. The lectures will incorporate active interaction between students and lecturers using personal response system (PRS) clickers to answer questions during lectures.
- VETS20014-Foundations of Animal Health 1 (*ANS-Specialization, ANM-R.E.*)

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- VETTS20014 Foundations of Animal Health 1 introduces students to the major determinants of health in domestic animals. Using case studies drawing on a range of domestic and exotic animals species and both Australian and international contexts, the roles of animal environments, nutrition, toxins and the scientific approach to managing the health of animals will be investigated. Students should develop an understanding of management systems appropriate for optimizing the management and health of domestic animal populations.
- VETS20015-Foundations of Animal Health 2 (*ANS-Specialization, ANM-R.E.*)
 - VETS20015 Foundations of Animal Health 2 adds to the understandings developed in VETS20014 Foundations of Animal Health 1, to consider the principles of animal welfare and its management, the genetic basis of animal health and performance and the fundamental principles of infectious disease control. A case study approach will introduce students to established health and welfare management practices of companion and production animals in Australia, and will reinforce understandings of the role of welfare, genetics, nutrition, housing and infectious disease control in the maintenance of health populations of animals.
- ZOOL20006-Comparative Animal Physiology (*ANS-ANS 100, ANM-R.E.*)
 - This lecture and laboratory based subject aims to give students a solid foundation in basic physiological processes in animals, with a focus on the different ways in which animals adapt to their environments. Particular emphasis will be placed on marine and desert animals, and the integrative mechanisms involved in the regulation of important organ systems. Topics include endocrine feedback, neural integration, water and salt balance; cardiovascular systems, thermoregulation; digestion and reproduction.

AUSTRALIA: University of Queensland

UCEAP Program: [Australian Universities](#)

Language: English

Terms: Mid February—Late June (UC Davis Winter + Spring)

Late July—Late November (UC Davis Summer + Fall)

Min GPA: 3.0

Courses:

- AGRC2013-Agricultural Microbiology and Gene Technology (*ANS-Specialization, ANM-R.E.*)
 - Note: Pre-rec for ANIM 3006
 - Introduction to the form, function & physiology of the major microbial groups, particularly as they relate to plant and animal health & production; introduction to the basic theory & applications of gene technology.
- AGRC3006-Pasture Science (*ANS-Specialization, ANM-R.E.*)
 - Advanced coverage of important topics in tropical & subtropical pasture science including pasture plant improvement, pasture plant adaptation, yield & ecology of sown pastures, carrying capacity, pasture sampling, role of pastures & fodder crops in sustainable agriculture & livestock production, environmental issues. Practicals & field trips.
- ANIM2021-Thermal Adaptation of Animals (*ANS-Specialization, ANM-R.E.*)
 - How domestic animals and wildlife interact with the natural and modified climate (housing & transport); Animal response to micro & macro climate; adaptive strategies for dealing with climate studies; impact of housing; environmental control for animals; monitoring of micro-climate & macro-climate as it applies to animals.
- ANIM3006-Animal Health and Epidemiology (*ANS-Specialization, ANM-R.E.*)
 - The maintenance of the health & productivity of individual animals, herds & flocks from a knowledge of disease pathogenesis, hygiene & the environmental factors affecting disease outbreaks.
- ANIM3012-Extensive Animal Production (*ANS Specialization, ANM-R.E.*)
 - Advanced concepts & practices used in the management of selected species of animals for the production of meat, milk, fibre & skins.
- ANIM3045-Livestock Enterprise and Management (*ANS-Specialization, ANM-R.E.*)
 - Advanced concepts and practices used in the sustainable management of beef cattle enterprises in Australia.
- ANIM3062-Emerging Issues in Animal Bioscience (*ANS-Specialization, ANM-R.E.*)
 - Examines contemporary local and global influences on Australian domestic animals and wildlife with an emphasis on sustainability and animal welfare.

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UCEAP Program: [Australian Universities](#)

Language: English

Terms: I: Mid-February—Late June (UC Davis Winter and Spring quarters)

II: Mid-July—Late November (UC Davis Summer and Fall Quarters)

Min GPA: 3.0

NOTE: Level 2000= Junior level coursework, Level 3000= Senior level coursework

Courses:

- **AGEN2006- Animal Production and Management (*ANS-spec, ANM-R.E.*)**
 - This unit of study is designed to develop the student's ability to critically examine and evaluate the production and management of animals used for food and fibre in Australia and internationally. The unit will focus on new and emerging issues in animal production, including productivity, welfare, remote monitoring and management, animals in the environment, and meeting specifications in an ever-evolving marketplace. The identification, selection and breeding of animals that are optimally suited to production systems is a focus. New thinking and innovations that are being used to address scientific, industry and social expectation challenges will be a feature of the unit and case studies will be used throughout to examine interactions between these factors and their impact on management practices. Students will gain research and inquiry skills through research based group projects, information literacy and communication skills through online discussion postings, laboratory reports and presentations, and personal and intellectual autonomy through working in groups. At the successful completion of the unit, students will have the core knowledge and skills to enable them to lead developments in production animal industries in Australia and overseas. **(Semester 2)**
- **ANSC3109- Animal Genetics and Genomics 2 (*ANS- spec, ANM-RE*)**
 - This multi-modal unit of study provides experience in topics relating to animal genetic research and animal population assessment and management, including domesticated or managed 'wild' species and populations. Students will have the option to choose two out of four available modules, namely: Domestic animal population and immunogenetics; Wildlife Conservation Genetics; Emerging issues in genetics and/or Comparative Genomics and Sequence Analysis. This unit will be delivered predominantly in the form of on-line modules, with practical classes and tutorials incorporated to emphasize population management to maintain genetic health and diversity and analytical sequencing methods to assess population diversity. **(Semester 2)**
- **BETH5202- Human and Animal Research Ethics (*ANS- spec/ANS 103, ANM-R.E.*)**
 - This unit of study critically examines research ethics in its wider context, from structuring research to its dissemination. It explores the ethical underpinnings of a

variety of research methods and their uses in humans and non-human animals including the justifications for engaging in research, key concepts in research ethics and research integrity. The unit also reviews the history of research and the impact of research abuse on participants, both human and animal. **(Semester 2)**

