The Anatomy, Cell and Developmental Biology (ACDB) programme, based in England's oldest biomedical science department, aims to give iBSc students the opportunity to study and perform original research at the highest level. The department's research and teaching are

15 credits

Number limit: 12

Term 2, Friday 10.00-13.00

Tutor: Dr Wendy Birch (w.birch@ucl.ac.uk)

Prerequisites: MBBS Yrs 1 & 2. Pass exams on first attempt with marks of 65% or better.

Assessment: Practical 1-hour spot exam (60%), 1,000-word coursework essay (20%), group case study comprising a report and 15-minute

Tutors: Professor Stephen Hunt (hunt@ucl.ac.uk) and Dr Sandrine Géranton
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This module aims to present an integrated approach to pain, which, until the 1960s, was considered an inevitable sensory response to tissue damage. Students will be presented with information about the basic mechanisms of pain and its clinical manifestations. They will also be introduced to current ideas about therapy and management of pain and to the problems inherent in measurements of pain.

15 credits

Term 2, Lectures: Mondays and Thursdays 12:00-13:00, mixed with laboratory visits. 445.7]TJ ET Q0 0 0 0 0887 0 595.25 842 reW*nBT/F5 111 Tf1 0 0 1

Tutors: Dr Laura K. Donovan (l.k.donovan@ucl.ac.uk) & Dr Paula Alexandre (p.alexandre@ucl.ac.uk).

Prerequisites: A good understanding of Cell Biology (MBBS Y1/Y2 sufficient)

Assessment: In-person exam (70%), Coursework (30%).

Cancer biology and embryo development are interconnected in various ways due to the shared underlying principles and mechanisms governing both processes. Embryo development results from a highly controlled series of events, while cancer cells sustain their growth, differentiation, and migration by exploiting the molecular and cellular mechanisms that underpin embryonic development.

Certain paediatric cancers originate from abnormal embryonic cells. The study of paediatric cancers through the lens of developmental biology has the potential to advance our comprehension of cancer onset and disease progression.

Studying the common pathways between cancer and embryology will provide a novel perspective of the disease, while expanding our understanding of developmental biological processes, and critically inform innovative therapeutic strategies.

Indicative lecture topics subject to possible changes:

- Embryonic origin of cancer
- Stem cells in embryo development and cancer
- Clinical lecture: Neuroblastoma, development to cure.
- Signalling pathways implicated in cancer and embryonic development.
- Cell proliferation and differentiation during cancer and embryo development
- Cellular migration during morphogenesis and metastasis
- Clinical lecture: Medulloblastoma, from progression to treatment

BIOS0040: ADVANCED STATISTICS AND MACHINE LEARNING FOR BIOSCIENCES

15 credits

Term 1, Lectures: Tuesday 11.00-13.00, Computer practicals T/F5 11 Tf1 0 0 1 264.63 736.97 Tme8(s)-9 2 reoeS8/Fq

Prerequisite modules: A good understanding of Neuroscience and Developmental Biology (e.g., PHOL0005/NEUR0005 and BIOL0013/ANAT0002/ANAT0003 or MBBS Neurobiology).

Assessment: Unseen 2-hour examination (100%).

The nervous system is the most complex system in the entire body. CELL0003 explores how this complex organization of hundreds of cells emerges during embryo development. The module focuses on the precise organization of tissues that arises during embryo development by the coordinated control of the differentiation, migration, proliferation and death of cells. It will provide a solid grounding for future specialised study of nervous system development, function and repair.

Lectures will be given by leading UCL researchers and will provide detailed descriptions of selected key processes involved in neural development, function and repair. They will explore the molecular and cellular mechanisms that regulate these processes, drawing on examples from both vertebrate and invertebrate organisms. The focus will be on recent work that has not been published in text books.

Indicative lecture topics (based on a typical year's syllabus):

Neural Induction

Neural crest development

Schwan cell development

Hindbrain patterning

Neurogenesis in C. elegans

Patterning the CNS

Drosophila neurogenesis.

CELL0004: CLOCKS, SLEEP AND BIOLOGICAL TIME

15 credits

Term 2 (first half), Monday 11.00-13.00, Wednesday 09.00-11.00

Tutor: Professor Jason Rihel (j.rihel@ucl.ac.uk)

Prerequisites: A good understanding of cell and molecular biology; MBBS Yrs 1 and 2.

Assessment: Unseen 3-hour examination (90%) and Short essay assignment in the shape of an exam essay (10%).

