

SCHOOL OF CLINICAL & APPLIED SCIENCES

(Biomedical Sciences)

LEVEL 4 – 1ST YEAR UNDERGRADUATE

Module information	Semester	ECTS
Immunology & Haematology Module Description: This module will introduce students to the innate and adaptive immune responses. It will cover the tissues, cells, and signals involved in generating an immune response. Students will also be introduced to blood and transfusion science, the mechanisms of haematopoiesis and haemostasis. Module content: Organs, tissues and cells of the immune system; Innate immunity, inflammation, complement; Adaptive immunity, humoral and cell-mediated; Cellular and chemical constituents of the haematological system; Haematopoiesis and haemostasis; and Transfusion science. Assessment: Phase Test 100%	Autumn	5
Cell Biology Module Description: Basic knowledge on cell organisation and function is essential in biomedical sciences. This module reviews the various compartments of the cells and highlights similarities and differences between various cell types. Module content: Nucleus; ER and Golgi; Vesicular trafficking; Plasma membrane and membrane transporters; Lysosomes/peroxisomes/mitochondria; Cytoskeleton/cell junction/cell communication; Histology; Cell theory; Microscopy, Ultrastructure, Staining; Cell division, cell cycle regulation; Transporters; and Intracellular and extracellular communication. Assessment: Phase Test 100%	Autumn	5
Human Physiology Module Description: This module introduces students to the mechanisms underpinning normal physiological function and the functional anatomy of the healthy human body, covering the major body systems including the nervous system, cardiovascular system, respiratory system and renal system. Teaching will be delivered as a series of lectures, laboratory practicals and interactive tutorials. Module content: Concept of homeostasis; negative and positive feedback mechanisms; Role of the nervous and endocrine system in the maintenance of homeostasis; Overview of the functional anatomy of major human body systems; and Examples of homeostasis in action in major body systems such as the cardiovascular, respiratory, renal and gastrointestinal systems Assessment: Phase Test 100%	Autumn	5
Genetics Module Description: This module will introduce students to some of the fundamental processes underpinning genetics. It will cover how information is transmitted through transcription and translation and how DNA is repaired, and compare these processes between eukaryotes and prokaryotes. Module content: Replication; Transcription; Translation; DNA repair; and Eukaryotes v prokaryotes. Assessment: Exam 100%	Autumn	5
Study Skills	Autumn	5

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<p>Module Description: This module will introduce students to a range of study skills to prepare them for their university life. This module will help students to develop a number of important generic skills, including numeracy skills, information literacy and writing skills and essential study skills.</p> <p>Module content: Study skills, including but not limited to referencing, plagiarism, scientific writing, numeracy, data handling.</p> <p>Assessment: Phase Test 100%</p>		
<p>Practical Skills</p> <p>Module Description: This module will introduce students to a range of practical skills essential to the study of biomedical science. Students will gain experience in health and safety, working as a group and use of practical techniques to answer a research question. The mechanisms of action of the various types of equipment will also be studied e.g the physics of microscopy and spectrophotometry.</p> <p>Module content: A range of laboratory techniques such as microscopy, spectrophotometry, making solutions and dilutions; Group work to answer a research question; Health and Safety; and Presentation of research.</p> <p>Assessment: Poster 20%; Assessment 80%</p>	Autumn	5
<p>The Microbial World</p> <p>Module Description: This module introduces students to the principles of microbiology regarding the life and function of microorganisms including bacteria, viruses, protozoa and fungi. The mechanisms via which microorganisms cause disease will be discussed with a focus on the interactions between the microorganism and the host. Whilst the factual knowledge of microbiology covered in the module will be delivered in lecture and tutorial environments, a key focus of the module is the acquisition of microbiological practical skills and as such a considerable proportion of the module is laboratory based.</p> <p>Module content: Basic principles of practical microbiology such as laboratory safety, aseptic technique, microbial enumeration and staining methods; Structure, cell structure and function of bacteria, fungi, protozoa and viruses. Mechanisms of gene transfer between microorganisms; Microbial cell growth and survival, factors influencing growth. Mechanisms of control of microbial growth; and Microbial pathogenicity, virulence and mechanisms of disease transmission.</p> <p>Assessment: Portfolio 50%; Exam 50%</p>	Spring	10
<p>Biochemistry</p> <p>Module Description: The module offers an interactive approach to learning the basis of the chemical processes that underpin biology. Students will gain an understanding of the main macromolecules in the body, how we can break down different foods through key pathways and to generate energy. The module also includes details of RNA & DNA structure. The module will be based upon chemistry tutorials, a series of lectures, and a series of laboratory classes forming the basis for a laboratory workbook forming one of the summative assessments. The second summative assessment will be in the form of an exam.</p> <p>Module content: The module outlines the basics of biochemistry that will be required throughout the courses; A tutorial series covers the basics of atoms, elements, molecules, and types of bonding (covalent, ionic, Van der Waals and hydrogen bonding); and The biochemistry lectures cover two main areas of biochemistry - Structure and function, Bioenergetics and Metabolism.</p> <p>Assessment: Lab Book 50%; Exam 50%</p>	Spring	10
<p>Principles of Pharmacology</p> <p>Module Description: This module introduces the basic concepts of pharmacology. It considers the mechanisms by which drugs are able to modify physiological activity to</p>	Spring	10