- BIOL3045- Animal Ecological Physiology (*ANS- spec, ANM- R.E.*)
 - Animal Ecological Physiology is a conceptually based unit of study that covers physiological interactions between organisms and their environments. The unit explores evolutionary processes that allow animals to persist in variable environments. These concepts are essential to understanding biodiversity and ecological function of animal populations, and how these are likely to change under future climate change. The unit will be suitable for those with an interest in zoology, as well as students with a particular interest in ecology and evolution. There is a strong focus on experimental biology and incorporating theory into practical classes, during which students design their own experiments. The unit provides essential skills for conducting and presenting research, and for critical evaluation of published research. **(Semester 1)**
- BIOL3046- Animal Behaviour (*ANS- spec/ANS 104, ANM- R.E.*)
 - The unit will provide a broad overview of the scientific study of animal behaviour. It will consider mechanistic and functional explanations of animal behaviour across contexts including kin selection and altruism, sociality, foraging, aggression and competition, sexual selection and mate choice, the behaviour of predators and prey, and communication and signalling. The information presented and discussed in this unit will reflect the most up-to-date research in each aspect of the field of animal behaviour. Practical sessions are closely aligned with the lecture material and will foster the development of key skills by providing hands-on experience of experimental design, data collection and analysis. **(Semester 1)**
- BCHM3082- Medical and Metabolic Biochemistry (*ANS- ABI 102/103, ANM-R.E.*)
 - This unit of study will explore the biochemical processes involved in the operation of cells and how they are integrated in tissues and in the whole human body in normal and diseased states. These concepts will be illustrated by considering whole-body aspects of energy utilisation, fat and glycogen storage and their regulation under normal conditions compared to obesity and diabetes. Key concepts that will be discussed include energy balance, regulation of metabolic rate, control of food intake, tissue interactions in fuel selection, the role of adipose tissue and transport of fuel molecules from storage organs and into cells. Particular emphasis will be placed on how the modern concepts of metabolomics, coupled with molecular biology methods and studies of the structure and function of enzymes, have led to our current understanding of how metabolic processes are normally integrated and how they become deranged in disease states. The practical component is designed to complement the lecture course and will provide students with experience in a wide range of techniques used in modern medical and metabolic biochemistry. **(semester 2)**
- BCHM3071- Molecular Biology and Biochemistry-Genes (*ANS- BIS 101, ANM- R.E.*)

- This unit of study is designed to provide a comprehensive coverage of the activity of genes in living organisms, with a focus on eukaryotic and particularly human systems. The lecture component covers the arrangement and structure of genes, how genes are expressed, promoter activity and enhancer action. This leads into discussions on the biochemical basis of differentiation of eukaryotic cells, the molecular basis of imprinting, epigenetics, and the role of RNA in gene expression. Additionally, the course discusses the effects of damage to the genome and mechanisms of DNA repair. The modern techniques for manipulating and analysing macromolecules such as DNA and proteins and their relevance to medical and biotechnological applications are discussed. Techniques such as the generation of gene knockout and transgenic mice are discussed as well as genomic methods of analysing gene expression patterns. Particular emphasis is placed on how modern molecular biology and biochemical methods have led to our current understanding of the structure and functions of genes within the human genome. The practical course is designed to complement the lecture course and will provide students with experience in a wide range of techniques used in molecular biology laboratories. **(Semester 1)**
- **BCHM3072- Human Molecular Cell Biology (*ANS- spec, ANM- R.E*)**
 - This unit of study will explore the responses of cells to changes in their environment in both health and disease. The lecture course consists of four integrated modules. The first will provide an overview of the role of signalling mechanisms in the control of human cell biology and then focus on cell surface receptors and the downstream signal transduction events that they initiate. The second will examine how cells detect and respond to pathogenic molecular patterns displayed by infectious agents and injured cells by discussing the roles of relevant cell surface receptors, cytokines and signal transduction pathways. The third and fourth will focus on the life, death and differentiation of human cells in response to intra-cellular and extra-cellular signals by discussing the eukaryotic cell cycle under normal and pathological circumstances and programmed cell death in response to abnormal extra-cellular and intra-cellular signals. In all modules emphasis will be placed on the molecular processes involved in human cell biology, how modern molecular and cell biology methods have led to our current understanding of them and the implications of them for pathologies such as cancer. The practical component is designed to complement the lecture course, providing students with experience in a wide range of techniques used in modern molecular cell biology. **(Semester 2)**
- **BCHM3081- Mol Biology and Biochemistry-Proteins (*ANS- spec, ANM- R.E.*)**
 - This unit of study is designed to provide a comprehensive coverage of the functions of proteins in living organisms, with a focus on eukaryotic and particularly human systems. Its lecture component deals with how proteins adopt their biologically active forms, including discussions of protein structure, protein folding and how recombinant DNA technology can be used to design novel proteins with potential medical or biotechnology applications. Particular emphasis is placed on how modern molecular biology and biochemical methods have led to our current understanding of the structure

and functions of proteins. It also covers physiologically and medically important aspects of proteins in living systems, including the roles of chaperones in protein folding inside cells, the pathological consequences of misfolding of proteins, how proteins are sorted to different cellular compartments and how the biological activities of proteins can be controlled by regulated protein degradation. The practical course is designed to complement the lecture course and will provide students with experience in a wide range of techniques used in molecular biology and protein biochemistry laboratories.

(Semester 1)

- BIOL3013- Marine Biology (*ANS- spec, ANM- R.E.*)
 - We will examine in detail processes that are important for the establishment and maintenance of marine communities. Lectures will expose students to the key ideas, researchers and methodologies within selected fields of marine biology. Laboratory sessions and field excursions will complement the lectures by providing students with hands-on experience with the organisms and the processes that affect them. Students will develop critical analysis and scientific writing skills while examining the current literature. **(Semester 2)**
- IMMU2101- Introductory Immunobiology (*ANS- spec, ANM- R.E.*)
 - Our immune system not only protects us from viruses, bacteria, and parasites, it can prevent the growth of tumours. Sometimes our immune system can be the cause of diseases like multiple sclerosis, Type 1 diabetes and rheumatoid arthritis. If you are interested in studying how our immune system works to keep us alive, then Introductory Immunology is for you. This unit of study will provide an overview of the immune system and the essential features of immune responses. You will be treated to a lecture course delivered by cutting edge immunologists that begins with a study of immunology as a basic research science. This includes an introduction to the nature of the cells and molecules involved in the immune response. We build on this foundation by introducing the immunological principles underlying the eradication of infectious diseases, successful vaccination strategies, organ transplantation, combatting autoimmune diseases and treating cancer. The integrated tutorials will build on the lecture material as well as provide you with instructions on how to successfully locate and critically analyse scientific literature. The practical sessions will further illustrate particular concepts introduced in the lecture program and provide you with valuable exposure to a variety of very important immunological techniques. **(Semester 1)**
- IMMU3102- Molecular and Cellular Immunobiology (*ANS- spec, ANM- R.E.*)
 - This study unit builds on the series of lectures that outlined the general properties of the immune system, effector lymphocytes and their functions, delivered in the core courses, IMMU2101 - Introductory Immunobiology and BMED2404 - Microbes, Infection and Immunity (formerly IMMU2001 and BMED2807). In this unit the molecular and cellular aspects of the immune system are investigated in detail. We emphasise fundamental concepts to provide a scientific basis for studies of the coordinated and regulated immune responses that lead to elimination of infectious organisms. Guest lectures from research scientists eminent in particular branches of immunological

research are a special feature of the course. These provide challenging information from the forefront of research that will enable the student to become aware of the many components that come under the broad heading 'Immunology'. Three lectures (1 hour each) will be given each fortnight: 2 lectures in one week and one lecture the following week, for the duration of the course. This unit directly complements the unit 'Immunobiology in Human Disease IMMU3202' and students are very strongly advised to undertake these study units concurrently. **(Semester 2)**

