Anatomy, Cell and Developmental Biology

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 very diverse. Students have access to an outstanding range of taught modules and opportunities to join internationally-recognised research groups. The experiences gained by students during this year will be of lasting value to their careers.

The Research Department of Cell and Developmental Biology (CDB) performs world-class research in:

1) Neuroscience (2014 Nobel Prize for Physiology OR Medicine awarded to Prof. John O'Keefe)

2) Cell, developmental and stem cell biology

3) Anatomy, palaeobiology and forensic science

4) Cell signalling and energetics

5) Functional genomics of model systems (including *C. elegans*, *Drosophila* and zebrafish)

These areas are well-represented in the wide range of popular modules and research projects that are offered to iBSc students. The project is arranged by the student with a supervisor of their choice in CDB; it is also possible to undertake projects in another UCL department or institute. The majority of iBSc students choose laboratory-based projects (although literature-based research projects are also available). Students are encouraged to arrange their research projects well in advance (i.e., in the preceding spring or summer terms).

Advice on project and taught module selection is always available from the Tutor, Prof. Michael Duchen (m.duchen@ucl.ac.uk), and/or the Head of Teaching for CDB, Dr Tom Hawkins (thomas.hawkins@ucl.ac.uk)

The iBSc programme offers:

- Induction session for the programme covering things but particularly how to approach independent study and research that is required, in contrast to MBBS Y1/Y2.
- Small-group meetings to support students in their adjustment to the research environment and an (optional) formative essay writing task.
- A wide range of extremely popular modules.
- Access to an internationally distinguished group of researchers.

MODULES AVAILABLE

Please note that some of the module assessment patterns listed below may be subject to change.

ANAT0007: FORENSIC OSTEOLOGY AND ANTHROPOLOGY

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 presentation (10%), case study conclusion (1 A4 page) (10%).

The module provides an introduction to the role of the dead body in the field of crime and forensic science, initially introducing the student to the recently deceased, and discussing how the process of decomposition finally results in skeletal remains. Students will be introduced to skeletal anatomy and in particular to the forensically relevant skeletal elements that can be used to help identify an individual. Students will have the opportunity to examine human remains both with and without soft tissue, to prepare material for osteological examination and also to see how these remains may be involved in helping to solve forensic cases. Please note that module numbers are capped and when there are more candidates than places exam grades will be taken into consideration.

ANAT0010: ADVANCED ANATOMY

15 credits

Number limit: 14

Term 1, Tuesday 14.00-16:45

Tutor: Dr Wendy Birch (w.birch@ucl.ac.uk) and **Professor Susan Evans** (s.e.evans@ucl.ac.uk)

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

Assessment: In-course Portfolio (30%), comprising dissection plan, dissection objectives and dissection report. The dissection and dissection presentation (70%).

The module offers students the opportunity to continue their studies of human anatomy through dissection, comparison, and reading related literature. Each student will focus on a specific dissection project, chosen by them in consultation with the module tutors. This will be complemented by a coursework portfolio including dissection plan, objectives, and report, and two short essays relating to the anatomy of the region, one on a topic of clinical or developmental relevance, and the other on a topic of comparative anatomical interest. The only iBSc students to be considered for the module are those on ACDB. If more students apply that there are places it may be necessary to consider students' marks from previous years.

ANAT0012: MOLECULAR BASIS OF NEUROPSYCHIATRIC DISORDERS

15 credits

Term 2, Monday 14:00-16:00

Tutors: Professor Stephen Hunt (hunt@ucl.ac.uk) **and Dr Sandrine Géranton** (sandrine.geranton@ucl.ac.uk)

Prerequisites: A basic understanding of neuroanatomy and neuroscience.

Assessment: Unseen 2-hour examination (80%) and a 1,500-word essay (20%).

Neuroscience is beginning to provide unprecedented information about processes that can result in, or relieve, dysfunctional behaviour. The aim of this module will be to review molecular and physiological data drawn mainly from animal research but also some human studies. The module will focus on defined brain systems that contribute to particular types of behaviour, and will cover the genetics of mental disease risk, the epigenetic influence of trauma and early life experience, the molecular basis of autism and Rett disease, the neurobiology of depression and anxiety, addiction and impulsivity, and schizophrenia; it will explore the molecular roots of dementia (particularly associated with problems of learning and memory).

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

Epigenetics I: Nature v Nurture, Mechanisms;

Epigenetics II: Nature v Nurture;

Environmental impact and mental health;

Genetics of Mental Disease;

The Neurobiology of Depression;

Psychedelic Drugs as Therapeutic Agent;

New therapeutic approaches in Psychiatry: Deep brain stimulation;

The Neurobiology of Drug Addiction;

Learning and Memory;

Fear and Anxiety;

Neurobiology of Schizophrenia;

Dissociation.

