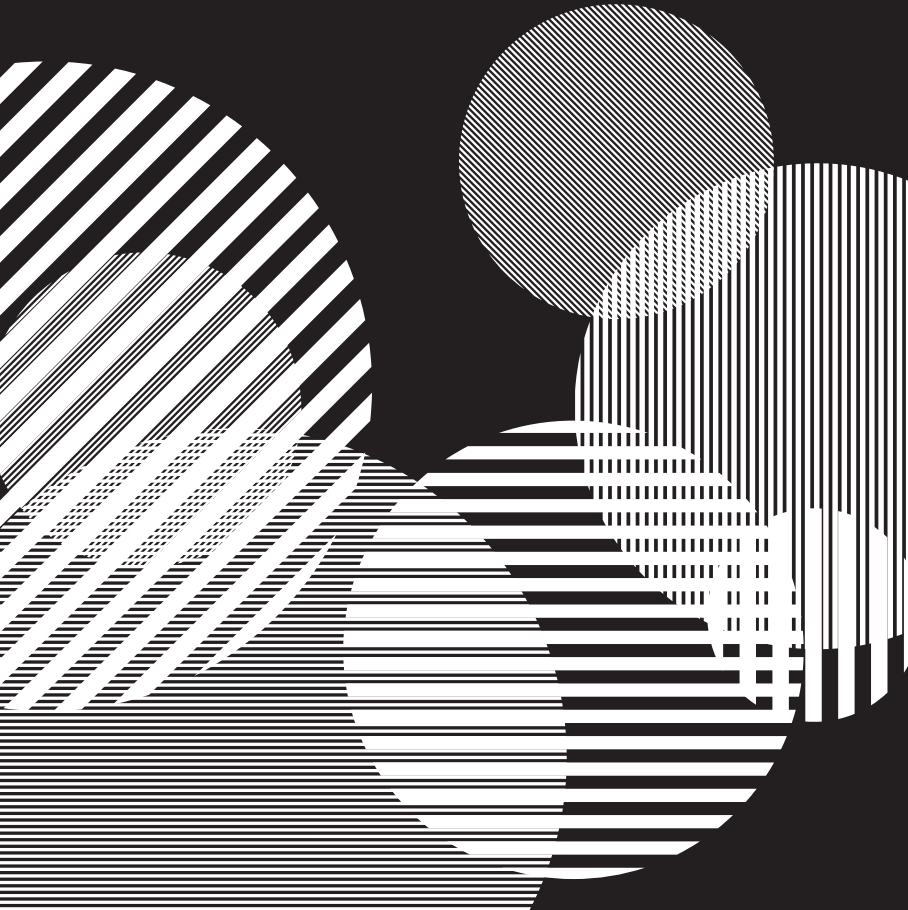


LONDON'S GLOBAL UNIVERSITY



UCL

Research Themes



Our tradition of groundbreaking research

Research has been a core activity at UCL since the university's foundation and it remains at the heart of our vision and strategy.

UCL began as a radical, struggling upstart on the fringes of London. Its founding principles of innovation, accessibility and relevance were intended to disrupt the status quo of England's establishment – simply because that was the most effective way to enhance social justice and opportunity.

UCL became the pioneer in England of university research in several important disciplines, such as architecture, civil engineering and medicine, and established the UK's first professorial chairs in many subjects, including geography, French, medical physics, media law and Egyptology. Our departments of statistics, chemical engineering, and the history and philosophy of science were the UK's first.

Our staff and students have undertaken groundbreaking research that has helped shape the modern world. Their achievements include:

- advances in communications such as the telephone and wireless telegraphy, and the first transatlantic computer network connection, which was the precursor of the internet
- understanding of the physiology of nerve cells and their synaptic connections
- biomedical breakthroughs such as the identification of hormones and vitamins, and the first antiseptic treatment of wounds
- understanding of the immune system's rejection of tissue and organ grafts, and of autoimmune diseases such as rheumatoid arthritis
- discovery of the inert gases, including neon, which resulted in the first of 21 Nobel Prizes so far earned by our staff and students.

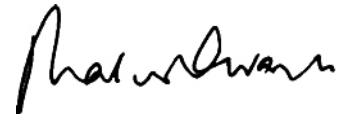
Almost two centuries after our founding – following the exploration, discovery and application of knowledge undertaken by generations of researchers – we have grown into one of the world's leading universities, now in the heart of one of the world's most cosmopolitan cities. The breadth, depth and quality of our current research exceeds the imagination even of our visionary founders.

Despite this advancement, we remain intent on challenging the status quo – simply because that is the most effective way to challenge the world's unnecessary suffering, destruction, conflict and inequity.

Universities like UCL are outstanding at increasing our understanding of the universe in which we live. We believe that with understanding there also comes responsibility, thus we have adopted an ambitious vision for our research over the next decade.

UCL is marshalling its research efforts to address some of the major problems facing the world, through the Grand Challenges of Global Health, Sustainable Cities, Intercultural Interaction and Human Wellbeing. We are committed to applying our collective expertise in order to provide humanity with sustainable and equitable solutions to its many profound and complex problems.

External engagement is central to our vision. We invite you to deploy your own expertise and objectives in partnership with ours. We accept it as our obligation, which we can best discharge through wide and effective partnerships, to continue to transform the world.



Professor Malcolm Grant
President and Provost of UCL

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UCL looks beyond its boundaries to develop research and its application. We are forming strategic partnerships to enable the excellence of our research to be extended as widely as possible. These and future partnerships will build on the existing and developing areas of thematic research (as well as those of departments, divisions and schools) outlined in this document.

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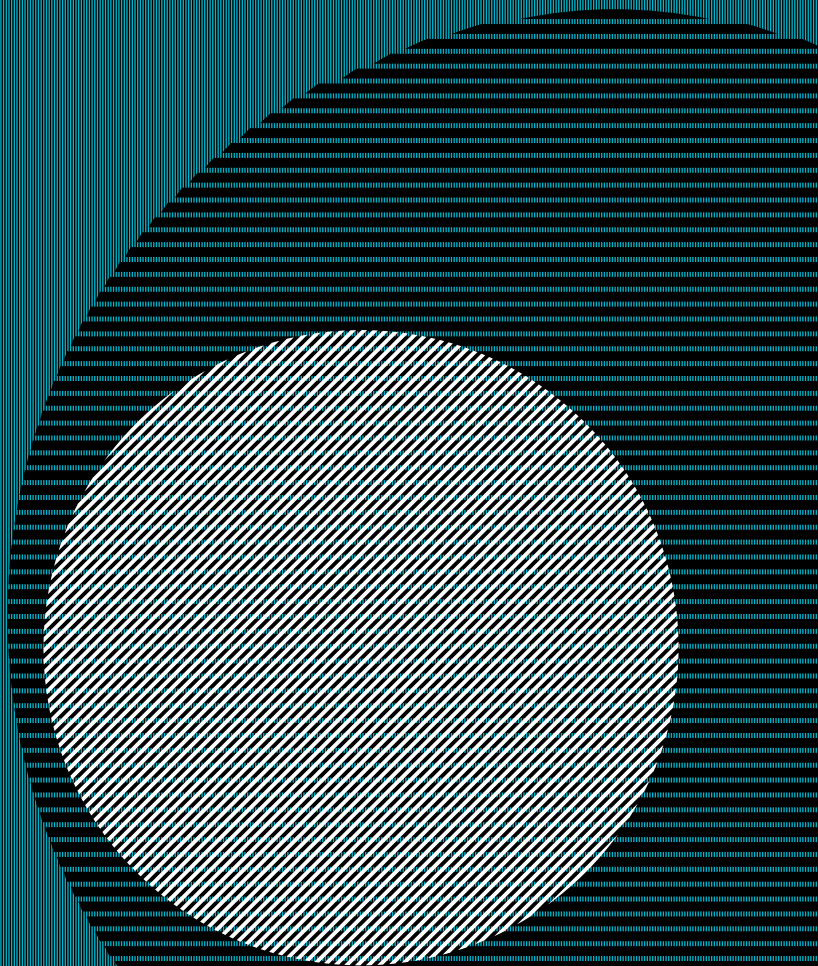
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Opportunity and obligation

The UCL Research Strategy integrates our collective expertise and focuses it on resolving the world's profound problems.

Billions of humans suffer from illness and disease, despite the existence of proven preventions and cures. Life in our cities is under threat from social tension, pollution and climate change. The prospect of global peace and cooperation remains under assault from tensions between our nations, ideologies, faiths and cultures. Our quality of life – actual and perceived – is diminishing despite technological advances.

These are global problems, and the world's most creative, insightful and inventive minds must address them if future generations are to be provided with the chance to flourish. As London's global university, UCL has the opportunity and the obligation to contribute to tackling the major problems facing the world.

Transcendent partnerships

The world's major intellectual, cultural, scientific, economic, environmental and medical challenges are complex and systemic. While we embrace and celebrate the outstanding problem- and curiosity-driven research conducted by our individuals and small groups, the resolution of these problems demands more than individual excellence, more than interdisciplinary collaboration; we need partnership transcending the boundaries between disciplines and an intensification of the integration, synthesis and outreach of our research.

Knowledge drawn from and tensioned between different disciplines – from neuroscience to urban planning, from security to health informatics and environmental law – and the cross-disciplinary debate that is provoked invariably reveal more of the true complexity of an issue and allow more nuanced consideration of all aspects of a problem.

We need not just knowledge alone but a higher level of analysis that leads to 'wisdom', by which we mean the judicious application of knowledge for the good of humanity.

UCL Grand Challenges

As part of the UCL Research Strategy, we have identified areas in which such endeavours can thrive, and where UCL's critical mass will deliver novel achievements.

We call these the Grand Challenges. They are global in significance and will draw on our expertise right across the arts and humanities, the built environment, biomedical sciences, laws, life sciences, mathematical and physical sciences, and social and historical sciences. Our initial Grand Challenges are:

- Global Health
- Sustainable Cities
- Intercultural Interaction
- Human Wellbeing.

Research themes

This document outlines the formidable range and depth of expertise we have to draw on as we tackle the Grand Challenges. Collectively our research groups, here organised by themes, constitute an intellectual powerhouse for interdisciplinary research applied to the world's major problems.

When our 4,000 researchers are enabled to engage in cross-disciplinary debate, our collective expertise and knowledge is greater than the sum of its parts, and our work is then best placed to yield wise solutions. Establishing a culture of wisdom therefore means: supporting the synthesis of new knowledge both within and across fields and disciplines; facilitating collective, collaborative working to gain new insights, fresh perspectives and, ultimately, wisdom; and establishing practical policies based upon the wise counsel so developed.