- MICR3032- Cellular and Molecular Microbiology (*ANS- spec, ANM- R.E.*)
 - This Unit of Study introduces students to key areas of research in molecular microbiology. Building on knowledge gained in MICR2012 and MICR2022, as well as MBLG1001, the lectures explore areas of microbial evolution, pathogenesis, physiology, ecology, biotechnology and genetics, with each key theme explored with a series of 6 lectures led by an expert in the field. Lectures will be complemented with practical/tutorial sessions that explore recent research in these areas. The first set of practical/tutorial sessions are small-group sessions led by demonstrators, which are focused on critical interpretation of the scientific literature in the area of host-microbe interactions. The focus is on experimental design, and analysis of the raw data. The second set of pracs are bioinformatics labs, which introduce software such as ORF Finder, BLAST, ClustalX, and TreeView and databases such as NCBI-Nucleotide and KEGG; the aim is to figure out the identity, functions, and biotech. applications of a mystery piece of microbial DNA. It is strongly recommended that students also take the complementary unit of study MICR3042 or MICR3942. **(Semester 2)**
- AGRO4005- Livestock Production Systems (*ANS- spec/ANS 148, ANM- R.E.*)
 - This unit examines livestock production following a whole system approach by integrating animals, vegetation, environment (soil, water, air and climate) and management, and analysing the interactions between them. The unit builds on principles delivered in core (AGEN1001, AGEN1004 and AGEN2006) and elective (ANSC3101, AVBS4012) units of study for those students interested in pursuing a career in Animal Science. The focus of this unit is on beef cattle and sheep. Particularities and commonalities of these livestock systems will be presented. The pasture/grassland section examines the relationship between livestock production, forage quality and quantity in both native and sown pastures, impact of weeds, and grazing management. Interactions between climate, forage and animal production are also addressed. The animal component of this unit integrates concepts in grazing ecology, nutrition, reproduction, animal behaviour and welfare, and economics to develop skills in managing the production process for improved productivity, production efficiency and environmental stewardship. A special characteristic of this unit is the strong focus on simulation models decision support systems, and new technologies. Computer-based and field classes will provide direct experience in business management of livestock production systems and skills in record keeping and data handling. Students completing this unit will acquire skills to examine and manage livestock enterprises following a whole-system approach required in roles as

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consultants, advisors or managers of sustainable livestock enterprises.

Teaching Staff: A/Professor Luciano Gonzalez (Coordinator), Dr Lachlan Ingram.

(Semester 2)

- BIOL3013- Marine Biology (*ANS- spec, ANM- R.E.*)
 - We will examine in detail processes that are important for the establishment and maintenance of marine communities. Lectures will expose students to the key ideas, researchers and methodologies within selected fields of marine biology. Laboratory sessions and field excursions will complement the lectures by providing students with hands-on experience with the organisms and the processes that affect them. Students will develop critical analysis and scientific writing skills while examining the current literature. **(Semester 2)**
- BIOL3007- Ecology (*ANS- spec, ANM- R.E.*)
 - This unit explores the dynamics of ecological systems, and considers the interactions between individual organisms and populations, organisms and the environment, and ecological processes. Lectures are grouped around four dominant themes: Interactions, Evolutionary Ecology, The Nature of Communities, and Conservation and Management. Emphasis is placed throughout on the importance of quantitative methods in ecology, including sound planning and experimental designs, and on the role of ecological science in the conservation, management, exploitation and control of populations. Relevant case studies and examples of ecological processes are drawn from marine, freshwater and terrestrial systems, with plants, animals, fungi and other life forms considered as required. Students will have some opportunity to undertake short term ecological projects, and to take part in discussions of important and emerging ideas in the ecological literature. **(Semester 2)**

DENMARK: University of Copenhagen

UCEAP Program: [University of Copenhagen](#)

Language of Instruction: English

Local Language: Danish (and English)

Terms: I Early August –Early January (Note: American students can take exams early and be home for winter; UC Davis Summer Session II + Fall Quarters)

II Early January—Late June (UC Davis Winter + Spring Quarters)

Min GPA: 2.85

Courses:

- SBIK 10212U- Aquaculture and Fish Diseases (*ANS-Specialization, ANM- R.E.*)

- The course includes theoretical and practical teaching concerning various aquaculture types (freshwater pond culture, mariculture, recirculated systems) and various natural aquatic biotopes. Additional topics treated are water quality aspects, environmental aspects of aquaculture, fish welfare, fish physiology, nutrition, feed technology, fish immunology, vaccinology, parasitology, virology and bacteriology. Practical aspects concerning sampling and diagnosis have high priority. Focus will be placed on prophylactic aspects and management methods. Classical and molecular methods will be applied in the practical exercises.
- **NBIB 13008U- Physiology of Aquatic Animals (*ANS-Specialization, ANM-R.E.*)**
 - The course aims to provide the student with detailed knowledge of different aspects of the physiology of aquatic animals – from shellfish to whales. The course will provide an understanding of the respiratory and circulatory system of these animals, as well as how oxygen is transported. In addition effect of - and physiological adaptation to - a variety of environmental factors, i.e. hypoxia, salinity, CO₂, pH, hydrogen sulfide, salinity and temperature, will be described. The course will also provide understanding of the physiology affiliated with fish swimming as well as feeding and digestion.
- **NBIB 14015U-Applied Marine Biology (*ANS-Specialization, ANM-R.E.*)**
 - The course will be based on a number of case studies representing specific applied issues, which will provide the frame for understanding and assessing the potentials, limitations and environmental effects of human activities for marine ecosystem structure and function. The cases will be presented in a scientific context, where an understanding of the underlying basic physiological and ecological processes will provide the foundation for evaluating and predicting environmental effects of human activities on marine systems.
- **NBIB 14019U-Immunology (*ANS-Specialization, ANM-R.E.*)**
 - Cells and mechanisms involved in innate and adaptive immunity. What is the specific immune system and how is it generated. The activation and effector mechanisms of T and B cells. Regulation of the immune system in health and disease. Autoimmunity, allergy, immune defects and tumor immunology. Application of immunology in drug development and in the biopharmaceutical industry. Introduction to immune systems in non-mammalian organisms.
- **NFOK 14026U- Dairy Microbiology (*ANS-147, ANM-R.E.*)**
 - The course will contain lectures on: Raw milk microflora, sweet dairy products microflora, pathogenic and spoilage microflora, primary (Lactic acid bacteria) and secondary (Yeasts, moulds, propionibacterium, red smear microflora, LAB ripening cultures) starter cultures microflora, bacteriophage and bacteriophage resistance, role of starter culture physiology on growth and end products (aroma

formation, proteolysis, glycolysis, amino acid catabolism), non-starter lactic acid bacteria, adjunct cultures and their role in cheese ripening.