ANAT0013: PAIN

15 credits

Term 2, Tuesday 11.00-1300

Tutor: Dr Sandrine Géranton (sandrine.geranton@ucl.ac.uk) and **Professor Stephen Hunt** (hunt@ucl.ac.uk)

Prerequisites: A basic understanding of neuroanatomy and neuroscience.

Assessment: Unseen 2-hour examination (80%) and a 1,500-word essay (20%).

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.

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

The Primary Afferent: Molecular Biology and Growth Factors.

The Primary Afferent: TRP and Sodium Channels and disease.

Dorsal horn and Pain Pathways to the Brain.

Central sensitization.

Descending controls and cortical pathways.

Developmental aspects of Pain Systems. Pain in Early Life.

Neuropathic Pain.

Central representation of Pain.

Pharmacology of Chronic Pain States.

Spinal Cord Circuits for touch, itch and pain.

ANAT0024 BIRTH DEFECTS: BASIC RESEARCH TO CLINICAL APPLICATION

15 credits

Number limit: 30

Term 2, Tuesday 10.00-11.00 1st half of term and 09.00-11.00 2nd half of term, Thursday 10.00-11.00

Tutors: Dr Paula Alexandre (p.alexandre@ucl.ac.uk) **and Dr Erwin Pauws** (e.pauws@ucl.ac.uk)

Prerequisites: A suitable grounding in Biosciences, MBBS Years 1 and 2, or equivalent.

Assessment: Unseen 2-hour examination (70%); 5-minute oral presentation with questions (30%).

This module presents an introduction to research into the diagnosis, developmental mechanism, prevention and treatment of birth defects at the UCL Great Ormond Street Institute of Child Health.

It will provide a biological overview of normal embryonic development, highlighting genes and mechanisms by which birth defects arise. Leading scientists will present their efforts to translate progress made into the understanding of the molecular mechanisms underlying birth defects into the development of novel therapeutic strategies.

Lectures will cover a variety of topics ranging from Clinical Diagnosis to Basic Research and Novel Therapies. Tutorials will explore the analysis and interpretation of experimental data. Students will

also debate and present case studies. A reading list and further on-line learning resources will be provided through Moodle.

After taking this module students should be able to:

- Describe the most common birth defects and their clinical features;
- Understand the underlying genetic and molecular mechanisms of birth defects;
- Explain how environmental factors can lead to birth defects;
- Identify key developmental genes and pathways;
- Describe research methods to determine the diagnosis, prevention and treatment of birth defects;
- Outline future potential intervention strategies for birth defects;
- Use their acquired knowledge on the subject and techniques to interpret and discuss contradictory observations.

ANAT0025: FORM AND FUNCTION OF THE VERTEBRATE HEAD: AN INTEGRATIVE ANATOMICAL APPROACH.

15 credits

Term 1, Lectures: Mondays 14:00-16:00, Practicals, museum visits, and presentations Fridays 09:00-11:00.

Tutor: Dr Phil Cox (philip.cox@ucl.ac.uk)

Prerequisites: No specific prerequisites. MBBS Y1/Y2 students will have sufficient anatomical knowledge.

Assessment: In person Exam (70%), Viva/oral presentation (20%), Coursework (10%).

An advanced module focusing on the form and function of the vertebrate head and taking a multidisciplinary approach that integrates research data from a range of disciplines including imaging, morphometrics, biomechanics, palaeobiology, evolutionary developmental biology, and forensic osteology.

Indicative lecture topics:

- Introduction to skull anatomy and development
- The early evolution of the vertebrate head
- Jaws and feeding in the water-land transition
- Geometric morphometrics and the modular organisation of the tetrapod skull
- Dinosaur feeding
- Forensic osteology of the skull
- Facial reconstruction.

ANAT0026: CANCER: INSIGHTS FROM EMBRYONIC DEVELOPMENT

15 credits

Term 2, Lectures: Mondays and Thursdays 12:00-13:00, mixed with laboratory visits.

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 Thursday 10:00-13:00

Tutor: Professor Christopher Barnes (christopher.barnes@ucl.ac.uk)

Prerequisites: Some programming experience; if you are interested in the module, please contact Prof. Barnes via the above e-mail address.

Assessment: In person Exam (2 hours) (50%), Data analysis project (2,000 words) (50%).

Computational skills are essential to many career options for scientists, doctors, researchers and for postgraduate study and research. In this module, students will learn the skills to write Python code to implement statistical and machine learning algorithms that can be applied in a range of contexts.