We are positioning ourselves to build exponentially on our contribution in these areas. We are forming alliances and collaborations, across multiple disciplines, focused on issues of global significance. We are removing internal barriers to interdisciplinary collaboration. We are establishing mechanisms whereby our expertise and analysis of these challenges can be brought into forums to engage local and national governmental bodies, non-governmental organisations, the NHS, funding agencies and charities, opinion formers and the public.

We hope that you will consider the role that you or your organisation could play in our work.



Professor David Price

UCL Vice-Provost (Research)

Scales of research

UCL's research activity takes place on a number of complementary scales: on the scale of the individual scholar; on the scale of department, division, faculty and school; on the scale of interdisciplinary groupings (organised, in this document, by research theme); and on the scale of the Grand Challenges.

Individual scholarship

Fundamental to our research excellence is outstanding problem- and curiosity-driven scholarship by individuals.

UCL is home to 4,000 academic and research staff, many of them at the very forefront of their disciplines. The sum total of this expertise makes us an academic powerhouse across the entire range of disciplines, advancing knowledge and its dissemination.

Our academics – inspired by their predecessors, who were giants of analysis and application – pursue timely and relevant research. In turn, their work enriches the teaching and learning environment, inspiring today's brightest students.

We continue to create new senior academic posts as disciplines develop – adapting to and anticipating the needs of humanity – which offer experts a secure base from which to make research breakthroughs, to disseminate knowledge, to build teams of researchers and to provide supervision for tomorrow's leaders.

Department and division

While individual excellence is essential – many significant discoveries are the product of lone investigation and invention – much groundbreaking research and teaching takes place within traditional academic disciplines. Historically, and for pragmatic reasons (such as the demands of research-led teaching and the nature of research assessment) these are based upon academic departments and divisions.

They deliver excellent research and education, as shown in the results of the UK government's 2008 Research Assessment Exercise (RAE). UCL was rated the best research university in London, and third in the

UK overall for the number of its submissions which were considered of 'world-leading quality'.

In 43 of the 49 RAE submissions, at least 50% of UCL staff were ranked at either the highest grade, 4* ('of world-leading quality') or 3* ('internationally excellent'). Excellent results were achieved across a wide spectrum, including:

- architecture and the built environment
- chemical engineering
- cancer studies
- computer science and informatics
- earth systems and environmental sciences
- economics and econometrics
- history
- history of art, architecture and design
- hospital-based clinical subjects
- infection and immunology
- law
- philosophy
- psychology

Crossing the disciplines

Even more significant outcomes result when our great minds from different disciplines act in concert. Bringing together different disciplines, perspectives, understandings and procedures can produce novel solutions.

A key element of our research strategy, then, is to increase and strengthen interdisciplinary research, bringing our excellent specialisms together and optimising their impact. This takes place in three ways: through the strengthening of existing academic departments that are already multidisciplinary; through the creation of new academic departments to address problems demanding diverse expertise; and through the creation and support of new thematically focused centres that draw on expertise from across our academic departments.

Many of our formal academic departments are already multidisciplinary. These include the world-renowned specialist centres that became part of UCL during the last 25 years:

- the UCL School of Slavonic & East European Studies, one of the world's leading specialist institutions – and the largest national centre in the UK – for the study of central, eastern and southeast Europe and Russia
- the UCL Eastman Dental Institute, which undertakes cutting-edge fundamental, clinical and translational research on biomaterials and tissue engineering, and microbial diseases
- the UCL Institute of Ophthalmology, which aims to further the understanding of the processes of vision and to develop new diagnostic and therapeutic strategies for the benefit of patients worldwide

- the UCL Institute of Child Health, which pursues an integrated, multidisciplinary approach to enhance understanding, diagnosis, therapy and prevention of childhood disease
- the UCL Institute of Neurology, whose eight academic departments – Neurodegenerative Disease; Molecular Neuroscience; Clinical & Experimental Epilepsy; Motor Neuroscience &

Movement Disorders; Imaging Neuroscience; Brain Repair & Rehabilitation; Neuroinflammation; and Clinical Neurosciences – each encompass clinical and basic research

- the UCL Institute of Archaeology, unique in the scale and diversity of its research and the global scope of its expertise and collaborative links.

Furthermore, three of UCL's recently constituted academic departments are similarly multidisciplinary:

- the UCL Cancer Institute, fostering interaction and collaboration between cancer researchers and scientists in nanotechnology, bioinformatics, developmental biology, stem-cell research, immunity, engineering and medicinal chemistry
- the UCL Institute for Women's Health, bringing together individuals with expertise

across the whole spectrum of women's health – from laboratory science to clinical skills to social and behavioural sciences

- the UCL Ear Institute, aiming to lead the world in understanding hearing and fighting deafness through an interdisciplinary approach.

Also, UCL has invested in non-departmental thematic centres to exploit our strong foundation of expertise, regardless of discipline. These include:

- UCL Energy Institute (page 40)
- UCL Environment Institute (page 40)
- UCL Genetics Institute (page 46)
- UCL Institute for Global Health (page 47)
- UCL Centre for Materials Research (page 55)
- UCL Institute of Origins (page 63)
- UCL Biosystems Network (page 30)
- UCL Centre for Digital Humanities (page 56)
- UCL Urban Laboratory (page 68).

These new institutes and centres are being supported internally and embedded into UCL's governance and planning procedures. They provide a focus for both internal planning and research initiation, facilitate the training of postgraduate students in fields of contemporary significance and attract new funding. They offer a window to the outside world, showing and disseminating the excellence and significance of UCL research, and they work with industrial and other partners to realise the economic and social potential of our activities.

The UCL Grand Challenges

The UCL Grand Challenges – initially those of Global Health, Sustainable Cities, Intercultural Interaction and Human Wellbeing – draw on activity occurring on each of the preceding scales.

Individually, the brightest people can discover and analyse, advancing our knowledge. Collectively, they can develop and implement solutions to humanity's major challenges.

UCL has prioritised those areas in which partnerships transcending disciplinary boundaries can thrive, and where critical mass will deliver novel achievements. We have committed our research to the Grand Challenges, in order to mitigate and prevent those circumstances that produce needless suffering, ill health, stress, misunderstanding and conflict.

Our first, the Grand Challenge of Global Health, offers an example of how this process can work. Across UCL, both cutting-edge research by thousands of experts in specialist themes and groundbreaking collaborative work by multidisciplinary groups take place. The UCL Institute for Global Health acts as a hub, bringing together this immense multidisciplinary wealth of intellectual capital, to provide innovative, workable solutions at scale. This collective effort produces a variety of outcomes which, in turn, stimulate further action by academics, policymakers, regulators, government, funding bodies and charities, and industry. The ultimate results are the delivery – in partnership with local communities and organisations – of effective and efficient programmes and capacity-building to improve the health of people in the developing world.

In 2009 UCL formally launched its Grand Challenge of Sustainable Cities, to rally the university's breadth of expertise in service of urban sustainability. Hundreds of invited guests – including policymakers and practitioners from government bodies and non-governmental organisations, architectural practices and

engineering firms – were welcomed by UCL President and Provost Professor Malcolm Grant, who said that by the end of the 21st century some 80% of humanity would live in cities. This rapid growth would further stress the urban environment, posing significant problems in areas such as food security, energy, water, waste, transport, economy, trade, manufacture, wealth creation and quality of life – problems UCL is poised to address.

The Grand Challenge of Intercultural Interaction examines the causes and features of social and cultural diversity, assesses their implications and devises novel strategies to address them. It works to mobilise expertise on the complexity of relations between individuals and groups from different ethnic, religious and linguistic backgrounds and heritage, between states, regions and civil societies, and between intellectual and artistic traditions and developments.

The Grand Challenge of Human Wellbeing considers both the nature of being human and the nature of wellbeing. It encompasses: how to achieve lifelong wellbeing for individuals and for society, including physical, mental, social and environmental wellbeing; how to achieve wellbeing in the context of different social and economic goals and priorities; and topics relating to happiness, cultural wellbeing, health and social justice.

Over the next few years, we intend to fully exploit our expertise in these areas, in order to produce new outputs that will enable UCL to be not only a generator of knowledge, but also a source of wisdom.

Partnerships

UCL looks beyond its boundaries to develop research and its application. We are forming strategic partnerships to enable the excellence of our research to be extended as widely as possible. These and future partnerships will build on the existing and developing areas of thematic research (as well as those of departments, divisions and schools) outlined in this document.

UK Centre for Medical Research & Innovation

UCL is partnering with three of the world's leading biomedical research organisations – Cancer Research UK, the Medical Research Council and the Wellcome Trust – to form the UK Centre for Medical Research & Innovation (UKCMRI).

UKCMRI will help to tackle diseases that end lives early and stop people working, finding new ways to treat diseases such as cancer, tuberculosis, influenza and malaria that affect communities across the world, in the UK and in London.

UKCMRI will bring together the best scientists, doctors and researchers. The project will put experts from different areas of research to work near each other, so they can discuss new ways to overcome the problems that hold up treatments. Sharing knowledge and expertise will lead to more discoveries – which means more treatments for these major diseases.

UCL Partners

UCL and four of the UK's world-renowned hospitals – the Great Ormond Street Hospital for Children NHS Trust, the Moorfields Eye Hospital NHS Foundation Trust, the Royal Free Hampstead NHS Trust and the University College London Hospitals NHS Foundation Trust – form UCL Partners, one of just five Department of Health-designated Academic Health Science Centres.

As Europe's leading centre of excellence in health research, UCL Partners involves more than 3,500 scientists, senior researchers and consultants, with a combined annual turnover of around £2 billion.

By pooling resources and expertise, UCL Partners – which treats more than 1.5 million patients every year – will be able to deliver the benefits more rapidly to patients.

Yale University

UCL has formed an alliance with Yale University – also involving UCL Partners and Yale/New Haven Hospital – to improve global health through scientific research, clinical and educational collaboration. Its initial focus is on cardiovascular disease, cancer and neurosciences.

The alliance is unusual in that both institutions are also in partnership with extensive hospital complexes. In addition to exchanging expert physicians to treat individual cases at each site, the members of the collaboration will make use of telemedicine technology to share clinical information and expertise among themselves, and eventually with other institutions around the world.

By analysing healthcare delivery in the diverse settings overseen by each institution, researchers will work to develop best management practices for hospitals.

UCL School of Energy & Resources, Australia

The UCL School of Energy & Resources, Australia (SERAus), is the university's first overseas campus, a research-led academic facility in Adelaide. It is the outcome of a partnership agreement between UCL, the Government of South Australia and Santos Limited, one of Australia's largest energy companies.