- SASB 10131U-Basic Animal Biology (*ANS-Specialization, ANM-R.E.*)
 - In the course the lectures will cover the physiology of all of the major organ systems with focus on homeostasis, the cardiovascular systems, the nervous systems, endocrinology, immunology, growth and development and reproduction. The course will relate these physiological concepts and systems to animal life cycles, concentrating on the human and mouse. Responses and adaptations to environmental challenges will also be covered in the course.
- SASB 10139U- Advanced Mammalian Biology (*ANS-ANS 100, ANM-R.E.*)
 - The course in Advanced Mammalian Biology shall provide the students of Biology-Biotechnology with an in-depth understanding of the physiology of the major organ systems, from the molecular and cellular level to the level of integration of individual organs into multi organ systems and whole-body physiology. The emphasis is on the function of individual organs and organ systems, and their importance for whole-body physiology. In addition, the students will be exposed to ongoing research and applied aspects of the covered subjects. This will be accomplished in a series of lectures based on text book material as well as case-based learning and journal clubs
- SBIB 10170U- Mammalian Genomics (*ANS-Bis 101, ANM-R.E.*)
 - The course is an advanced course in theoretical and practical genomics with focus on mammals. The course will provide information that will allow the student to gain knowledge on methods and technologies currently used to dissect, describe and characterise complex genomes. Aspects of both research and application within the field of genomics will be addressed. The students will also learn innovative thinking.
- NMAK 14003U-Applied Statistics (*ANS-STA 100/PLS 120, ANM-R.E.*)
 - Each student carries out a statistical project (in a group) related to an experiment or a numerical investigation preferably delivered by one of the students in the group. A report is written in journal style and presented orally. Besides, a small number of statistical themes are taught. Examples of such themes are multi-way ANOVA, random effects, analysis of repeated measures and cross-over trials, analysis of count data or ordinal data, analysis of data with detection limit, simulation methods, non-linear regression models, analysis of time series data, Markov models. There will also be some discussion of statistical methods relevant to application areas such as biology, chemistry, computer science, nutrition, and sport science.. The statistical themes as well as the application areas may vary somewhat from year to year and to some extent adapt to the interests of the students.

GHANA, WEST AFRICA: University of Ghana

UCEAP Program: [University of Ghana](#)

Language of Instruction: English

Local Language: English and local dialects

Terms: Late July/Early August – Early/Mid December

Mid-January—Late May

Min GPA: 2.85

Courses:

- ANIM 414-Applied Animal Breeding (*ANS-Bis 101 or ANG 107, ANM-R.E.*)
 - Principles of selection; genetic effect of selection; selection for different kinds of gene action. Basis for selection. Methods of selection, Response to selection and factors affecting it. Systems of mating; Systems of breeding and selection for the genetic improvement of various species of livestock. Special problems of implementing genetic improvement of livestock programmes in the tropics (with particular reference to Ghana); Open nucleus breeding schemes.
- ANIM 415-Applied Animal Nutrition (*ANS-NUT 115, ANM-R.E.*)
 - The digestion of starch and protein in the pig and cattle – glands, organs, digestive juices, enzymes and end products. Bioenergetics and partition of energy within the animal. Evaluation of feeds; in vivo, in vitro and in Sacco. Use of metabolizable Energy concept in Animal Feeding. Proteins in feeds – measures of protein quality for monogastrics and Ruminants. Ration formulation and Nutrient Requirements for body functions.
- ANIM 416-Ruminant Animal Production (*ANS-NUT 122, ANM-R.E.*)
 - Small Ruminant Production: The millennium development Goals and the Livestock revolution – the role of the Animal Scientist. The bane of the small ruminant production on the coastal savanna of Ghana; sustainable dry season feeding strategies; Improving the reproductive efficiency of breeding ewes and rams. Other management practices – Flushing, creep feeding, weaning and calendar of activities on a small ruminant farm.
 - Dairy Cattle Production: Importance of milk and dairy products. Breeds of dairy cattle – characteristics and production. Status of the dairy industry in Ghana. Constraints to milk production in Ghana. Essentials of a profitable dairy operation. Milk yield and composition and factors affecting them. Management and milking of the dairy herd. Managing dairy cattle for high fertility

- Forage Production, Management and Conservation: Types of pastures; natural, cultivated. Management and improvement practices of grasslands; reseeding, fertilization, water supply, weed control, burning, supplementary feeding; concepts of grazing; stocking rate, carrying capacity, grazing capacity, overgrazing. Grazing management systems; continuous, rotational, zero, deferred. Forage conservation; aims, techniques, socioeconomic and technical considerations, haymaking, silage making.
- ANIM 419-Meat Science and Technology (*ANS-Specialization, ANM-R.E.*)
 - Definitions; Anatomy of Livestock/Poultry; Conversion of muscle to meat; Carcass/meat grading and evaluation; By-products of Meat Industry; Storage and Preservation of meat; Microbial flora of meat and meat products; Factors influencing quality of Cured meats; Marketing of meat and meat products.
- FISH 313-Introduction to Aquaculture (*ANS-Specialization, ANM-R.E.*)
 - Water as environment for aquaculture; characteristics for selection of fish for aquaculture; energy budget of fish of typical fish for aquaculture. Aquaculture systems and techniques. Concepts of integrated aquaculture. Mariculture. Principal food chain in fish ponds. Control of aquatic plants, predators and diseases. Status of aquaculture in West Africa Biotechnology and aquaculture. General economics of aquaculture.
- FISH 412-Aquaculture Engineering and Practice (*ANS-Specialization, ANM-R.E.*)
 - Global status and importance of aquaculture. Design and construction of aquaculture facilities e.g. ponds, cages. Fish feeds formulation, preparation, storage and feeding. Design, construction and operation of fish hatchery. Tilapia and African catfish culture Constraints to production and their mitigation. Fish health management. Environmental impacts of aquaculture developments. Basic genetic principles (molecular genetics and cytogenesis. Tools for genetic engineering (triploidy, gynogenesis, androgenesis, monosex populations, inbreeding, etc.). tools for breeding: heritability and monosex selection. Aquaculture as a business. Genetically modified organisms.
- FISH 414-Fish Processing and Utilization (*ANS-Specialization, ANM-R.E.*)
 - Principles of fish processing and preservation. Methods of fish processing and preservation by artisanal and industrial fisheries in the tropics. Types of fish products – chilled fish, dried fish, salted fish, smoked fish, fish oil, fish meal, fermented products. Fish handling and storage. Effects of bumper harvest. Fish spoilage. Fish utilization. Fish by-products. Fish marketing. Local and foreign markets for diversified fish products. Quality control and packaging.

HONG KONG: University of Hong Kong

UCEAP Program: [Univ. of Hong Kong \(HKU\)](#)

Language of Instruction: English

Local Language: Cantonese

Terms: I: Late August—Late December (UC Davis Summer Session II + Fall Quarters)

II : Early January—Late May (UC Davis Winter and Spring Quarters)

Min GPA: 3.0

Courses:

- BIOL2115-Cell Biology and Cell Technology (*ANS-Specialization, ANM-R.E.*)
 - Cellular membranes. Organelles. Cellular transport: ions transport and ions channels. Protein and RNA transport. Membrane potentials. Action potentials. Cell junctions. Extracellular matrix. Cell-cell interactions. Cell-matrix interactions. Mammalian cells in culture. Primary and continuous cell lines. Cell types and cell growth parameters. Media formulation, growth factors and design of serum-free media. Culture lab facilities and sterilization. Mechanism of cryopreservation. Root and shoot cultures. Explant regeneration. Protoplasts. Secondary metabolites.
- BIOL 2119-Genetics (*ANS-BIS 101, ANM-R.E.*)
 - Topics will include cellular reproduction, principles and chromosomal basis of Mendelian genetics, linkage analysis and mapping, concept and definition of the gene, molecular mechanisms of mutation, DNA repair and recombination, DNA transposition, extra-nuclear inheritance, developmental genetics, quantitative and population genetics.
- BIOL2205-Immunology (*ANS-Specialization, ANM-R.E.*)
 - Immunological functions in the vertebrates and analogous activities in invertebrates. Structures and biological properties of immunoglobulins and T-cell receptors. Divergence of antibody genes. Emergence and characteristic of lymphoid tissues. Major histocompatibility complex. Complement pathways. Immunity against bacteria, viruses and parasites. AIDS, Vaccination, hypersensitivity, and autoimmunity. Immunological tests and immunochemical techniques using non mammalian and mammalian antibiotics and their application to various biological problems.
- BIOL2215-Animal Physiology and Environmental Adaption (*ANS-ANS 100, ANM-R.E.*)