Each week the module will cover an aspect of computer coding using examples and exercises that drawn on bioscience contexts.

Topics will include:

- Probability, maximum likelihood, Bayes theorem
- Supervised learning: regression and classification
- Unsupervised learning: dimensionality reduction and clustering
- Model evaluation and improvement
- Reinforcement learning
- Neural networks and deep learning.

CELL0001 & CELL0002: MECHANISMS OF DEVELOPMENT

15 credits (CELL0001 = lectures only) & 30 credits extended version (CELL0002 = lectures plus practicals)

Term 1, Lectures: Tuesday 11.00-13.00, Friday 14.00.16.00; CELL0002 Practicals on some Thursday 14.00-17.00

Tutor: Dr Vilaiwan Fernandes (vilaiwan.fernandes@ucl.ac.uk) **and Professor Claudio Stern** (c.stern@ucl.ac.uk)

Prerequisites: A good understanding of developmental biology.

Assessment CELL0001: Unseen 3-hour examination (100%).

Assessment CELL0002: Unseen 3-hour examination (60%) and up to 6 practical write-ups (40%).

The development of a single cell (the fertilized egg) into an animal made of millions of cells is one of the most amazing phenomena in biology. It has inspired scientists for millennia. This module will consider the cellular and molecular events that underlie animal development, drawing on examples from a range of vertebrate and invertebrate model organisms (including nematodes, fruit flies, sea urchins, zebrafish, frogs, and chicks). It aims to bring the students' knowledge and understanding of developmental biology to the level of current research. Topics will include axis formation, gastrulation, neural induction, patterning of the nervous system, neural crest, gene regulatory networks, left-right asymmetries, circadian clocks, eye development, stem cells, transgenesis in the mouse embryo, genetic studies on early development in nematodes and flies. The 30-credit version of the module (CELL0002) will also include 5-6 laboratory practicals (e.g., *Drosophila*, *Xenopus,* zebrafish, chick, mammal, *C. elegans*).

CELL0003: CELLULAR AND DEVELOPMENTAL NEUROBIOLOGY

15 credits

Term 1, Tuesday 16.00-18.00

Tutor: Dr Gaia Gestri (g.gestri@ucl.ac.uk) **and Professor Stephen Price** (stephen.price@ucl.ac.uk)

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 Monday 10.00-11.00, Thursday 11.00-12.00.

Tutors: Professor Saverio Tedesco (f.s.tedesco@ucl.ac.uk) **and Dr Marc Amoyel** (m.amoyel@ucl.ac.uk)

Prerequisites: A suitable grounding in cell and developmental biology, e.g., MBBS Developmental Biology.

Assessment: Unseen 2-hour examination (85%) and online quiz (15%).

The aim of the module is to provide an up-to-date survey of the rapidly changing field of stem cell research, from fundamental principles to the practicalities of regenerative medicine. Realistic assessments of progress to date and future potential will be made. Students will acquire a detailed understanding of stem cell biology, the promise of regenerative medicine and associated ethical issues. Critical thinking skills will be developed, enabling students to evaluate research strategies and the data produced. Students will develop independent learning skills, problem solving and written presentation skills.

CELL0013: FUNCTIONAL GENETICS OF MODEL SYSTEMS

15 credits

Term 2, Tuesday 16:00-18:00.

Tutor: Dr Richard Poole (r.poole@ucl.ac.uk) **and Professor Jason Rihel** (j.rihel@ucl.ac.uk)

No prerequisite modules but some knowledge of molecular biology and genetics would be useful.

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

Classical genetic studies (of mutations) have made an enormous contribution to our understanding of biological phenomena. Modern genetics has supplemented these classical approaches with a wide range of molecular approaches. The aim of this module is to provide in-depth coverage of new concepts in the molecular genetics of animal model systems, including nematode worms, fruit flies, zebrafish and mouse. Following a refresher on model organism biology and basic genetics, the topics covered will include genetic screening, modern gene mapping techniques, advanced recombinant technology and genome editing, as well as emerging concepts such as chemical genetics and optogenetics. Drawing mainly on recent examples from the primary literature, emphasis will be placed on the use of molecular genetics to tackle wide-ranging questions, from basic biological principles in development and neuroscience to the dissection of disease.