UCL SERAus provides a range of programmes, designed for both new graduates and established professionals, to address areas of skills shortages identified by industry and government, and provide scientists and engineers with management skills through courses designed specifically for the energy sector.

The school focuses on the needs of the energy and resources business sector. By working closely with industry, business consultancies and government departments in Australia and beyond we seek to ensure that our MSc curriculum produces highly-employable graduates.

Comprehensive/Specialist Biomedical Research Centres

UCL is the academic partner in one of five new Comprehensive Biomedical Research Centres (CBRCs) and two of six new Specialist Biomedical Research Centres (SBRCs) announced by the Department of Health in 2006: the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre, the

Moorfields/UCL Institute of Ophthalmology SBRC and the Great Ormond Street Hospital for Children NHS Trust/UCL Institute of Child Health SBRC.

Each of the centres' research themes is based around an existing internationally recognised research programme designed to take the advances achieved by basic laboratory science through to clinical advances, in order to save lives, prevent suffering and improve quality of life. Underlying all of the themes is an educational programme designed to train the next generation of outstanding healthcare researchers.

Higher Education London Outreach

Higher Education London Outreach (HELO) is a £1.3-million project led by UCL in partnership with MegaNexus Ltd and supported by London Business School. The scheme enables London businesses to access free consultancy and technical expertise from these leading institutions.

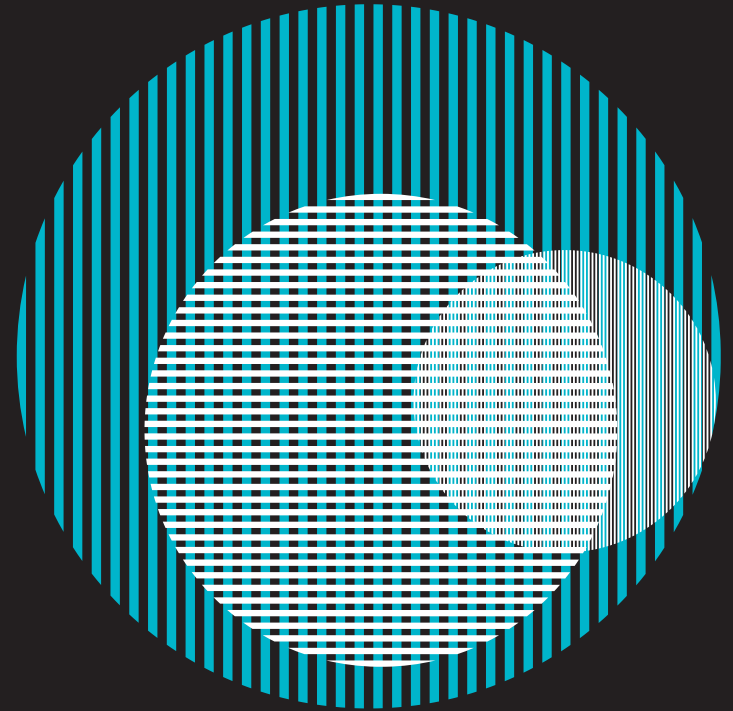
HELO provides: assistance with developing business or technology strategies; technical support for new products or support for production problems; enhancement of the environmental capabilities of companies, development of greener products or production methods; general technical advice; business development and marketing support; and training and staff development.

Beacon for Public Engagement

UCL is one of six Beacons of Public Engagement in England and the only one in London, as part of a nationwide initiative to get universities more closely involved with their local communities and the wider public.

As a Beacon, UCL received £1.2 million to build on its extensive existing outreach programme with schools, colleges, museums, and community and other relevant groups. It works with partners including the British Museum, the South Bank Centre, Birkbeck College, the Cheltenham Science Festival, Arts Catalyst and City & Islington College, which ensures a unique grouping of expertise, networks and contacts to give UCL opportunities for wide engagement with the general public, and also for focused work with small groups, including some of London's most disadvantaged communities.

UCL Research Themes



AGEING & WELLBEING



Research in this theme spans the fundamental biological mechanisms of ageing, through research on age-related ailments to understanding the biological, medical, psychosocial, environmental, economic and domestic determinants of healthy ageing.

Work in ageing and wellbeing will form the core of our activity in the Grand Challenge of Human Wellbeing (page 16).

Mental Health is also a developing theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Long-Term Conditions – Diagnosis, Treatment & Management and Neurodegeneration are also themes of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Centre for Stem Cells & Regenerative Medicine – page 31
- Centre for Economic Research on Ageing – page 38
- UCL Consortium for Mitochondrial Research – page 45
- Global Health Research Theme – page 47
- UCL Centre for Behavioural & Social Sciences in Medicine – page 50

UCL CRUCIBLE Centre for Lifelong Health & Wellbeing

RESEARCH AIM

- to bring together research groups from across UCL, creating, supporting and delivering innovative research to meet this challenge of high-quality wellbeing in the context of increased life expectancy

UCL CRUCIBLE is backed by more than £3 million over five years, ensuring that leading UCL scientists and academics have both the time and resources to reach across disciplinary boundaries and engage in research that improves humanity's health and wellbeing.

UCL Institute of Healthy Ageing

RESEARCH AIM

- to bring together researchers working on the basic biology of ageing (biogerontology) with those working to understand the causes of ageing-related disease

By merging biogerontology and the study of ageing-related diseases, the UCL Institute of Healthy Ageing aims to develop a new translational biogerontology, using the ageing process as a point of intervention to protect against the diseases of old age.

UCL Centre for Ageing & Mental-Health Sciences (CAMHS)

RESEARCH AIMS

- to develop and support interdisciplinary research and education
- to provide a clear and cohesive vision for academic work in ageing and mental-health sciences
- to promote high-quality research in basic and applied science in relation to ageing, epidemiology, therapies and services

UCL Accessibility Research Group (ARG)

RESEARCH AIMS

- to carry out basic and applied research into all aspects of accessibility to the physical, sensory and cognitive environment
- to work towards the elimination of barriers to access for all people, especially people who experience physical, sensory or cognitive barriers to their involvement in society
- to base research on a user-centred approach, working with people to understand their difficulties and to investigate solutions they find appropriate
- to disseminate results and work in progress to as wide an audience as possible

The UCL ARG's research interests include issues such as: infrastructure design; pedestrian manoeuvrability; specification and design of accessible vehicles; rural public transport; urban public transport micro-networks; community development; information systems for people with learning difficulties; transport problems for people with mental-health problems; coordination of transport resources; manoeuvrability of wheelchairs in restricted spaces; biomechanics of wheelchair users and their carers; and ethics, social inclusion and access to justice in planning processes.

MRC Unit for Lifelong Health & Ageing

RESEARCH AIM

- to realise the scientific potential of the MRC National Survey of Health & Development as a world-class, interdisciplinary lifecourse study of ageing by: scientific discovery of life-course influences on normal

and healthy ageing; transfer of knowledge to policymakers, health practitioners and other research users; and promotion of healthy ageing

The MRC Unit for Lifelong Health & Ageing incorporates the MRC National Survey of Health & Development, the oldest of the British birth cohort studies, unique in having data from birth to age 60 years on the health and social circumstances of a representative sample of men and women born in England, Scotland or Wales in March 1946.

English Longitudinal Study of Ageing

RESEARCH AIM

- to explore the unfolding dynamic relationships between health, functioning, social networks and economic position

The English Longitudinal Study of Ageing is the first study in the UK to connect the full range of topics necessary to understand the economic, social, psychological and health elements of the ageing process. It is a study of people's quality of life as they age beyond 50 and of the factors associated with it, including: health, disability and healthy life expectancy; economic position and both physical and cognitive health; determinants of economic position in older age; timing and circumstances of retirement and post-retirement labour-market activity; social networks, support and participation; and household and family structure and the transfer of resources. It is a partnership between UCL Epidemiology & Public Health, the Institute for Fiscal Studies, the National Centre for Social Research and the University of Cambridge.

ESRC International Centre for Lifecourse Studies in Health & Society (ICLS)

RESEARCH AIM

- to investigate processes throughout the lifecourse that relate the development of personal and professional skills to health and wellbeing, and to patterns of employment and social participation

Identifying factors associated with enhanced childhood wellbeing may have lifelong consequences: this information can be used to inform policy with influences on health and wellbeing throughout life. The ICLS's research is possible due to the unique longitudinal birth cohort studies that have been carried out in the UK and the availability of comparative international data.

BIOMEDICAL IMAGING



Research in this theme applies a wide range of technologies and includes both fundamental and applied fields, such as neuroimaging, medical-imaging computing, cell and molecular imaging, nuclear medicine, non-neurological medical imaging and preclinical imaging.

Imaging – Structural, Functional & Molecular and Neuroimaging – Future Impact on Patient Care are also themes of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Medical-Modelling Group – page 45
- Neuroscience Research Theme – page 60

UCL Centre for Advanced Biomedical Imaging

RESEARCH AIMS

- to establish an integrated strategy for the development and application of novel in vivo imaging technologies to further understand the mechanisms of disease and develop therapeutic strategies
- to deliver a multimodal-imaging programme to investigate the molecular, functional and structural consequences of the disease process on a range of different scales

The development of imaging technology is an essential part of the translational pipeline for drug development and personalised medicine, and is integral to research and adoption of imaging in the pharmaceutical industry. The UCL Centre for Advanced Biomedical Imaging's experimental imaging strategies will help to remove major 'bottlenecks' in the translation of new discoveries to the clinic and generate the knowledge and understanding to transform human health and wellbeing.

UCL Centre for Medical Image Computing (CMIC)

RESEARCH AIM

- to contribute to the translational pipeline from imaging methodology arising in mathematics, computer science, physics, chemistry and the engineering disciplines, to biomedical sciences and healthcare

A joint venture between UCL Medical Physics & Bioengineering and UCL Computer Science, the UCL CMIC combines excellence in medical-imaging sciences with innovative computational methodology. Its research – focused on detailed structural and functional analysis in neurosciences, imaging to guide interventions, image analysis in drug

discovery, imaging in cardiology and imaging in oncology, with a strong emphasis on e-science technologies – finds application in biomedical research and in healthcare.

UCL Centre for Neuroimaging Techniques (CNT)

RESEARCH AIMS

- to promote an awareness within UCL of research on brain anatomy, function, physiology and pathology, using a variety of imaging techniques
- to promote excellence in neuroimaging research through an annual award to a young UCL investigator
- to provide a forum within UCL in which ideas can be exchanged and collaborations formed between practitioners of different neuroimaging techniques

The UCL CNT is a virtual centre comprising more than 300 investigators and students with an interest in neuroimaging across all physical and temporal scales.