- Basic concepts of animal adaption to environmental changes/extreme environment; modification of energy metabolism according to oxygen availability; different models of gaseous exchange for aquatic, inter-tidal, and terrestrial habitats; cross-adaption to different environment: air-breathing fish vs diving adaptations in mammals; visual signals and differential levels of photoreception from protozoa to mammals; background adaptation: functions and mechanisms for color presentation; sound wave as environmental signals: functions and mechanisms of detection in aquatic and terrestrial habitats; echo sounding in bats for navigation without visual signals; behavioral, morphological and physiological adaptations in hostile environment: extreme hot vs freezing cold; salinity changes in aquatic habitats and water availability in terrestrial habitats on osmoregulation, water balance and nitrogenous metabolism.
- **BIOL2507-Meat and Dairy Science (*ANS-Specialization, ANM-R.E.*)**
 - Principles of animal nutrition and feed formulation; genetic selection and breeding of farm animals; slaughter and carcass inspection; meat preservation and safety; sensory quality of meat. Dairy processing emphasizing fermented products such as chees and yogurt; probiotics and health effects. Meat and dairy product marketing.
- **BIOL2607-Fish Biology (*ANS-Specialization, ANM-R.E.*)**
 - Introduction to course: biological and ecological concepts; fish diversity and morphological adaptations. Single species patterns: influence of environmental on distribution; feeding ecology; growth; movement; reproduction and modes of sexuality's strategies in time and space. Multispecies interactions: competition and mutualism; marine and freshwater fish assemblages; coral reef communities; censusing fish communities. Conclusion: biodiversity; conservation of fishes; ethics of fish research and exploitation.
- **BIOL2625-Animal Behavior (*ANS-Specialization, ANM-R.E.*)**
 - This course will introduce students to scientific reasoning and conceptual basis of the understanding of animal behavior and behavioral ecology. In this course, based upon ecological and evolutionary principles, students will learn to think within the paradigm of behavioral ecology and understand the causes, functions, development, and evolution of behavior. We will discuss several classical studies that form the foundation of this field, as well as more recent research that represents the current concepts which have led to modern understanding of animal behavior. We will also illustrate the links between the recent extraordinary advances in behavior ecology and socio-ecology with their application in animal conservation.
- **BIOL3315-Animal Biotechnology (*ANS-Specialization, ANM-R.E.*)**
 - Improvement of animal production through genetic selection and animal breeding, sex selection, artificial insemination and embryo transfer. Application of immunological techniques and growth promoting agents in animal reproduction. Genetic biotechnology in animals (transgenic, knockouts and other related

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technologies): transgenic animals as models in the study of human disease, as bioreactors for the production of hormones, antibiotics and vaccines and organs for xenotransplantation. Genetically-modified fish and other animals for food production. Nuclear transfer and animal cloning. Advanced molecular biology techniques related to human and animal science based research, disease diagnosis and development of new therapies. These include but not limited to: genomics, proteomics and bioinformatics; applications of DNA technologies in diagnostic medicine and forensic science; tissue engineering.

IRELAND: University College Cork

UCEAP Program: [Irish Universities](#)

Language: English

Terms: I Late August—Late December (UC Davis Summer Session II + Fall Quarter)

II Early January to Early May (UC Davis Winter + Spring Quarters)

Min GPA: 3.0

Courses:

- ZY 3015-Advanced Vertebrate Biology (*ANS-Specialization, ANM-R.E.*)
 - An in-depth look at the taxonomy and systematics of selected vertebrate groups and the comparative processes which govern morphology, adaptations, biology and ecology. Topics include evolution of major vertebrate groups, taxonomic diversity, cranial morphology and life history parameters.
- ZY 3019-Animal Physiology (*ANS-NPB 101, ANM-NPB 101.*)
 - This module will examine the physiological adaptations of animals, in terms of their cell structure and function, immunology, osmoregulation, respiration, circulation and how these are altered to adapt to extreme environments.
- ZY 4012-Population Dynamics of Birds (*ANS-Specialization, ANM-R.E.*)
 - The principles of population dynamics in birds and the methods used to monitor population change. The module will preview, and take an overview of LRS (Life Reproductive Success), and address topics in Reproductive Success, Survival and density dependence, Mortality in relation to predation and pathogens. Other factors which will be addressed include the effects of weather and inter-annual variations in food supply. Particular emphases will given to the methods of assessing population change (i.e. point counts, transects, etc) and the underlying demographic parameters.
- ZY 4013-Freshwater Biology (*ANS-Specialization, ANM-R.E.*)

- This module will build on the introductory material in the AE3016 module. Particular attention will be given to the physico-chemical and catchment characteristics that make running waters in particular such a unique habitat; as well as to the habitat heterogeneity, species interactions and physical disturbances that contribute to the structure and function of communities. The module will also explore some of the ecosystem processes and the influence of human activity on the surrounding land and in-stream on the freshwater systems.
- **ZY 4016- Biology of Marine Mammals (*ANS-Specialization, ANM-R.E.*)**
 - Topics covered include the evolution, behaviour, ecology and management of marine mammals. Detailed consideration is given to adaptations (anatomical and physiological) that allow mammals to live in the sea.
- **ZY 4019-Animal Behaviour (*ANS-Specialization, ANM-R.E.*)**
 - Animal Behaviour covers a wide range of areas but this module will concentrate on a number of the more important ones, using examples to illustrate the ideas drawn from both invertebrates and vertebrates. Topics include: recording and measuring behaviour, mechanisms of behaviour; optimal foraging; sexual selection; communication, social behaviour and applied behavioural ecology. Fieldwork practicals will be conducted in Fota Wildlife Park.
- **ST 2001-Introduction to Biostatistics (*ANS-Specialization, ANM-R.E.*)**
 - The application of Statistical Methods in the Biological, Environmental, Health and Food Sciences, with real examples; Descriptive Statistics, Statistical Graphics; Basic Probability concepts; Sampling and Sample Selection methods; Sampling Distributions; Estimation and Hypothesis Testing.
- **ST 4203-Biostatistics (*ANS-Specialization, ANM-R.E.*)**
 - Review of Hypothesis Testing; Frequency Analysis; Parametric and Non-Parametric Regression Analysis; Analysis of Variance; Non-Parametric Techniques; Experimental Design; Presentation of Data Analyses.
- **MB 2005-Fundamental Principles of Microbiology (*ANS-Specialization, ANM-R.E.*)**
 - Introduction to microbiology, microbial diversity (bacteria, archaea, eukarya and viruses) bacterial cell structure, structure of viruses, microbial growth, virus life-cycles, nutrition and metabolism, role of microbes in food fermentations, human response to microbial infections, practical microbiology.
- **MB 3007-Molecular Genetics and Genomics (*ANS-Specialization, ANM-R.E.*)**
 - Nucleic acids structure, properties and function; Replication in Procaryotes and Eucaryotes; Transcription and translation in Procaryotes and Eucaryotes; Control of gene expression (lactose operon, tryptophan operon); Bacteriophage lambda lifecycle regulation; Microbial genome sequencing projects.
- **MB 3008- Immunology: Host Response to Pathogens (*ANS-Specialization, ANM-R.E.*)**