CELL0015: MITOCHONDRIAL BIOLOGY, BIOENERGETICS AND METABOLISM IN HUMAN DISEASES

15 credits

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-word essay on topic of student's choice (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 modern cell biological research. The module emphasises the relationship between the chemical scale and more complex levels of organisation in cells, and the balance of interactions required for cellular function. It explicitly recognises the different understandings of cell biology in different branches of biosciences including virology and microbiology in health and disease. Students should acquire a good broad knowledge of the principles and practice of modern cell biology. They should be able to use this knowledge to enhance their understanding and appreciation of other aspects of molecular life sciences. Students should appreciate that cell biology is a highly interdisciplinary research activity that overlaps, and is inextricably linked with, work in a wide range of physical and biomedical sciences.

CELL0024: TISSUE BIOLOGY

15 credits

Term 1, Lectures Tuesday 10.00-11.00, Workshops Thursday 14:00-16:00

Tutors: Professor Daniel Cutler (d.cutler@ucl.ac.uk), **Dr Julie Pitcher** (julie.pitcher@ucl.ac.uk) and Dr Vincenzo Calvanese (v.calvanese@ucl.ac.uk)

Prerequisites: Please contact Prof. Cutler via to e-mail address above if you are interested in the module.

Assessment: Grant application (3,000 words) (80%), Scientific poster (20%).

Most physiological functions in animals are carried out by assemblies of different specialised cells that cooperate to form a unique structure, that can carry out a specific process. In man there are approximately 100 of these structures: tissues or organs. The mechanistic underpinning of how cell-types cooperate in forming organs and in executing their essential functions is now a major research focus: Molecular, computational and imaging approaches are being combined with ex vivo cultures, xenografts, in vivo models, organoids, or simple cell systems to discover how tissues maintain homeostasis and recover from insult and injury.

This module will focus on how the research is actually done, what it can achieve, and the kind of thinking and writing that research scientists use to advance their work.

CELL0025: TISSUE AND DEVELOPMENTAL BIOMECHANICS

15 credits

Term 1, Lectures and group tutorials: Thursdays 11:00-13:00

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 within Cell and Developmental Biology (those modules with ANAT and CELL codes, as well as a few BIOS ones), but they may select from other suitable modules from within the Division of Biosciences (with codes BIOC, BIOL, NEUR, PHAR or PHOL). However, the final selection of modules must have the approval of the Programme Tutor.

Details of the modules can be found in the UCL Module Catalogue (which allows searches by subject area):

https://www.ucl.ac.uk/module-catalogue/

Module descriptions are also to be found in Portico. Occasionally students may take a module from outside the Division and Faculty (so long as Programme Tutor approval is granted).

Students must also take a project module. Most students take the 45-credit ANAT0015 lab project but if they wish students may take the 30-credit **CELL0005** library project (https://www.ucl.ac.uk/module-catalogue/modules/advanced-investigative-project-in-cell-and-developmental-biology-CELL0005).

ANAT0015: ADVANCED RESEARCH PROJECT IN CELL AND DEVELOPMENTAL BIOLOGY

45 credits

Terms 1 & 2.

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 at the end of Term 2. Sometimes BSc and iBSc projects may result in research journal publications.

Assessment: Laboratory project dissertation (80% overall), comprising supervisor's assessment of lab performance (10%), supervisor's assessment of dissertation (35%), internal examiner's assessment of dissertation (35%); panel assessment of oral presentation of research (20%).

Note that most original research projects, by their nature, cannot have a guaranteed outcome; assessment is therefore based on the quality of the work and its presentation, rather than on the 'success' of the results. Projects are available in the key research areas in CDB: Neuroscience, Stem cells and Regenerative Medicine, Functional Genomics and model systems, Cell signalling and bioenergetics and Anatomical and Forensic Science.

CELL0005: ADVANCED INVESTIGATIVE PROJECT IN CELL AND DEVELOPMENTAL BIOLOGY

30 credits

Terms 1 & 2

Tutor: Dr Tom Hawkins (thomas.hawkins@ucl.ac.uk)

No prerequisite modules

Assessment: Dissertation (70%), Oral presentations (30%)

CELL0005 is a library-based research project for 3rd year BSc and iBSc students in Biosciences who wish to write an in-depth dissertation in the areas covered by the Research Department of Cell and Developmental Biology. A detailed review of the primary research literature on a topic of interest to each student will be conducted under the individual guidance of a project supervisor. Topics will be in the areas of anatomy, cell biology, developmental biology, neuroscience or evolution. The provisional title/subject area and the supervisor has to be approved by the module organizer at the start of Term 1. Dissertations are submitted after reading week in term 2.

PROGRAMME TUTOR: Prof. Michael Duchen - m.duchen@ucl.ac.uk / 020 7679 3207 / X33207

PROGRAMME ADMINISTRATOR: Ms Helen Jefferson-Brown - h.jefferson-brown@ucl.ac.uk / 020 7679 2200 / X32200