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<p>produce both therapeutic and adverse effects. The effects of the body on the drug with respect to absorption, distribution and elimination are also considered.</p> <p>Module content: Principles of drug administration, absorption, distribution, metabolism and excretion, sites of drug action, adverse effects; and Mechanisms of action of drugs affecting the autonomic and somatic nervous systems, Actions of drugs affecting the central nervous system, including drugs of abuse, Actions of antimicrobial drugs.</p> <p>Assessment: Coursework 50%; Phase Test 50%</p>		
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LEVEL 5 – 2ND YEAR UNDERGRADUATE

Some modules will have pre-requisite requirements which you must meet before study commences. It is important that you pay particular attention to this to ensure that you have the necessary level of study to take these modules.

Module information	Semester	ECTS
<p>Biology of Cancer</p> <p>Module Description: This module addresses the nature of cancer, its causes, epidemiology, mechanisms and treatment. It considers the changes in the cell cycle during carcinogenesis. We will analyse the changes in histology during cancer development and evaluate the various treatment options for different forms of cancer. We will examine in greater depth some of the most common types of cancer and use a case study approach to evaluate evidence.</p> <p>Module content: What is cancer, cancer epidemiology, oncogenes and tumour suppressor genes, carcinogenesis, cell cycle disruption in cancer, DNA repair mechanisms, invasion, metastasis, angiogenesis. Case studies on colorectal, breast, cervical cancer and modes of treatment.</p> <p>Assessment: Exam 40%; Coursework 60%</p>	Autumn	10
<p>Medical and Environmental Microbiology</p> <p>Module Description: The module explores the different means by which infectious diseases are transmitted. Environmental factors such as air and water are covered along with considerations of microbial food safety. Emphasis is placed on the global nature of infectious disease and the predisposing factors which lead to more widespread transmission. There is discussion of strategies to prevent the transmission of disease, with particular reflection on healthcare associated infections.</p> <p>Module content: The content of the module includes topics of importance at the local level, but also has a strong global focus; Topics include air as a means of disease transmission; waterborne infection, with a detailed consideration of strategies to prevent waterborne infections such as sewage treatment, purification of drinking water and surveillance of water supplies. Infections associated with the recreational use of water are also considered; There is a strong emphasis on the current situation with regard to food poisoning with analysis of modern approaches to maintaining microbial food safety; Healthcare associated infections are covered in depth with the particular problems of highly susceptible patients being highlighted; and Throughout the module theoretical principles will be reinforced and enhanced by laboratory based experiments.</p> <p>Assessment: Exam 50%; Workbook 50%</p>	Autumn	10
<p>Medical Physiology</p> <p>Module Description: This module considers diseases affecting major human body systems that are currently important in human health. An understanding of the causes, mechanisms and consequences of a range of disorders such as specific cancers, neurodegenerative diseases, diabetes mellitus and obstructive respiratory diseases will be developed through lectures, case-studies and laboratory based practicals.</p> <p>Module content: Key diseases affecting organ systems (e.g. cardiovascular, nervous, respiratory, gastrointestinal) will be considered with respect to epidemiology, aetiology and pathophysiology. Examples will include specific cancers, neurodegenerative diseases, diabetes mellitus and obstructive respiratory diseases.</p> <p>Assessment: Exam 60%; Coursework 40%</p>	Autumn	10
<p>Professional Scientific Practice</p>	Autumn	10