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- Overview of the immune system. Cells (Th cells, Tc cells, NK cells, B cells, monocytes, neutrophils, granulocytes). Lymphoid organs (bone marrow, thymus, lymph nodes, spleen, Peyer's patches). Cell migration and chemotaxis. Innate immunity, Toll-like Receptors. Antibody structure, function, diversity and mode of action. T Cell Receptor, MHC and antigen recognition, processing and presentation. Immunological tolerance. Immunity to viruses. Immunity to bacteria and fungi. Tumour immunology. Hypersensitivity type I, II, III, IV, Immunodeficiencies. Transplantation and rejection. Final Overview.
- MB 4009- Advanced Immunology (*ANS-Specialization, ANM-R.E.*)
 - Detailed overview of the major components of the immune system including the most up-to-date research findings: Complement fixation, phagocyte recruitment and activation, antigen processing and presentation, T and B cell proliferation and differentiation, T cell subsets including regulatory T cells. A detailed analysis of current, topical areas in immunology research: immune responses to extracellular and intracellular bacterial infection, adjuvants & vaccine development and design, Toll-like receptors in health and disease, immunity in the GI tract, tumour immunology and immune-therapy, HIV infection and immunity and design of HIV vaccines and therapies.
- AE 3016-Biology of Aquatic Organisms (*ANS-Specialization, ANM-R.E.*)
 - This module will introduce the biota, their biology, physiology and behaviour in a range of marine and freshwater systems, including the open ocean, the inter-tidal, estuaries, ponds, lakes, streams and rivers.

SOUTH KOREA: Yonsei University

UCEAP Program: [Yonsei Univ.](http://yonsei.ac.kr)

Language: English (and maybe some Korean)

Terms: I Mid-August to Late December (UC Davis Summer Session 2 + Fall Quarter)

II Mid-February to Mid-June (UC Davis Winter + Spring Quarters)

Min GPA: 3.0

<http://oia.yonsei.ac.kr/>

Courses:

NOTE: # 1000=lower division, 2000-4000=upper division with increasing difficulty, 5000=graduate level classes

- BCH 3101: Biochemistry 1 (*ANS-ABI 102, ANM-R.E.*)
 - The structure and function of biomolecules and the characteristics of catalytic enzyme reactions will be taught by this course.
- BCH 3106: Biochemistry 2 (*ANS-ABI 103*)
 - This lecture deals with metabolism and its regulation.
- BIO 2103: Genetics (*ANS-BIS 101, ANM-R.E.*)
 - Structure and properties of genes and chromosomes in individual organisms and populations.
- BIO 3102: Microbiology (*ANS-Specialization, ANM-R.E.*)
 - A lecture course covering the general and cellular characteristics, cultivation, methods, metabolism in general growth, and industrial utilization of microorganisms together with the regulation of gene expression, genetics, and genetic engineering of microorganisms.
- BIO 3104: Immunology (*ANS-Specialization, ANM-R.E.*)
 - Immunology lecture introduces the components of the immune system, and the fundamental principles that govern all immune responses.
- BIO 3112: Animal Histology and Physiology (*ANS- ANS 100, ANM-R.E.*)
 - Lecture focuses on the characters of the four basic tissues: epithelial, connective, muscular, and nervous tissues. In addition, lecture covers anatomy and physiology of such systems as digestive, cardiovascular, respiratory, urinary, reproductive, endocrine, and integumentary systems. Molecular and cellular aspects of each system are also provided.
- BST 2002: Microbiology and Lab (*ANS-Specialization, ANM-R.E.*)
 - Lecture and lab on structure, classification, ecology, physiology, host parasite relationships, and immunology of microorganisms. Lab: Principles and techniques of cultivation and utilization of microorganisms under aseptic conditions.
- BST 3011: Genetics (*ANS- BIS 101, ANM-R.E.*)
 - Lecture on transmissions of genetic materials, on biochemistry and developmental genetics, and also on evolutionary mechanisms maintaining genetic variability.
- BST 3022: Immunology (*ANS- Specialization, ANM-R.E.*)
 - An introductory survey of the basic principles of immunology and their practical applications.

- BST 3032: Marine Biology and Lab (*ANS- Specialization, ANM-R.E.*)
 - An orientation to the structure and dynamics of ecosystems.
- BST 3034: Feedstuff Resources (*ANS- Specialization, ANM-R.E.*)
 - Livestock feeds and their nutrients; functions of and requirements for nutrients; evaluation of feeds; feeding practices and formulation of rations for all classes of livestock.
- BST 3035: Animal Reproduction (*ANS- Specialization, ANM-R.E.*)
 - A study of physiology focusing on reproduction. General concepts on fertility, pregnancy, parturition, and lactation will be taught.
- BST 3038: Animal Genetics and Breeding (*ANS- ANG 107, ANM-R.E.*)
 - Genetics applied to selection and mating of livestock. Consideration of gene frequency, heritability, relationships, inbreeding, heterosis, and selection indexes; use of individual pedigree, sibling and progeny records.
- BST 3041: Animal Nutrition (*ANS- Specialization, ANM-R.E.*)
 - A study of the nutrients and diets of animals related to animal physiology to increase animal production. General concepts on nutrients, digestion, absorption and metabolism will be taught.
- BST 3045: Animal Cell Biotech (*ANS- Specialization, ANM-R.E.*)
 - Theory and practice of animal tissue culture.
- BST 3047: Applied Microbiology and Lab (*ANS- Specialization, ANM-R.E.*)
 - Methods of collecting, culturing, and identifying microorganisms from food. Understanding microorganism techniques applied in the dairy industry, including microscopic examination, microbial growth, and their metabolism.
- BST 3048: Animal Reproduction Biotech and Lab (*ANS- Specialization, ANM-R.E.*)
 - A course studying current reproduction biotech with experiments: basic principles of AI, IVF, ET, transgenesis, cloning, and stem cell technology.
- BST 3050: Analysis of Dairy Products Lab (*ANS- Specialization, ANM-R.E.*)
 - The principles, methods, and techniques necessary for quantitative physical and chemical analysis of dairy foods and various processed dairy products.
- BST 3052: Grassland Production and Lab (*ANS- Specialization, ANM-R.E.*)

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- Principles, practices, and relationships of grazing, grazing methods, planning of pasture-forage supply systems, intake, and quality of hay and silage.
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NEW ZEALAND: Lincoln University

[UCEAP Program: Sustainability, Sciences & Environmental Management, Lincoln Univ.](#)

Language: English

Terms: I: Mid June –Late November (UC Davis Summer + Fall Quarters)

II: Early Feb—Late June (UC Davis Winter + Spring Quarters)

Min GPA: 2.85

Courses: (Note: must enroll in at least 4 courses per term=60 credits)