Wellcome Trust Centre for Neuroimaging

RESEARCH AIM

- to understand how thought and perception arise from brain activity, and how such processes break down in neurological and psychiatric disease

The Wellcome Trust Centre for Neuroimaging, UCL, brings together clinicians and scientists who use neuroimaging techniques to study higher cognitive function, including vision, memory, language and reasoning, emotion, decision-making and motor control.

Centre for Neuroimaging

RESEARCH AIMS

- to provide state-of-the-art neuroimaging facilities for the School of Psychology, Birkbeck College, and UCL Psychology & Language Sciences
- to encourage new neuroimaging collaborations between the two institutions

The Centre for Neuroimaging was founded through a joint Science Research Investment Fund grant. It features a magnetic resonance scanner equipped for echo-planar, diffusion-tensor and structural imaging, as well as facilities for participant reception and testing, and data post-processing.

BIOPROCESSING



Research in this theme aims to create links between advances in life science and fundamental engineering in order to achieve successful outcomes for global healthcare. Research includes studies leading to the creation of new processes for more highly potent macromolecular therapies, the advanced design of small molecule building blocks for drug and specialty chemicals, and the understanding of the impact of the bioprocess environment on the proliferation and controlled differentiation of human cells for regenerative medicine. The research theme is highly multidisciplinary and involves biochemical engineering, computer science, mathematics, chemistry, molecular and structural biology, clinical medicine and surgery, good manufacturing practice facilities, chemical engineering and nanotechnology.

SEE ALSO

- UCL Biosystems Network – page 30
- UCL Centre for Stem Cells & Regenerative Medicine – page 31
- UCL Centre for Chemical Biology – page 45
- UCL Centre for Nanotechnology, Biomaterials & Tissue Engineering – page 60

UCL Innovative Manufacturing Research Centre (IMRC) in Bioprocessing

RESEARCH AIM

- to change fundamentally the ways in which novel bioprocesses are created for the delivery of complex and highly specific biopharmaceuticals for next-generation healthcare.

The multidisciplinary UCL IMRC in Bioprocessing draws upon academic expertise from a wide range of UCL departments as well as from recognised experts in other institutions throughout the UK and internationally. It considers the whole bioprocess dimension and employs a series of the most advanced expression systems and macromolecular products in order to create the necessary fundamental engineering insights. The research benefits from a 15-strong industrial steering group. Associated funding, especially through the Technology Strategy Board, provides the translational studies of the UCL IMRC outcomes. The research is also closely connected to the training ethos of the host department, UCL Biochemical Engineering, through the Industrial Doctoral Training Centre for Leadership in Bioprocessing.

UCL Bioconversion-Chemistry -Engineering Interface (BiCE) Programme

RESEARCH AIM

- to establish novel approaches to accelerate biocatalytic process creation and to integrate biocatalysis within optimized, atom-efficient multistep chemical syntheses

The multidisciplinary UCL BiCE Programme brings together academics from three faculties (UCL Engineering Sciences, UCL Mathematical & Physical Sciences and UCL Life Sciences) and focuses on the creation of sustainable and environmentally benign routes to the synthesis of value-added chemicals from renewable feedstocks. Applications include the manufacture of both commodity and fine chemicals (industrial biotechnology) and pharmaceuticals. The programme draws upon specialist skills in synthetic and molecular biology, analysis of enzyme

structure and function, metabolic pathway engineering and modelling, bioinformatics, microfluidic and microscale processing, process automation, scale-up and modelling, and chemical synthesis and analysis. A consortium of 13 leading national and international companies provides an industrial steering group.

UCL RegenMed

RESEARCH AIM

- to facilitate the translation of the basic science into therapies for routine clinical practice

The multidisciplinary UCL RegenMed programme is focused on the bioprocess-engineering aspects of stem-cell and regenerative-medicine translation, including scale-up and scale-out. It takes a 'whole bioprocessing' approach: the complete process from donor or patient biopsy all the way through to clinical implantation into the patient. The range of UCL expertise is complemented by a large and growing number of external collaborators from academia, healthcare professions and the regenerative-medicine industry.

CANCER



Research in this theme brings together scientists, clinician-scientists and clinicians, tackling all aspects of fundamental, laboratory and clinical activity.

Cancer is also a developing theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Cancer – Improving Cancer Care by Integrating Molecular Diagnostics, Genomics & Experimental Therapeutics is also a theme of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- MRC Laboratory for Molecular Cell Biology – page 31
- UCL Consortium for Mitochondrial Research – page 45
- UCL Genetics Institute – page 46
- Bloomsbury Centre for Bioinformatics – page 47

UCL Cancer Institute

RESEARCH AIMS

- to house 300 scientists eventually, bringing together one of the world's major concentrations of biomedical researchers to influence the development and implementation of a UCL-wide policy on cancer research and to consolidate cancer sciences within a single entity at UCL
- to foster integration between cancer researchers across UCL Biomedicine and the clinical activities of partner hospitals – University College London Hospitals NHS Foundation Trust (including the National Hospital for Neurology & Neurosurgery, Queen Square), the Great

Ormond Street Hospital for Children NHS Trust and the Royal Free Hampstead NHS Trust – facilitating access to high-quality extensive genetic data, as well as a body of patients to participate in clinical trials, before, during and after treatment

- to carry out internationally recognised cancer and translational research, discovering new strategies to prevent, diagnose, monitor and cure human cancer
- to engage and educate its local community in central London in aspects of cancer research, prevention and care
- to train a new generation of cancer researchers and cancer-clinician scientists

At the heart of the institute's vision is the fostering of interactions and collaborations between cancer researchers and scientists in nanotechnology, bioinformatics, developmental biology, stem-cell research, immunity, engineering and medicinal chemistry.

UCL National Medical Laser Centre

RESEARCH AIM

- to understand the interaction of light with living tissue in the laboratory and use the results to develop new techniques for the diagnosis and treatment of human disease

The UCL National Medical Laser Centre is a world leader in photodynamic therapy – the combination of light and a photosensitising drug – having defined much of the biology that has led to clinical applications in the treatment of dysplasia and cancer in the mouth, oesophagus, lungs and other organs.

Cancer Research UK & UCL Cancer Trials Centre (CTC)

RESEARCH AIM

- to investigate new cancer treatments, or methods of early detection, through

the design, conduct and analysis of multicentre national and international randomised phase III trials, feasibility studies and early phase I or II studies

The UCL CTC conducts trials in a range of tumour areas, most of which are based on evaluating chemotherapy, radiotherapy or surgery. It is responsible for a significant proportion of the national academic cancer-trials portfolio. A key component of its work is translational research, since its clinical databases can be used to examine biological pathways that may define further the use of new treatments, or lead to the testing of novel therapies in future trials.

CARDIOVASCULAR MEDICINE



Research in this theme uncovers how the heart and blood vessels work and translates that knowledge into new treatments for patients.

Cardiovascular research is also a developing theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Cardiovascular Disease is also a theme of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Genetics Institute – page 46
- Bloomsbury Centre for Bioinformatics – page 47
- Experimental & Systems Medicine Research Theme – page 44

UCL Institute of Cardiovascular Science

RESEARCH AIM

- to unite more than 400 cardiovascular scientists and cardiologists with scientists from disciplines such as chemistry, physics and mathematics, in order to integrate basic and applied sciences to produce translational research, leading to clinical therapeutics, new diagnostics and preventative medicine

In partnership with Great Ormond Street Hospital and UCL Hospitals, the UCL Institute of Cardiovascular Science's research themes are: ageing, obesity and metabolism; arrhythmia; cardiac development and morphology; cardiovascular cell signalling; cerebrovascular disease; and genetics and epidemiology.

UCL Centre for Cardiovascular Genetics

RESEARCH AIM

- to identify the genetic factors that contribute to an individual's risk of developing coronary heart disease

As it is clear that the environment modulates the impact of genetic factors, the UCL Centre for Cardiovascular Genetics' work has focused on examining gene-environment interactions in plasma lipid metabolisms, inflammation, energy homeostasis, left-ventricular mass, and haemostasis and thrombosis.

Hatter Cardiovascular Institute

RESEARCH AIMS

- to maintain its role as a world leader in the area of cardiovascular research and increase knowledge and teaching in this key area

- to maintain a strong relationship between basic and clinical scientists
- to maintain a strong publication record, based upon hypothesis-driven research which has direct clinical relevance

The Hatter Cardiovascular Institute contributes to the greater understanding of cardiovascular disease, with the ultimate aim of generating new therapies for the treatment of heart disease.

CELL & MOLECULAR BIOLOGY



Research in this theme ranges from the mechanisms of normal and abnormal cell functions and embryo development, neural development, regeneration and repair, stem-cell biology, evolution and development, and the molecular genetics of cells and embryos.

Cellular & Gene Therapy is also a theme of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Institute of Healthy Ageing – page 23
- Experimental & Systems Medicine Research Theme – page 44

UCL Biosystems Network

RESEARCH AIM

- to facilitate, coordinate and strengthen interdisciplinary, cross-faculty research in systems biology, systems medicine and synthetic biology

Researchers within the UCL Biosystems Network come from across various disciplines but are united by a common interest in combining experimental and theoretical approaches to get at the principles and mechanisms underpinning life processes. This type of systems-level analysis and understanding can then be applied to the treatment and prevention of disease, and towards the predictable re-engineering of living systems.

UCL Centre for Stem Cells & Regenerative Medicine

RESEARCH AIMS

- to understand stem-cell biology, by identifying the genes that define stem-cell properties, their functions and mechanism of action, as well as the factors that control cell proliferation and differentiation along specific pathways
- to define culture conditions that favour the isolation, maintenance and expansion of stem cells
- to develop biotechnological applications, such as the use of stem cells for drug screening
- to translate preclinical stem-cell and tissue-engineering research into therapeutic modalities for specific diseases
- to address the societal implications and socio-economic impact of this innovative research, as well as biomedical ethics and legal issues

The UCL Centre for Stem Cells & Regenerative Medicine brings together 150 research groups from several faculties, specialised hospitals and institutes across UCL with a common interest in all aspects of stem cells, tissue engineering, repair and regeneration, and the development of their therapeutic and biotechnological potential. This research is highly multidisciplinary and increasingly incorporates ideas and

technologies beyond the life and medical sciences, including engineering, nanotechnology, mathematics and the physical sciences, computing, bioinformatics and chemistry. A strong emphasis is placed on capacity-building and training activities, such as the Wellcome Trust-funded PhD programme on Developmental & Stem-Cell Biology, that offers students a unique environment with one of the largest and strongest concentrations of high-quality developmental and stem-cell biologists in the world.