The module provides a broad understanding of the relevance and mechanisms underlying biological timing, with emphasis on the regulation of sleep. What is currently known about circadian clocks (what makes the clock 'tick') and sleep will be considered in a range of animal systems, from *Drosophila* to the mouse. Lectures will include the genetic-molecular aspects, biochemistry and neurobiology, as well as how sleep and the clock regulate physiological events. The importance of light and the retina in setting the clock will be discussed, as will the timing of hibernation, cell division and animal migration. We will also examine the neurobiological underpinnings of human sleep diseases.

CELL0012: STEM CELLS AND REGENERATIVE MEDICINE

15 credits

Term 2, Usually

Term 2, Monday 14:00-15:00, Friday 11:00-12:00 and some sessions on Friday afternoon 14:00-16:00

Tutor: Professors Michael Duchen (m.duchen@ucl.ac.uk) and Gyorgy Szabadkai (g.szabadkai@ucl.ac.uk)

Prerequisite modules: A strong background in Biochemistry/Cell Biology is required. Please contact the module organiser if you have any questions about the background required. MBBS Yrs 1 & 2

Assessment: Unseen 2-hour examination (80%) and oral presentation (20%).

This module will establish firm foundations for understanding core processes and pathways that dictate cellular energy balance, and explore the roles of mitochondria in health and in disease. The first half of the course establishes fundamental principles that govern mitochondrial cell biology, while the second half is focused on mechanisms of mitochondrial dysfunction in diseases, including cancer, neurodegenerative disease and cardiovascular disease. The course will therefore provide a basis for understanding essential aspects of mitochondrial bioenergetics and cell biology, including pathways of cell death. The course includes a technical component to ensure that students understand how key measurements are made and interpreted, including opportunities for hands-on laboratory based demonstrations of major technical approaches in metabolic studies. Lecturers on this course are all international leaders in their field.

CELL0016: ADVANCED MOLECULAR CELL BIOLOGY

15 credits

Term 1, A couple of Mondays 14.00-16.00, Wednesday 10.00-12.00, Friday 09.00-11.00.

Tutor: Professor Jonathan Chubb (j.chubb@ucl.ac.uk)

No prerequisite modules but a good understanding of cell biology is required.

Assessment: Unseen two-hour examination (70%) and a practical write-up (30%).

The module aims to provide an understanding of key topics in modern cell biology and its relationship to disease. Topics include microtubules, actin and intermediate filaments, control of cell shape, endocytosis and lysosomal sorting, cellular senescence, programmed cell death, cell cycle control, transcription in single cells, circadian clocks, calcium signalling, and mathematical modelling. A firm understanding of live imaging techniques is essential to an understanding of modern cell biology. A lecture on imaging techniques is followed by imaging practicals on confocal microscopes (to small groups of 4-5 students). This allows everyone to get the chance to drive a confocal microscope and generate multicolour images of cells. All of the lecturers are actively researching in these fields and so are in a position to provide not just background information but also cutting-edge research as well as primary knowledge of the field.

CELL0017: INTERDISCIPLINARY CELL BIOLOGY

15 credits

Term 1, Tuesday 10.00-11.00, Friday 12.00-13.00

Tutor: Dr Julie Pitcher (julie.pitcher@ucl.ac.uk)

No prerequisite modules

Assessment: Unseen 2-hour examination (70%), one 2,000-[illegible] (30%).

The module is targeted at students on broad or interdisciplinary degree programmes who have a wide scientific outlook. The intention is that learners should come to recognize the breadth of

Tutor: Prof. Roberto Mayor (r.mayor@ucl.ac.uk)

Prerequisites: A basic understanding of developmental biology (MBBS Y1/Y2 sufficient).

Assessment: Exam (75%), Oral presentation (25%).

The aim of this module is to provide an in-depth introduction to Biomechanics with particular emphasis on how forces work on cell and tissues during embryo development. This is a novel and rapidly growing area of research whose teaching is absent from UCL.

The module aims to provide students with a solid foundation and core principles of biomechanics and how these principles can be used to understand embryo development and tissue morphogenesis.

Indicative Topics:

- Forces in epithelia tissues
- Mechanics of neural crest cell migration in amphibian
- Mechanics of embryo elongational zebrafish
- Forces during wound healing in Drosophila
- Cell migration of the lateral line in zebrafish
- Biomechanics of heart development
- Embryo architecture in Drosophila
- Biomechanics of cancer

OTHER TAUGHT MODULES

Students are encouraged to select the majority of their modules from incaged to sues duevl0887 0 595.25 842 reW*nE

Tutors: Dr Eric Lambie (e.lambie@ucl.ac.uk)

No prerequisite modules

The Research Department of Cell and Developmental Biology offers a diverse, ever-changing range of cutting-edge research projects. Medical students can expect to join an internationally-ranked research lab for up to 6 months (October – March). Dissertations (up to 7,500 words) are submitted