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<p>Module Description: In this module students will cover some of the key skills required to become a biomedical science researcher. Topics covered include Health and Safety, COSHH, ethics of using human participants, writing CVs and postgraduate applications.</p> <p>Module content: Employability, ethics, human participation in clinical trials, COSHH, risk assessments, laboratory quality control and assurance, good lab practice.</p> <p>Assessment: Workshop tasks 35%; Lab tasks 65%</p>		
<p>Research Investigations</p> <p>Module Description: This module develops understanding of how a research question or hypothesis can be formulated and tested. The appropriateness of different qualitative and quantitative designs are compared, with a range of data analysis and interpretation techniques. Existing evidence from biomedical studies is critically evaluated and used to support students in developing a research protocol which will provide the focus of their level 6 project.</p> <p>Module content: Methods of obtaining new knowledge, question formulation, hypotheses formulation and testing; Qualitative research methods, observation, interviews, focus groups, qualitative surveys etc.; Techniques of data collection, design and use of questionnaire, experimental approaches; Statistical methods, descriptive statistics, sampling, correlation and regression, non-parametric and parametric analysis; Ethical principals; Evaluation of published research; The structure of a research protocol; and The structure of a systematic review.</p> <p>Assessment: Phase test 40%; Protocol 60%</p>	Autumn <i>(runs over 2 sems)</i>	10
<p>Human Lifespan</p> <p>Module Description: This module is designed to develop student knowledge of the complex biological processes causing anatomical and physiological changes through the human life span: starting from the fertilization of the ovum and ending with the natural death at old age. The module will provide the students with opportunities to discuss these processes and how they are used to produce lifespan related databases.</p> <p>Module content: Fertilization, implantation, and physiology of placenta; Foetal development; Physiological changes in the mother during: pregnancy, childbirth and lactation; Physiology of newborn babies and early childhood changes; Puberty; Growth charts; Post-puberty milestones including menopause; Theories of ageing and senescence cellular changes; Demographic changes in the UK and worldwide; and Psych-social impact of physiological changes through the lifespan.</p> <p>Assessment: Multi choice exam 50%; Assignment 50%</p>	Spring	10
<p>Infectious Diseases</p> <p>Module Description: Using a case study approach the students will look at several different groups of infectious diseases e.g. childhood viral, respiratory, those causing meningitis. The laboratory sessions will be linked to the lecture material, requiring the students to identify the unknown pathogen in the samples provided.</p> <p>Module content: The groups of organisms covered will vary depending on current issues, but is likely to cover respiratory infections, sexually transmitted diseases, staphylococcal and streptococcal infections, meningitis, hospital acquired infections.</p> <p>Assessment: Exam 50%; Case study 50%</p>	Spring	10
<p>Molecular Biology and Medicine</p> <p>Module Description: The importance of the Human Genome project and future applications of molecular biology for the diagnosis, prevention and treatment of disease. Students will gain practical experience in basic techniques in cloning genes and using molecular methods to screen for disease in a series of laboratory experiments.</p>	Spring	10