MRC Laboratory for Molecular Cell Biology

RESEARCH AIMS

- to carry out internationally competitive research into the molecular mechanisms underlying cell behaviour relevant to human disease
- to provide the structural, technical and intellectual environment that will attract the highest calibre of principle investigator
- to provide a first-class environment for the training of younger scientists at both the pre- and postdoctoral levels in the area of molecular cell biology
- to facilitate cross-departmental interactions at UCL and to promote scientific opportunities

The scientific strengths of the MRC Laboratory for Molecular Cell Biology cover four general biological themes: cytoskeleton, protein trafficking and signal transduction, polarity and morphogenesis, and cell cycle. This work has an impact on at least five important human disease topics: neuronal disorders, cancer, viral infection, inflammation and visual disorders.

Institute of Structural & Molecular Biology (ISMB)

RESEARCH AIMS

- to provide a scientific environment conducive to world-class research in the field of protein science
- to integrate the chemical and physical sciences to provide the molecular basis of protein function
- to exploit the knowledge of protein function to further the understanding of human diseases

A major goal of UCL and Birkbeck College's ISMB is to promote interdisciplinary research through its six programmes: structural biology; chemical biology; biophysics; bioinformatics; proteomics; and biochemistry and molecular biology. The ISMB organises multidisciplinary activities that are aimed at increasing collaborative, interdisciplinary research within speciality areas, and between these areas and the vast biomedical research taking place at UCL and the MRC National Institute for Medical Research.

CHILDREN'S & WOMEN'S HEALTH



Research in child health includes, but is not limited to, the topics of cancer, cardiac and respiratory, genetics, developmental biology, infection and immunity, neurosciences and mental health, nutrition and paediatric surgery. Research in women's health ranges from laboratory science to clinical skills to social and behavioural sciences.

Women's Health and Child Health are also themes in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Women's Health & the Newborn is also a theme of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

The Great Ormond Street Hospital for Children NHS Trust and the UCL Institute of Child Health are also home to a National Institute for Health Research Specialist Biomedical Research Centre (page 18), focusing on: Molecular Basis of Childhood Diseases; Gene, Stem & Cellular Therapy; and Novel Therapies for Childhood Diseases.

SEE ALSO

- Global Health Research Theme – page 47
- Bloomsbury Centre for Bioinformatics – page 47
- UCL Centre for Developmental Cognitive Neuroscience – page 61
- UCL Developmental Cognitive Neuroscience Unit – page 63

UCL Institute for Women's Health

RESEARCH AIMS

- to bring together the expertise of clinicians and researchers from a diverse range of disciplines
- to deliver excellence and innovation in research, clinical practice, education and training
- to make a real and sustainable difference to women's health locally, national and worldwide

The objective of the institute is to make a difference to the health of women in the UK and internationally by the creation of a leading centre of excellence for research, clinical care, education and training. From childhood to puberty, motherhood to menopause, maturity to old age, the lives of women around the world are fascinating and complex journeys filled with great joys and also suffering. From developmental problems to menstrual abnormalities, infertility to hormone deficiencies, premature labour to neonatal death, bladder problems to cancer, there are now amazing opportunities to make this journey better.

UCL Centre for International Health & Development (CIHD)

RESEARCH AIMS

- to promote the health, nutrition and welfare of children and their families in less developed countries
- to develop the scientific basis for improvement in clinical practice and public health using robust epidemiological, laboratory and social-science methodologies
- to capacity-build with partner organisations in developing countries to disseminate its work as widely as possible

The UCL CIHD's main research themes are: maternal and newborn health; nutrition and livelihoods; early childhood development; and disability and children in difficult circumstances. It collaborates with a number of centres of excellence (especially in Africa and Asia) and shares results of research widely, so that improvement can be made to the health, nutrition and development of people in poor communities. It also works with a range of international agencies and NGOs promoting the use of evidence-based good practice.

MRC Childhood Nutrition Research Centre (CNRC)

RESEARCH AIM

- to conduct research on the impact of nutrition on the health and development of infants and children, in order to underpin and foster the development of both clinical and public-health practice and professional training in paediatric nutrition

The MRC CNRC's seven groups span the field of nutrition in relation to cognitive function, cardiovascular health, bone health, body composition and energy metabolism, dietetics, biochemistry and stable isotope research on nutrition and metabolism. The centre is able to put together multidisciplinary teams to approach key issues in nutrition within the generic areas of nutrition and public health, nutrition and disease, adverse effects of foods and, importantly, the impact of early nutrition on long term outcome.

MRC Centre of Epidemiology for Child Health

RESEARCH AIMS

- to improve the health and wellbeing of children through interdisciplinary collaborative research that addresses questions central to clinical practice and to public health
- to understand the biological, genetic, developmental, environmental and social mechanisms underlying the early life origins of illness, health and wellbeing in childhood and adult life, and the longer-term consequences of early life exposures and interventions
- to improve the scientific basis of strategies for the prevention, diagnosis and treatment of diseases affecting children and the adults they will become
- to increase research capacity through the provision of training in epidemiology, biostatistics and academic public health applied to children

The MRC Centre of Epidemiology for Child Health, UCL, is known for its research on: infections of the mother, her foetus and child; lifecourse and intergenerational epidemiology; inherited and congenital disorders of the foetus and child; paediatric ophthalmic epidemiology; childhood growth and obesity; statistical methods for growth and lifecourse analyses; and policy research.

COMMUNICATION, LANGUAGE & HEARING

Research in this theme addresses human communication in all its forms, including, but not limited to, phonetics, phonology, morphology, semantics, pragmatics, neural systems, perceptual processes, language development and learning, sign language and lip-reading, as well as the nature of deficits in any part of the chain of communication and possible ways of ameliorating them.

UCL Centre for Human Communication (CHC)

RESEARCH AIM

- to encourage and facilitate cross-disciplinary interaction among the full spectrum of UCL staff involved in research on human language and communication across the lifespan, in order to understand normal function better, and improve remediation of various communication disorders

The UCL CHC brings together leading research across UCL centred on human communication in all its forms, and particularly on language. This spans an unusual range of disciplines, from those traditionally considered to lie in the humanities and social sciences, to those of a more scientific, engineering or medical aspect. The UCL CHC enhances the university's research across these various disciplines through workshops, lecture series and building interdisciplinary research activity. Areas studied include: basic aspects of hearing, speech and language, both in the adult and the developing child; linguistic theory concerning syntax, phonology and

pragmatics; speech production and speech perception; acquisition of first- and later-learned languages; sign languages; developmental language disorders like stuttering, dyslexia and specific language impairment; acquired language disorders like aphasia and dysarthria; hearing impairments and their remediation through training and prostheses (hearing aids and cochlear implants); and speech recognition and speech synthesis by computer.

UCL Ear Institute

RESEARCH AIM

- to lead the world in understanding hearing and fighting deafness through an interdisciplinary approach

The UCL Ear Institute is truly interdisciplinary: studies aimed at understanding the genetic bases of human forms of deafness inform clinical investigations designed to provide early warning to individuals and families most susceptible to age-related or noise-induced hearing loss; investigations into the development of the inner ear, and its potential for repair and regeneration, cross the boundaries of individual research labs and ensure that progress in one discipline informs research in another; and laboratories investigating important functions in hearing that arise at different brain centres share resources, facilities and personnel.

UCL Centre for Speech & Language Therapy Research (CSLTR)

RESEARCH AIMS

- to foster collaborative research related to health services in the field of speech and language pathology and therapy
- to disseminate current research

information and encourage implementation in clinical practice

- to foster partnerships in order to build research capacity across speech and language therapy centres, including making bids for funding
- to involve NHS users in research development
- to be a resource for clinicians (primarily speech and language therapists) by providing access to web-based test materials for use in assessment and therapy

The UCL CSLTR focuses on clinical and health service-related research in speech and language disorders, with an emphasis on the practical implementation of research.

UCL Centre for Applied Interaction Research (CAIR)

RESEARCH AIMS

- to provide a forum for the development of ideas relating to the understanding of communication disorders through interaction and conversation
- to provide a forum for the analysis of video and audio data of human interaction
- to support and promote interdisciplinary research
- to promote collaborative links between groups and individuals with an interest in interaction research

UCL CAIR facilitates research and links between groups and individuals undertaking applied research into normal and disordered human interaction, with an emphasis on analysing video or audio recorded naturally occurring conversations that take place in health, social and education settings. UCL CAIR brings together academics and stakeholders from a number of institutions, clinical and education settings, and third-sector organisations around the UK.

ESRC Deafness Cognition & Language Research Centre

RESEARCH AIMS

- to bring together leading deaf and hearing researchers in the fields of sign linguistics, psychology and neuroscience
- to provide a unique perspective on language and thought, based on deaf people's communication
- to place sign languages and deaf people in the centre of the general understanding of how language and communication work within linguistics, psychology and child development

The research themes of the ESRC Deafness Cognition & Language Research Centre, UCL, include: assessment tools for British Sign Language; signed and spoken language development in deaf children; face-to-face communication and gesture; atypical sign language; spoken and signed language processing; and the deaf individual and the community.

COMPUTATIONAL SCIENCE & DIGITAL SYSTEMS



Research in this theme includes, but is not limited to: digital-information systems and policymaking; human-computer interaction; software-systems engineering; astrophysics and remote sensing; bioinformatics and computational biology; climate change and earth observation; finite element analysis and computational fluid dynamics; optimisation, data analysis and molecular dynamics; epidemiology; high-energy physics; organic and pharmaceutical materials simulation; earth-materials simulation; nanoscience and defects simulation; surface science and catalysis simulation; mathematical sciences; medical imaging; molecular quantum dynamics and electronic structure; neuroscience; and systems biomedicine.

UCL Research Computing underpins our Computational Science theme through a collaborative approach to the provision, management and development of services and infrastructure for capacity and capability in high-performance computing, the exploitation of interdisciplinary synergies across the wide spectrum of research at UCL.

SEE ALSO

- UCL Centre for Medical Image Computing – page 25
- UCL Medical-Modelling Group – page 45
- UCL Clinical Operational Research Unit – page 50
- Media, Communications & Information Research Theme – page 56
- Gatsby Computational Neuroscience Unit – page 62
- UCL Space Group – page 68
- UCL Centre for Advanced Spatial Analysis – page 69

UCL Centre for Computational Science

RESEARCH AIMS

- to harness emerging petascale computational resources to produce genuine scientific advances
- to design and promote methodologies which make computation-based and patient-specific medical techniques possible in areas as disparate as HIV infection and neurosurgery
- to develop methods for the prediction and design of nano-composite materials through atomistic simulation
- to utilise computational methods to gain fundamental understanding of complex fluids

The UCL Centre for Computational Science's different computational techniques span time- and length-scales from the macro-, through the meso- and to the nano- and micro-scales. It is committed to studying new approaches (eg the Grid) and techniques that bridge these scales, as well as crossing boundaries between traditional research communities in computer science, materials science and biology.