- ANSC 207-Animal Health (*ANS-Specialization, ANM-R.E.*)
 - A study of the diseases of animals that may constrain product quality or quantity, compromise welfare or be transmitted to humans. (Term: 2)
- ANSC 271- Beef and Deer Production (*ANS-Specialization, ANM-R.E.*)
 - Livestock production deals with the day-to-day management of feeding, breeding and health of farmed animals run in large groups. It is based on an understanding of the underlying physiologies of reproduction, lactation, growth and development and nutrition and of factors affecting the level of performance of an individual animal. This course involves the study of the practical management of systems and underpinning theory involved in the nutrition, reproduction, growth and health of beef cattle and deer, and factors affecting level of production (Term: 2)
- ANSC 272- Dairy Production (*ANS-Specialization, ANM-R.E.*)
 - Livestock production deals with the day-to-day management of feeding, breeding and health of farmed animals run in large groups. It is based on an understanding of the underlying physiologies of reproduction, lactation, growth and development and nutrition and of factors affecting the level of performance of an individual animal. This course involves the study of the principles of management systems involved in the nutrition, breeding, reproduction, animal health, growth and development as they influence milk composition and yield of dairy cattle. (Term: 1)

- ANSC 314- Meat and Wool Production Science (*ANS-Specialization, ANM-R.E*)
 - The science that underpins the production of meat and wool in New Zealand sheep, beef and deer farming systems. The use of scientific literature to explore the role of genetics and nutrition in determining the quality and quantity of the meat and wool produced. The importance of reproduction, animal health, and welfare in meat and wool production. (Term: 2)
- ANSC 319- Animal Physiology (*ANS-ANS 100, ANM-R.E.*)
 - An advanced study of mammalian physiology, with emphasis on regulation of reproduction, lactation and growth and of the process underlying pain, stress and welfare of animals. Attention is placed on current research and its implications for humans, production animals, feral animals and wildlife. (Term: 2)
- ANSC 327- Animal Nutrition, Biochemistry, and Metabolism (*ANS-NUT 115/NUT 122/NUT 123, ANM-R.E.*)
 - An advanced study of mammalian nutrition, metabolism and nutritional biochemistry, including principles of nutrient supply and demand in animals. Rumen function, fermentative and enzymatic digestion. Nutrient absorption. Carbohydrate, protein, lipid, mineral and vitamin metabolism and biochemistry and approaches to estimating nutrient requirements at various stages of animal life cycles. (Term: 1)
- ANSC 340-Animal Breeding and Genetics (*ANS-ANG 107, ANM-R.E.*)
 - This course aims to give participants a working knowledge of contemporary issues in breeding and genetics including the most recent publications. Focus will be on both domestic animal species and wildlife with the opportunity to undertake a case study in a particular area of interest. It involves the study of: the application of population and molecular genetics to domestic animal populations, and the roles of selection, crossbreeding, and molecular technologies in livestock breeding. (Term: 2)
- BIOS 273- The Science and Practice of Organics (*ANS-Specialization, ANM-R.E.*)
 - A study of the role of organic production science and practice in modern agriculture, focusing on the ecological basis for growing, market considerations and environmental awareness within farming systems. (Term: 1)
- ECON 204- Resource Economics (*ANS-Specialization, ANM-R.E.*)
 - Property rights, externalities and common property resources. The role of public and private sectors in natural resources management. Economic analysis of resource use (E. G. land, water, fisheries) and resource use issues (E. G. pollution, population growth, congestion). (Term: 1)
- FOOD 202- Food Safety and Microbiology (*ANS-Specialization, ANM-R.E.*)

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- Micro-organisms involved in foodborne disease and spoilage. Toxins. Methods of control of micro-organisms. Enumeration of micro-organisms. Food safety; standards and procedures. (Term: 1)
- **MGMT 201-Principles of Farm Management** (*ANS-Specialization, ANM-R.E.*)
 - The farm as a bioeconomic unit employing resources of land, labor, capital, management, and technology. The personal factor in management; practical integration of husbandries into farming systems; comparative analysis techniques; farm planning and resource allocation; land tenure. Case study investigation of management principles. (Term: 1)

NEW ZEALAND: Massey University

UCEAP PROGRAM: [New Zealand Universities](#)

Language: English

Terms: I Early February to Late June (UC Davis Winter and Spring Quarters)

II Late June to Mid November (UC Davis Summer and Fall Quarter)

Min GPA: 2.85

Courses:

- **117.255-Animal Health, Behaviour, and Welfare** (*ANS-Specialization, ANM-R.E.*)
 - Provide an understanding of the major diseases and welfare of livestock in New Zealand and the relevance of these for production, market access and public health. The role of husbandry, behaviour and welfare in improving dairy and beef herd and sheep flock health. Exotic diseases of livestock and biosecurity. Livestock remedies and issues with residues in animal products. Basic horse and dog health relevant to farm use. (Term: I)
- **117.342- Animal Nutrition** (*ANS-NUT 115, ANM-R.E.*)
 - The principles of animal nutrition as related to ruminant and monogastric livestock. An in-depth coverage of the processes of feed intake, digestion, absorption and metabolism, and the factors affecting them. The determination of the nutritive value of feedstuffs, with particular emphasis on forages. Schemes for estimating animal requirements for energy, protein and minerals. The principles of ration formulation and the use of computer programmes. Practical feeding regimes, design, implementation and interpretation of nutrition trials. (Term: I)
- **117.344-Animal Growth and Meat Production** (*ANS-ANS 123, ANM-R.E.*)

- Patterns of growth and development of farm animals will be described with emphasis on those characteristics of growth with economic implications for meat production, such as the rate, efficiency and composition of growth. Structural and functional aspects of muscle, bone and fat as they relate to animal well-being as well as carcass and meat quality will be considered. In describing factors that can affect animal growth, carcass composition and meat quality, particular attention will be given to on-farm factors. (Term: I)
- 117.345-Genetics for Livestock Improvement (*ANS-ANG 107, ANM-R.E.*)
 - The relative influence of genetic and environmental factors on quantitative traits. Methods of calculating breeding values or indices to exploit genetic variation in quantitative traits. The use of computers to utilise pedigree and performance records. Selection for disease resistance, the use of new reproductive technologies to enhance genetic gain and the potential importance of molecular genetics in livestock improvement. Maternal influences and methods of selecting for maternal components. Crossbreeding and inbreeding as selection tools. (Term: II)
- 117.361-Companion Animal Science (*ANS-ANS 142, ANM-R.E.*)
 - This paper is an integration of the scientific and theoretical aspects of companion animal science. The main topics covered include the nutrition, health, behaviour, welfare, reproduction and genetics of dogs and cats. The emphasis will be placed on the scientific foundation for the promotion of animal wellbeing and longevity. (Term: II)
- 117.371-Animal Production (*ANS-Specialization, ANM-R.E.*)
 - The impacts of breeding, nutrition, reproduction and lactation in New Zealand animal production systems. A modularized paper requiring students to select three systems from: dairy cattle production, wool production, sheep production, pig and poultry production, beef cattle production and the working dog. (Term: I)
- 117.381-Solving Problems in Animal Production (*ANS-Specialization, ANM-R.E.*)
 - This paper builds on knowledge gained in 117.371 by examining the underlying science of animal production in New Zealand. The critical evaluation of the impacts of specific aspects of breeding, nutrition, reproduction and health on animal production and the design and development of improved production systems. A modularized paper requiring students to select two systems from: dairy, beef, sheep, pigs and poultry. (Term: II)
- 162.303-Immunology (*ANS-Specialization, ANM-R.E.*)
 - The principles of immunology including innate immunity, cell and antibody mediated immunity, the major histocompatibility complex, the hypersensitivities, immunodeficiency and autoimmunity. An introduction to vaccines, clinical immunology and immunological laboratory tests. (Term: I)
- 199.204-Animal Behaviour (*ANS-Specialization, ANM-R.E.*)
 - An integration of biological processes through behavioural mechanisms, the functional responses of individuals and the evolution of social behaviour.