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<p>Module content: The module examines how recent advances in molecular biology have led to major breakthroughs in biomedical sciences as well as many other disciplines; Students will receive a grounding in the principles of DNA manipulation - methodologies of recombinant DNA technology and genetic engineering, PCR, as well as expression and detection of cloned genes; The rest of the module is concerned with the various applications of these techniques, such as methods of DNA analysis, the Human Genome Project, DNA profiling and the application of molecular biology in the screening and treatment of disease; Basic gene expression in prokaryotes and eukaryotes will be discussed, including a consideration of current molecular methods for analysing gene expression; and Students will undertake laboratory exercises in gene cloning and DNA analysis, disease detection and mutagenicity testing.</p> <p>Assessment: Exam 50%; Report 50%</p>		
<p>Pharmacological Treatment of Disease</p> <p>Module Description: This module focuses on pharmacological approaches to the treatment of a range of disease conditions, linking principles of pharmacology with an understanding disease mechanisms gained from study of physiology and cytology modules. Students are also introduced to laboratory techniques used to assess drug potency.</p> <p>Module content: Receptor pharmacology and measurement of drug effects; Drugs used to treat selected diseases of the respiratory system, digestive system, endocrine system, cardiovascular and nervous systems; Anti-inflammatory drugs; and Selective toxicity and chemotherapy.</p> <p>Assessment: Exam 50%; Coursework 50%</p>	Spring	10
<p>Understanding Disease</p> <p>Module Description: This module focusses on the mechanisms of disease at the level of the cell. It considers the changes in the cell as it responds to injury, resulting from a variety of causes, e.g. environmental, genetic or metabolic. We will consider why some injuries are reversible while others are fatal to cells, and the key changes as a cell progresses to become cancerous. An understanding of the role of the immune system in initiating, protecting from or helping recovery from cellular damage will be developed.</p> <p>Module content: Overview of causes of cellular malfunction with special reference to genetic factors, immunological factors, and the role of environmental agents in the development of disease. The pathological changes accompanying cell injury, e.g. necrosis, inflammation, blood clotting, wound healing and angiogenesis, and neoplasia.</p> <p>Assessment: Exam 60%; Coursework 40%</p>	Spring	10

LEVEL 6 – FINAL YEAR UNDERGRADUATE

Some modules will have pre-requisite requirements which you must meet before study commences. It is important that you pay particular attention to this to ensure that you have the necessary level of study to take these modules.

Module information	Semester	ECTS
<p>Clinical Immunology</p> <p>Module Description: To provide an understanding of immunological disease and disorders, transplantation immunology, prophylaxis and immunotherapy. Underlying immunological mechanisms are linked to the clinical signs and symptoms of the disorders. The range of laboratory tests used to diagnose and monitor treatment are evaluated.</p> <p>Module content: Immunodeficiency, primary and secondary; Hypersensitivity reactions; Autoimmune disease; Immune prophylaxis; Transplantation immunology; Immunotherapy; and Research and diagnostic techniques.</p> <p>Assessment: Portfolio 50%; Exam 50%</p>	Autumn	10
<p>Drug Development and Toxicology</p> <p>Module Description: The module allows students to study advances in drug development and treatment. Focus is on the drug discovery and development process, the advantages and limitations of historical and current strategies and the factors that have driven advances in this area. Toxicological principles and methods relevant to evaluation of drug safety are considered in the context of the drug development process. Current areas of pharmacological interest and strategies which may lead to development of new treatments will be considered.</p> <p>Module content: The drug development process. Drug discovery. Disease areas. Costs and timescales. High Throughput Screening. Screening cascades and compound selection. Rational drug design. Serendipity in drug discovery. Drug adverse effects. Assessing Drug Safety. Regulatory requirements relating to drug safety and toxicity. Principles of toxicity. Toxicokinetics. Toxicity testing. Carcinogens. Teratogens. Clinical trials. Illustrative examples and case-studies relating to development of selected drugs. Areas of current research interest.</p> <p>Assessment: Coursework 60%; Coursework 40%</p>	Autumn	10
<p>Enterprise in Biomedical Sciences</p> <p>Module Description: Students will work in groups acting as the project management team of a biotechnology company. The remit is to devise and develop a new biotech product, from the science behind it through to marketing and finance. Each person in the group has a specific role, e.g research scientist, marketing manager. Students then present their product to a “dragons den” type audience.</p> <p>Module content: The content concentrates on skills development- the students look at their Belbin roles to analyse how they work in groups, and undertake a short activity to determine if they agree with this. They also complete a questionnaire based on employability skills. Other skills covered are business skills and presentation and report writing. The topic for the biotechnology product is chosen by the group and they then work on the development of this.</p> <p>Assessment: Report 60%; Presentation 40%</p>	Autumn	10
<p>Global Topics in Infectious Disease</p> <p>Module Description: Using a case study approach students will cover different infectious diseases from different sites in the body e.g TB as a respiratory disease, HIV as a sexually transmitted disease, Malaria as a vector borne disease. There will be an introductory lecture on each topic, followed by workshops using current literature on the topic. The laboratory practicals will be linked to the topics covered- using a</p>	Autumn	10