UCL Centre for Computational Statistics & Machine Learning (CSML)

RESEARCH AIM

- to pioneer an emerging field that brings together statistics, the recent extensive advances in theoretically well-founded machine learning, and links with a broad range of application areas across UCL, including neuroscience, astrophysics, biological sciences and complexity science

The UCL CSML spans three departments: UCL Computer Science, UCL Statistical Science and the Gatsby Computational Neuroscience Unit at UCL. There is a deliberate intention to maintain and

cultivate a plurality of approaches within the centre, including Bayesian, frequentist, online and statistical.

UCL Interaction Centre (UCLIC)

RESEARCH AIMS

- to conduct scientifically based human-computer interaction research that starts with the study of people and interactive phenomena
- to develop novel design solutions and methods for analysing interactive systems, and thus have an impact on society

Based on the disciplines of psychology and computer science, UCLIC researches a range of phenomena related to human-computer interaction, including: human error and cognitive resilience; exploratory and goal-directed search; sensemaking, information work and digital libraries; design practice; collaborative learning; experiences of novel interaction; affect, emotion, and subjective experience; engagement and immersion; and physical and spatial aspects of interactions.

London Software Systems

RESEARCH AIM

- to develop techniques and tools for designing large-scale complex information-technology systems, and make them available to industrial and academic users for evaluation

London Software Systems brings together the UCL Software Systems Engineering and the Imperial College Distributed Software Engineering groups, to link the former's tradition of work on networks and communications and the latter's tradition of work on theory and formal methods as well as distributed programming environments.

Thomas Young Centre at UCL (TYC@UCL)

RESEARCH AIMS

- to provide a focus for computational materials science at UCL and increase its visibility to the outside world
- to create the critical mass needed for large collaborative bids for support to the research councils and industry
- to coordinate graduate teaching and training across the participating departments

TYC@UCL is an alliance of more than 30 UCL research groups engaged in computational materials science, and operates within the UCL Centre for Materials Research (page 55). It is the UCL branch of the London-wide Thomas Young Centre (TYC), which was established to coordinate activities among the leading research groups in London who work on the theory and simulation of materials, thereby enhancing both the quality of research and its impact on industry and academia.

ECONOMIC ANALYSIS



Much of the research in this theme is conducted in partnership between UCL Economics and the Institute for Fiscal Studies, Britain's leading independent microeconomic research institute.

SEE ALSO

- UCL Jevons Institute for Competition Law & Economics – page 55
- UCL Centre for Law & Economics – page 55

ESRC Centre for the Microeconomic Analysis of Public Policy (CPP)

RESEARCH AIM

- to carry out core analytical research that will allow informed microeconomic analysis of major public-policy issues, from productivity growth to poverty reduction, and from promoting employment to ensuring sound public finances

The CPP's focus is on the careful modelling of individual, household and firm behaviour, combining cutting-edge empirical analysis with detailed understanding of policy options and implementation.

Centre for Economic Research on Ageing (CERA)

RESEARCH AIM

- to develop new techniques and collect new data designed to understand issues raised by ageing populations, and in particular the topics of retirement, saving and pension provision

At the heart of CERA is the analysis, and design, of individual-level data on all aspects of later life, including economic and social position, health and cognitive function.

ESRC Centre for Economic Learning & Social Evolution (ELSE)

RESEARCH AIM

- to develop a common view of important aspects of human economic behaviour

ELSE is devoted to the study of those areas of human behaviour in which economics and psychology come together. Methods and researchers from UCL Mathematics

form an important part of the centre's work. Its research is grouped into three themes: industrial organisation, individual decision-making and interactive decision-making.

ESRC Centre for Microdata Methods & Practice

RESEARCH AIM

- to develop and apply methods for modelling individual behaviour, the influences on it and the impact of policy interventions.

The centre conducts research and organises conferences, symposia, workshops and training courses. It maintains an extensive network of fellows at home and abroad, and is home to one of the world's leading working papers series in the field of microeconometrics.

Centre for the Economics of Education (CEE)

RESEARCH AIM

- to undertake systematic and innovative research in the field of the economics of education by applying the latest techniques of empirical analysis

The CEE looks at a broad range of questions, including why people invest in education and training, the way education systems are organised, and the impact of education and skill acquisition on economic and social outcomes. Its programme covers education at all stages of people's lives.

Centre for the Evaluation of Development Policies (EDePo)

RESEARCH AIMS

- to identify successes and failures in policy interventions in developing countries

- to promote best practice in designing, conducting and evaluating interventions

EDePo's main objective is to generate knowledge about cost-effective, feasible and sustainable interventions that can be implemented in environments different from those for which they were originally designed. This requires understanding the mechanisms through which a particular programme works and so involves modelling the reaction of individual agents (individuals, households or firms) to the economic (and other) incentives provided by the programme.

ENERGY, ENVIRONMENT & TRANSPORT



Research in this theme provides the scientific endeavour necessary to shape human activity and policymaking, with particular emphasis on climate change, energy-demand reduction and transport systems. Other key areas include CO₂ technology, coast and estuarine management, environmental change, environmental law, and polar observation and modelling.

SEE ALSO

- UCL Centre for Sustainable Heritage – page 52
- London Centre for Nanotechnology – page 59
- UCL Urban Laboratory – page 68
- UCL Space Group – page 68
- UCL Complex Built Environment Systems Group – page 69

UCL Environment Institute

RESEARCH AIMS

- to act as a focus for interdisciplinary research on the environment at UCL, providing support activities rather than conducting the research itself
- to improve links between the UCL's research community, policymakers and private-sector interests
- to identify the environmental concerns that will drive future policy agenda and to contribute the science required to address them

The UCL Environment Institute is engaging in pan-UCL initiatives addressing themes including: water security; sustainable cities; population and migration; past climates and ecologies; biodiversity; climate predictions and impacts; carbon governance; and eco-culture. The institute also seeks to enhance connections between the arts community and environmental professionals through its artist- and writer-in-residence programmes.

UCL Energy Institute

RESEARCH AIMS

- to bring together different perspectives, understandings and procedures in energy research, transcending the boundaries between academic disciplines
- to bring together multidisciplinary teams, providing critical mass and capacity for large projects
- to develop and undertake research in the area of energy-demand reduction

The UCL Energy Institute coordinates and stimulates research on energy and carbon-emissions reductions across UCL through building multidisciplinary teams around ambitious projects. It also acts as the public interface for energy research and related activities in UCL. The institute focuses on understanding and reducing

energy demand, and the implications of energy supply-demand interaction for pathways to a low-carbon economy. It plays a leading role in advising government and industry through placing particular emphasis on data quality (by energy monitoring, analysis of existing data-sets, and model construction) and its use in evidence-informed policy and decision-making.

UCL Centre for Transport Studies

RESEARCH AIMS

- to carry out internationally recognised research in transport studies to support the provision of transport systems that meet the needs of society
- to improve understanding of the societal, economic, environmental and health effects of transport systems for users and citizens
- to contribute to the development of transport systems that are safe, convenient, accessible, reliable and affordable
- to explore the operation of public-access transport systems in terms of equity and sustainability
- to develop novel methodologies for the analysis, planning, survey, modelling, design and engineering of transport systems

The UCL Centre for Transport Studies works in partnership with other UCL centres and departments, and with leading universities in the UK, the EU and abroad, on research and dissemination. It draws on methodologies from across the social and physical sciences, and disseminates through publication of research outputs, education of research and graduate students, and advice to governments, consultants and practitioners.

UCL Centre for CO₂ Technology

RESEARCH AIM

- to develop breakthrough technologies for the large-scale reduction (eg alternative, low carbon, energy sources), removal (eg gas separation from flue emissions) and sequestration (eg long-term storage in geological and terrestrial systems) of carbon dioxide

The UCL Centre for CO₂ Technology works on five research themes: energy-systems design and optimisation; electrochemical energy conversion and storage; low-carbon chemical technologies; energy-systems safety and environmental engineering; and low-carbon energy technologies.

UCL Coastal & Estuarine Research Unit

RESEARCH AIM

- to carry out research and consultancy relating to coastal and estuarine processes, modelling and management

The UCL Coastal & Estuarine Research Unit's main interests and expertise include: coastal and estuarine processes; hydrodynamic and morphodynamic modelling; climate change and coastal morphodynamics; tidal wetland processes and restoration; flood defence and coastal protection; behavioural system modelling; coastal applications of remote sensing; and specialised environmental instrumentation.

UCL Environmental Change Research Centre (ECRC)

RESEARCH AIM

- to reconstruct, monitor and model environmental change, particularly in freshwater ecology, palaeolimnology and palaeoceanography, on timescales ranging from decades to hundreds of thousands of years

The UCL ECRC's research is concerned with the understanding of environmental change, past, present and future, especially with respect to aquatic systems and climate change. Research interests across the group are diverse but their unifying philosophy is a belief in the importance of setting contemporary environmental processes and problems in the context of longer timescale variability, and in the associated need to understand the interplay between natural variability on different timescales and the multi-layered and ever increasing impact of human activity on natural ecosystems.

UCL Centre for Law & the Environment

RESEARCH AIM

- to advance research and teaching and explore the role of law in meeting contemporary environmental and energy challenges

UCL Centre for Law & the Environment is committed to treating domestic law (UK), regional (EU) and international aspects of environmental law in a comprehensive and integrated manner. This approach is reflected in offerings on the LLM course and the supervision of doctoral students, as well as in the design of its research projects.

Centre for Polar Observation & Modelling (CPOM)

RESEARCH AIM

- to study processes in the Earth's polar latitudes that may affect the Earth's albedo, polar atmosphere, ocean circulation and global sea level

Funded by the Natural Environment Research Council and part of the National Centre for Earth Observation, CPOM uses theoretical and laboratory-derived understanding to form new mesoscale

models of interactions between the ice, ocean and atmosphere, and uses ground and satellite observations to test the predictions of these and other climate models. It is a partnership between UCL Earth Sciences, the University of Bristol and the University of Edinburgh.