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Practical skills of description, quantification, comparison and experimentation are emphasized. (Term: II)

- 203.212-Principles of Genetics (*ANS-BIS 101/ANG 107, ANM-R.E.*)
 - A general course on the principles and applications of genetics, with an emphasis on problem solving. Topics include gene structure, function and variation, genetic inheritance, cellular genetics and cytogenetics, population and quantitative genetics, genomics, and methods of genetic analysis. (Term: II)
- 227.304-Poultry, Fish and Wildlife Management and Disease (*ANS-Specialization, ANM-R.E.*)
 - Management, pathology, diagnosis, prevention and treatment of diseases of selected animal species with emphasis on poultry, waterfowl, pigeons, ratites, aviary birds, fish and wildlife (marine and terrestrial). (Term: II)
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UK, SCOTLAND: University of Edinburgh

UCEAP Program: [Scottish Universities](#)

Language: English

Terms: I September to Mid-December (UC Davis Fall Quarter)

II January to Late June (UC Davis Winter and Spring Quarters)

Min GPA: 3.0

<http://www.ed.ac.uk/studying/visiting-exchange/overview>

Courses:

BILG08003-Genes and Gene Action 2 (*ANS-BIS 101, ANM-R.E.*)

The concept of the gene, the nature of chromosomes, and genetic mapping. Molecular genetics of prokaryotic and eukaryotic cells. Protein synthesis and the regulation of gene expression. The manipulation of DNA. (Term 2)

BILG08011-Animal Biology 2 (*ANS-Specialization, ANM-R.E.*)

An introduction to the evolution of body plans and physiological systems will provide a framework for understanding the range of invertebrate groups, a selection of which will then be studied in more detail in the context of a major habitat, the sea. Vertebrate body plans will lead into a detailed study of the mammals; and a section on animal associations will bring together invertebrates and vertebrates from the viewpoint of parasites and their hosts. (Term 2)

BILG09002- Molecular Genetics 3 (*ANS-BIS 101, ANM-R.E.*)

A core course in molecular genetics. The course covers chromosome structure and organisation; gene expression and RNA processing in prokaryotes and eukaryotes; genetic engineering; genetic stability and instability; transposable

elements and DNA rearrangements; genetic analysis; mouse genetics and transgenesis. The lectures are complemented by tutorials and by practical sessions that provide hands-on experience of genetical and molecular genetical manipulations. (Term 1)

- BILG09005- Genomes and Genomics 3 (*ANS-Specialization, ANM-R.E.*)
 - Complete genomic DNA sequences have now been published for more than 900 bacteria and Archaea, and for *Saccharomyces cerevisiae*, *Caenorhabditis elegans*, *Arabidopsis thaliana* and *Drosophila melanogaster*. A 'draft' version of the human genome is available, and this and many other genome sequencing projects will be completed in the next few years. The study of complete genomes provides new insights into the working of living systems at the most fundamental level, with important implications for understanding the evolutionary development of organisms and for practical applications in biotechnology and human health. The lecture course will be complemented by laboratory practicals and by weekly 'Technology Sessions' which will give first-hand experience of the experimental techniques of genomics and of computer data analysis and bioinformatics. (Term 2)
- BILG09007-Immunology (*ANS-Specialization, ANM-R.E.*)
 - A course in cellular and molecular immunology presented in the context of human disease: cells and tissues of the immune system; antibodies, T cell receptors and immune recognition; the regulation of immune responses; defects of the immune system; AIDS; immunity to pathogens and vaccines. Laboratory work illustrates the lectures and gives some practice in experimental applications. (Term 1)
- BILG09013- Molecular Microbiology 3 (*ANS- Specialization, ANM-R.E.*)
 - Molecular Microbiology provides insight into the fascinating diversity of microorganisms and how they interact with their environment. Many of these interactions are of great benefit to man (e.g. for yoghurt and beer production), as well as harmful (e.g. infectious pathogens). The course explores the basic theory behind several of the most important microbial processes and examines how they operate at a molecular level. The course also has a substantial practical component which is designed to highlight the properties of living microorganisms in action. These practical sessions are aimed primarily at demonstrating how microorganisms can be characterised, controlled or harnessed. (Term 1)
- BILG09019- Animal Diversity and Evolution 3 (*ANS-Specialization, ANM-R.E.*)
 - Understanding the evolution and diversity of animals is a fundamental goal of zoological research, with profound implications for both science and conservation. We will provide students with a modern view of animal diversity and an understanding of how the process of evolution has produced this diversity. Students will examine what key features make animals different from the rest of

life and the evolutionary significance of these features. They will then explore this diversity from different perspectives, including the phylogenetic description of diversity, the general causes of diversification in animals and more detailed examination of the diversification of key animal traits such as immunity, physiology and life-history. They will examine how patterns of diversity at different levels of biological organisation, from genetic diversity within populations to species diversity patterns across the globe can be understood. They will examine how the diversity of body plans can be understood in terms of the relationship between evolution and development. The course will finish by considering the future of animal diversity. We will include sessions which illustrate approaches and techniques used to examine animal diversity and evolution, emphasising that this is an active research field, and also sessions to develop core skills within the context of the course. (Term 1)

- MATH0805- Statistics Year 2 (*ANS-STA 100, ANM-R.E.*)
 - Summary statistics, sampling distributions, hypothesis testing, interval estimation, likelihood, analysis of categorical data, joint, marginal and conditional distributions, ANOVA and regression. The computer program R will be introduced through a two-hour practical near the beginning of the course. Its use will be supported with examples in lectures and tutorials with supplementary material on the course website. (Term 2)
- MATH09022- Statistics Year 3 (*ANS-STA 100, ANM-R.E.*)
 - Summary statistics, sampling distributions, hypothesis testing, interval estimation, likelihood, analysis of categorical data, joint, marginal and conditional distributions, ANOVA and regression. The computer program R will be introduced through a two-hour practical near the beginning of the course. Its use will be supported with examples in lectures and tutorials with supplementary material on the course website.
- CHEM08023- Biological Chemistry 1B (*ANS-ABI 102, ANM-R.E.*)
 - The course is designed to provide an introduction to the key chemical principles underpinning many biological processes. The main themes addressed by the course are the chemistry of biologically important functional groups; biological catalysis (enzyme kinetics - principles and examples); bioenergetics, bioelectrochemistry and metabolic reactions (the kinds of reactions catalysed by enzymes with extensive reference made to energetics and biocatalysis). Standard first course (usually with Biological Chemistry 1A (CHE-1-BC1A) or Introductory Chemistry of Biology 1 (CHE-1-ICB)) for students of Biological Sciences and other students requiring only one year of chemistry or intending to proceed to Chemistry for Life Sciences 2 (CHE-2-CLS).