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<p>problem based learning approach students will identify the pathogen from the given samples.</p> <p>Module content: The topics will vary from year to year but will cover those diseases currently in the news, for instance HIV, TB, Malaria, Filariasis, and general topics such as WHO campaigns for elimination of diseases such as measles, urbanisation and infectious disease.</p> <p>Assessment: Report 50%; Exam 50%</p>		
<p>Biotechnology</p> <p>Module Description: The module covers up to date issues concerning current biotechnological products and processes especially with regard to the use of microorganisms and recombinant DNA techniques. The global impact of biotechnology in medicine, food and the environment is discussed giving students a comprehensive insight into the biotechnology industry. Introduced topics are critically evaluated using current journal articles. Students are given the opportunity to investigate biotechnological products through laboratory experiments, enhancing their practical skills.</p> <p>Module content: The module examines the current state of the biotechnology industry in the United Kingdom and internationally, highlighting the difficulties experienced in bringing products to market; Topics covered in the module will vary according to current interest, but will include areas such as production of traditional fermented foods, genetically modified food, biosensors, vaccines, smart wound dressings, biofuels and bioremediation; and Laboratory experiments include production and analysis of a traditional fermented food, and techniques for the detection of adulterated foodstuffs.</p> <p>Assessment: Report 50%; Exam 50%</p>	Spring	10
<p>Clinical Biochemistry</p> <p>Module Description: This module provides an overview of the key aspects of clinical chemistry – the science behind many of the diagnostic tests used in medicine. The module includes how the measurements are performed and how they can be setup, and measures to ensure reliability of results. A major section of the module outlines the most common biochemical tests and the disease processes / treatments that they can used to identify or distinguish between. This includes many case studies where the student takes the place of the clinician to work out the diagnosis from the discussed markers. The markers include those associated with many areas, including: kidney function, liver function, glucose metabolism and diabetes, genetically inherited conditions, hormone systems and those performed in A&E.</p> <p>Module content: Assay validation and quality assurance for methods; and Use and interpretation of clinical chemistry analyses, including Thyroid function tests, Kidney function, Liver function tests, Acute Medicine and Blood Gases, Inherited genetic disorders (e.g. porphyrias), Bone profiles, Glucose metabolism and Diabetes monitoring, Clinical enzymology, and Principles and application of Therapeutic Drug Monitoring.</p> <p>Assessment: Lab practical report 45%; Portfolio 55%</p>	Spring	10
<p>Human Nutrition & Health</p> <p>Module Description: Advancements in nutrition research have had a huge impact over recent years on human health. This module allows students to investigate current understanding of the relationships between nutrition and health at the global and local level. The biochemical and immunological basis for the significance of macro- and micronutrients are studied, along with the consequences of deficiencies in such nutrients. Strategies to overcome the impact of malnutrition are discussed, focussing particularly on the plight of young children in resource-poor settings.</p>	Spring	10

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<p>The relationship between microorganisms and food is also covered, in terms of the negative effects of microbes as causes of food spoilage and foodborne infection and favourable factors as, for instance, in the uses of microorganisms in food production.</p> <p>Module content: Topics will include: The effects of malnutrition on immunity and consequent increased susceptibility to infection; Breast-feeding: advantages in terms of protection against infection in both resource-rich and resource-poor environments; link with HIV transmission; The effectiveness of probiotics in terms of protection of the individual from gastrointestinal infections; Microbial food spoilage, current techniques used in food preservation; update on foodborne infection; Role of micronutrients such as copper, zinc, selenium etc. in the diet; biochemical basis for the effects of such micronutrients; and Changes in biochemical mechanisms arising from starvation.</p> <p>Assessment: Lab report 40%; Essay 60%</p>		
<p>Topics in Neuroscience</p> <p>Module Description: This module examines current research in the field of neuroscience such as the neurological basis of learning and memory and the mechanisms involved in neurodegenerative disease. Up to date research is discussed and evaluated in a series of lectures and journal club activities which develops students ability to critically analyse scientific research. This culminates in students producing a systematic-type review answering a neuroscience related research question of their own choosing.</p> <p>Module content: Localisation of function and hemispheric specialisation of the cerebral cortex; Aspects of cortical function in health such as memory, language, mood and cognition; and Aspects of cortical function in illness such as dementia, aphasia, depression and schizophrenia.</p> <p>Assessment: Presentation 25%; Coursework 75%</p>	Spring	10