OMEGA Centre for Mega Projects in Transport & Development

RESEARCH AIM

- to learn from and share lessons about experiences in the planning, appraisal and delivery of mega urban transport projects

The OMEGA Centre was founded under a grant from the Volvo Research & Educational Foundations in 2006. The centre has established a worldwide network of nine academic partner universities and numerous non-academic partners drawn from the public and private sectors. Under direction from UCL, the network is investigating decision-making in the planning, appraisal and delivery of mega urban-transport projects – roads, railways, tunnels and bridges, as well as combinations thereof – through a series of 30 case studies in Europe, North America, Asia and Australia. The ultimate aim is to derive a series of lessons and guidelines of both a generic and context-specific nature so as to aid future transport decision-makers in the public and private sector.

EUROPEAN STUDIES



Research in this theme encompasses the languages, cultures, socio-political systems and histories of European countries, the integration and governance of the European Union, and its cultural and geopolitical context.

SEE ALSO

- UCL Centre for Transnational History – page 52
- Migration Research Theme – page 58

UCL European Institute

RESEARCH AIMS

- to address key questions on the socioeconomic, political, legal and cultural aspects of Europe and the European Union
- to facilitate collaboration and stimulate intellectual activity and debate across the disciplines
- to promote early career researchers in the field of European studies
- to enhance the academic, public and policy impact of UCL research and expertise, both nationally and internationally
- to position UCL as a key informant on European issues to the public, policy sectors and the media

The UCL European Institute is a university-wide initiative to develop and promote UCL's profile and wealth of expertise on Europe and the European Union. As a hub for researchers from across the faculties, it aims to stimulate new research on the EU as a framework, on mobility and cultural understanding in Europe, and on the role of Europe in the world.

UCL Centre for the Study of Central Europe

RESEARCH AIM

- to promote research and teaching on the German-speaking countries (Austria and Germany), the Habsburg monarchy and its successor states (Croatia, the Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia and Ukraine, as well as the Baltic states)

The UCL Centre for the Study of Central Europe's approach to the region is multidisciplinary, comprising history, languages and literature, culture, politics and social sciences.

UCL Centre for Russian Studies (CRS)

RESEARCH AIMS

- to create a focus for cultural, historical, linguistic, literary and social-sciences research into Russia, past and present
- to promote knowledge and discussion of Russia in the broader academic community and with the public at large

UCL CRS advances joint and individual research on Russia, with particular focus on interdisciplinary and comparative approaches. Its activities enhance the quality of both postgraduate and undergraduate teaching and at the same time provide a 'home' for the many postgraduate students with an interest in Russia.

UCL Centre for South-East European Studies

RESEARCH AIM

- to promote teaching and research on South-East Europe, broadly conceived, with the emphasis on interdisciplinary approaches

The UCL Centre for South-East European Studies offers specialist coverage of the

following countries: Albania, Bosnia, Bulgaria, Croatia, Macedonia, Serbia and Romania. It supports an outstanding range of comparative and interdisciplinary teaching and research, and aims to promote knowledge and discussion of South-East Europe in the broader academic community and the public at large.

UCL Centre for European Politics, Security & Integration

RESEARCH AIM

- to generate and provide a venue for new thinking, anticipating contemporary policy debates, and to produce and support world-class scholarship covering all aspects of the politics of contemporary Europe

The centre has as its focal point the convergence of the processes of transition, integration and globalisation in the European context. It is broadly oriented towards theoretically and empirically informed, critical and normative approaches that are sensitive to national and sub-regional variation as well as capable of grasping the uniqueness of the pan-European context.

UCL Centre for Law & Governance in Europe

RESEARCH AIM

- to be a leading research and teaching centre in all areas of EU law and governance

The research interests of the members of the UCL Centre for Law & Governance in Europe are the constitutional and administrative law of the EU, including external relations, and a wide range of policy areas, such as social policy, competition, migration, environment, employment, consumer, agriculture and intellectual property.

Centre for East European Language-Based Area Studies (CEELBAS)

RESEARCH AIM

• to realise the UK's strategic commitment to the study of Central and Eastern Europe and Russia, by developing the research agenda and building capacity through the education of a new generation of researchers

CEELBAS aims to integrate the scholarly capacities of the universities involved – with unrivalled breadth of expertise in the social sciences and humanities, as well as in language provision, covering all the countries of the region – in order to generate the sustainable flow of highly trained area expertise. It is a partnership between the UCL School of Slavonic & East European Studies, the University of Oxford and the University of Birmingham.

EXPERIMENTAL & SYSTEMS MEDICINE



Research in this theme aims to develop new approaches to disease and treatment, for example ranging from genome-wide genetic and epigenetic analyses to functional imaging in humans and extensive information from model organisms.

Eyes & Vision is also a theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

The Moorfields Eye Hospital NHS Foundation Trust and UCL Institute of Ophthalmology are also home to a National Institute for Health Research Specialist Biomedical Research Centre (page 18), focusing on: Age-Related Macular Degeneration; Diabetes; Glaucoma; Ocular-Surface Disease; Paediatric Ophthalmology and Inherited Eye Disease.

SEE ALSO

- Cancer Research theme – page 28
- Cardiovascular Research Theme – page 29
- UCL Biosystems Network – page 30
- UCL Centre for Stem Cells & Regenerative Medicine – page 31
- UCL Ear Institute – page 35
- Bloomsbury Centre for Bioinformatics – page 47
- Nanotechnology Research Theme – page 59
- Neuroscience Research Theme – page 60

UCL Centre for Amyloidosis & Acute Phase Proteins

RESEARCH AIM

• to elucidate fundamental normal and pathobiological mechanisms in order to improve diagnosis, management and outcome of disease

The UCL Centre for Amyloidosis & Acute Phase Proteins conducts world-leading research in all aspects of the pentraxin family of plasma proteins, and in amyloidosis. Studies range from structural biology, through molecular, genetic, biochemical, physiological and pathological studies, to clinical diagnostics, patient management and new drug discovery.

UCL Centre for Altitude, Space & Extreme Environment Medicine

RESEARCH AIM

• to conduct research, teach courses and offer advice in the areas of space, aviation, high altitude, remote, dive and hyperbaric medicine

The UCL Centre for Altitude, Space & Extreme Environment Medicine is a group of clinicians and scientists with specialist interests and training in the medicine and physiology of extreme environments. Central to its work is the concept that the study of human systems stretched to breaking point in extreme environments can increase the understanding of critically ill patients.

UCL Centre for Chemical Biology

RESEARCH AIM

• to be an international centre of excellence for the design and synthesis of small-molecule tools for use in biological and biomedical sciences

The UCL Centre for Chemical Biology's four research programmes are:

small-molecule modulators of enzymes and proteins; development of 'labelled' probes to aid fundamental biological and clinical studies, including imaging; synthetic peptide and protein chemistry to aid fundamental biological and clinical studies; and structure-based design, modelling and molecular dynamic simulation.

UCL Medical-Modelling Group

RESEARCH AIMS

• to use modelling and related means to advance understanding, with the goal of aiding clinical strategy, decision-making, improvement of devices and diagnostics, taking advantage of a large network

• to focus on specific areas, such as haemodynamics in the brain, whole-body studies and lower urinary-tract models

• to accommodate suitable advances in theory and method in all the adjunct fields and take them to a wide variety of medical and clinical applications, as well as industrial-linked applications as those applications arise

The UCL Medical-Modelling Group encompasses an expanding team of applied mathematicians, engineers, statistical scientists, physicists, imagers, computationalists and clinicians working on a variety of medical problems, principally by developing models of disease to guide clinical intervention.

UCL Consortium for Mitochondrial Research

RESEARCH AIMS

• to generate innovative experimental approaches and applications to illuminate major questions from fundamental mechanisms of mitochondrial biology and bioenergetics to understanding the role of mitochondria in disease

• to transform the investigation and

management of mitochondrial-related disease

The consortium, which brings together a wide range of basic and clinical scientists through a spectrum of scientific disciplines across UCL, recognises the fundamental role of mitochondria in the wellbeing of cells, tissues and the organism, and their major role in a remarkable array of major diseases.

Institute of Hepatology

RESEARCH AIM

- to conduct basic and translational research to develop and extend knowledge of the human liver and its diseases

The institute's five main programmes of work encompass the areas of: acute liver failure and liver-support systems; viral hepatitis; liver-cell and bile-duct cancer; the pathophysiology of portal hypertension; and liver injury after partial surgical resection, including sepsis in liver disease.

GENETICS & EPIGENETICS



Research in this theme spans the elucidation of fundamental principles involved in gene expression, through translational research leading to better therapies, diagnostics and prophylactics. It includes, but is not limited to, in-silico evolutionary simulations, anthropological genetics and clinical trials of gene therapies, to genetic epidemiology and the latest applications of whole-genome analysis. Through the study of heritable changes in genome function that occur without a change in DNA sequence, it also offers new routes of investigation and insight into phenotypic plasticity in health and disease that cannot be explained by classical genetics.

SEE ALSO

- UCL Centre for Cardiovascular Genetics – page 30
- UCL Consortium for Mitochondrial Research – page 45

UCL Genetics Institute

RESEARCH AIM

- to develop and apply bio-statistical and bio-informatics approaches to clinical and human population genetics

As well as offering support to the genetic activities of the many non-human research groups at UCL, the UCL Genetics Institute has a major (but not exclusive) focus on application to three disease areas, chosen based on the clinical strengths at UCL and their relevance to society – cardiovascular, neurological and cancer – with an additional major activity in the pharmacogenetics of these diseases.

UCL Centre for Genetic Anthropology

RESEARCH AIM

- to pursue research on the evolution and migrations of human populations in north Africa, east Africa, the near East, Asia and Europe

A joint initiative by UCL Anthropology and UCL Biology, the UCL Centre for Genetic Anthropology undertakes research on modern populations and, by the analysis of ancient DNA, their precursors. It uses the latest advances in molecular genetics to study questions in human history and pre-history that cannot be addressed by other means.

Bloomsbury Centre for Bioinformatics (BCB)

RESEARCH AIM

- to deliver computational tools and analysis which address global biomedical research questions, through collaborative projects on themes such as stem cells, cancer, cardiovascular genetics, perception and relief of pain, childhood diseases, HIV and immunology

The BCB is a research, support and training centre in partnership with Birkbeck College, comprising 21 affiliated research groups which span a range of disciplines such as protein-structure prediction and classification, genomic- and transcriptomic-data analysis, statistical genetics and systems biology.

GLOBAL HEALTH



Research in this theme includes work on infectious diseases (particularly HIV/AIDS, STIs and tuberculosis), poverty and the social determinants of health, maternal and child health, vulnerable populations, the health effects of climate change, non-communicable diseases and politics, policy and justice. Contributing disciplines include, but are not limited to anthropology, development planning, political science, built environment, law, climatology, human rights, economics and biomedicine.

Population Health is also a developing theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Global Health is one of the UCL Grand Challenges (page 15).

SEE ALSO

- UCL Accessibility Research Group – page 24
- UCL Centre for International Health & Development – page 33
- Centre for the Evaluation of Development Policies – page 39
- UCL Environment Institute – page 40
- Health Services Research Theme – page 49
- UCL Institute for Human Rights – page 53
- UCL Institute for Risk & Disaster Reduction – page 66
- Aon Benfield UCL Hazard Research Centre – page 66

UCL Institute for Global Health

RESEARCH AIMS

- to initiate and enhance discipline- and department-specific programmes, research and teaching at UCL
- to stimulate interdisciplinary discourse and intellectual debate across UCL
- to enable the development of activity at UCL to make possible effective

large-scale multidisciplinary approaches and interventions

- to create real and virtual spaces for academic discourse, in the public-policy arena and international political processes
- to explore partnerships with other universities, government, industry, funding bodies, trusts and charities, UK and international agencies to support UCL's research, education, advocacy and public-policy initiatives
- to position UCL as the key informant to governments, business and the community about matters relating to global health
- to develop the provision of UCL's intellectual capital through consultancy and project portfolios

The UCL Institute for Global Health coordinates an institution-wide agenda of cross-fertilisation and application of UCL expertise to the Grand Challenge of Global Health, through strategies, programmes, research, publication, consultancy, symposia and teaching.

UCL International Institute for Society & Health (IISH)

RESEARCH AIMS

- to take action on the social determinants of health
- to inform global, national and local policy responses on reducing inequalities in health
- to improve the health and wellbeing of all, in rich and poor countries

The social determinants focus of the UCL IISH complements the United Nations Millennium Development Goals by focusing on a broad range of populations – poor, intermediate and better off. The UCL IISH provides a platform for linking UCL's strengths in humanities, medicine and social sciences, in order to tackle the problems of global health and the multifactorial causes of health and disease.

Leonard Cheshire Disability & Inclusive Development Centre

RESEARCH AIMS

- to undertake field research studies in participation with Leonard Cheshire Disability programmes implemented globally
- to provide expertise for policymakers and other stakeholders (NGOs, UN agencies, other donor agencies) primarily in developing countries, including the areas of legislation, inclusion, empowerment and mainstreaming within existing policies
- to participate in academic networks, and to share research experience and knowledge through field surveys, publications and teaching about disabled people, vulnerable groups and international development

The Leonard Cheshire Disability & Inclusive Development Centre, UCL, is consolidating a body of research about disability issues, not only in conflict and emergency situations, but more generally in transitional and developmental contexts.

HEALTH SERVICES

Research in this theme addresses changes in healthcare delivery, clinical education and professional regulation, the pace of innovation in information technology and the exponential growth of knowledge in the biomedical and clinical sciences. It includes, but is not limited to, epidemiology, psychology, sociology, economics and other analytic sciences.

Health-Services Research is also a theme of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Centre for Speech & Language Therapy Research – page 35
- Global Health Research Theme – page 47

UCL Centre for Philosophy, Justice & Health

RESEARCH AIM

- to provide a UCL-based focus for research into distributive justice and health, through conferences, workshops, papers, public engagement and teaching

The UCL Centre for Philosophy, Justice & Health is a partnership between many UCL departments, including UCL Philosophy, UCL Political Science, UCL Laws, the UCL Medical School and UCL Epidemiology.

UCL Healthcare Evaluation Group

RESEARCH AIM

- to examine: the determinants of health-service use; the relationship between healthcare inequalities and

health inequalities across socioeconomic and other groups (particularly age and gender); healthcare and public-health programmes, with particular reference to variations across socioeconomic and other groups; the cost-effectiveness of healthcare programmes; resource allocation in healthcare; and clinical decision-making in areas of uncertainty

The UCL Healthcare Evaluation Group's studies have or are being conducted in fields as diverse as mental health, palliative care, intensive care, cardiology, reproductive health and health promotion.

UCL Patient Care Research & Innovation Centre (PCRIC)

RESEARCH AIMS

- to investigate questions of symptom management, quality-of-life, end-of-life, and the roles of caregivers (self, family, professionals) in health promotion and disease management across the lifespan
- to develop and validate measures and evaluate effectiveness of nursing and allied health-delivered therapies with an emphasis on the partnership between patients, families and healthcare professionals
- to support nursing, midwifery and allied health professionals by advancing the research expertise of these clinical professionals and developing new opportunities for research careers
- to provide a clear and cohesive vision for interdisciplinary scholarship in patient-care research within UCL

The UCL PCRIC's research takes place in a variety of settings where healthcare is delivered and is conducted in collaboration with researchers from other clinical disciplines, basic sciences and NHS partners to achieve rapid translation of clinical research into innovations in patient-care delivery and improved patient care.

UCL Surgical Outcomes Research Centre (SOuRCe)

RESEARCH AIM

- to be a source of expert advice within and outside UCLH on risk adjustment and outcomes analysis for the surgical specialities

UCL SOuRCe's advice is based on the results of research and audit studies looking at risk adjustment and outcome measures, and a parallel programme of process evaluation and implementation testing conducted in partnership with clinicians.

UCL Clinical Operational Research Unit

RESEARCH AIM

- to apply expertise in mathematical, statistical and computer-based modelling techniques to a wide range of clinical and health-service delivery problems relevant to policy

The UCL Clinical Operational Research Unit's knowledge base includes a wide variety of mathematical modelling techniques, statistics, trial design and analysis. Expertise in these technical areas is complemented by proficiency in collaborating with healthcare professionals.

UCL Centre for Health Informatics & Multiprofessional Education (CHIME)

RESEARCH AIM

- to address quality, information and governance in healthcare, with a special emphasis on translational research

UCL CHIME is an innovative and dynamic centre, with a wide-ranging programme of research into health informatics and associated areas. It runs undergraduate and postgraduate teaching programmes on

information, quality and governance for health. It is founded on the principle that close contact with real healthcare requirements and services must underpin its research and teaching and its work is grounded in the implementation of practical information systems and services.

UCL Centre for Behavioural & Social Sciences in Medicine

RESEARCH AIM

- to examine issues to do with health and illness from the perspectives of health psychology, medical sociology and medical anthropology

The UCL Centre for Behavioural & Social Sciences in Medicine performs research ranging from the impact of surgery on the brain, through coping with chronic illness, ageing and retirement, stigma and illness, to cultural differences in health. In addition, it is involved in theoretical developments including approaches to health inequalities, self-management in chronic illness, the development of new illnesses and the nature of different research paradigms.

UCL International Centre for Evidence-Based Oral Health (ICEBOH)

RESEARCH AIM

- to develop the best evidence for prevention, diagnosis and treatment in oral healthcare, with a particular interest in periodontal diseases and implantology

UCL ICEBOH is a leading authority internationally in conducting systematic reviews in dentistry, and in developing the research methodology of such reviews. It designs reviews to answer important healthcare questions relevant to patients, clinicians and policymakers.

British Psychological Society's Centre for Outcomes Research & Effectiveness (CORE)

RESEARCH AIM

- to use psychological theory and expertise to promote the increased effectiveness of a broad range of healthcare interventions

CORE's major research themes are: the development of clinical guidance, particularly in mental health; theories and techniques of behaviour change; the development and evaluation of novel health-service interventions; psychological interventions for depression, in particular low-intensity interventions; and competence frameworks for psychological interventions.

Wellcome Trust Centre for the History of Medicine

RESEARCH AIM

- to further knowledge of medicine's past in order to offer analyses of the complexities and ambiguities, as well as the hard-won knowledge surrounding health, diseases and their treatment

The centre's academic activities build on long-standing expertise in the western medical tradition, with as wide-ranging a chronological coverage as possible for both teaching and research. It also explores the historical interactions between the western medical tradition and other kinds of medical traditions, particularly in Asia, a matter of crossing boundaries and borders, for which it has borrowed terms like 'global history' and 'connected histories'. The centre is also engaged in outreach and in fostering public understanding of the subject, through community projects, exhibitions and online resources, teaching and training, programmes of seminars, lectures and symposia, and publishing, broadcasting and other activities.

HERITAGE, HISTORY & CULTURES



Research in this theme involves disciplines such as history, archaeology, anthropology, history of art, museum studies, science and technology studies, and history of medicine. It includes, but is not limited to, collections, archives, film history, study of culture and cultures, history of science, technology and medicine, science and heritage, social and cultural dynamics, material culture, identity, communities, human evolution and historical studies.

SEE ALSO

- European Studies Research Theme – page 42
- UCL Centre for Genetic Anthropology – page 47
- Wellcome Trust Centre for the History of Medicine – page 51
- UCL Cultural Informatics Research Centre for the Arts & Humanities – page 57
- UCL International Centre for Archives & Records-Management Research & User Studies – page 57
- Migration Research Theme – page 58
- UCL Urban Laboratory – page 68

UCL Centre for Museums, Heritage & Material-Culture Studies

RESEARCH AIM

- to direct research in the future of museums, cultural heritage and object analysis

The UCL Centre for Museums, Heritage & Material-Culture Studies brings together expertise across UCL Anthropology, the UCL Institute of Archaeology and UCL

Museums & Collections, and will develop into a wider pan-UCL and London network.

UCL Centre for Sustainable Heritage

RESEARCH AIM

- to fill the gap between disciplines responsible for the physical protection of movable and immovable heritage

The UCL Centre for Sustainable Heritage's contribution to a sustainable future for heritage is through participation in collaborative environmental, scientific and technological research, innovative teaching, advice and consultancy. It engages in evidence-based research on heritage protection and, through its teaching activities, challenges the traditional divide between preservation and use. Its current research themes include: effects of climate change on cultural heritage; natural ageing of objects in the display or storage environment; effects of indoor environments on collections, and how these problems should be addressed by conservation; and use of innovative technologies for cultural heritage.

UCL Centre for Transnational History

RESEARCH AIMS

- to provide institutional support to individual and collaborative research projects in transnational history
- to offer an institutional framework for graduate studies in the field
- to organise related seminars, lectures and workshops

The UCL Centre for Transnational History provides a forum for research and graduate training in the field of transnational history

across different departments and faculties of UCL, including UCL History, the UCL School of Slavonic & East European Studies, the Wellcome Trust Centre for the History of Medicine at UCL, UCL Anthropology, UCL History of Art, UCL Scandinavian Studies and UCL Science & Technology Studies.

International Centre for Chinese Heritage & Archaeology (ICCHA)

RESEARCH AIMS

- in partnership with Peking University, to develop and promote new ideas and technologies relating to Chinese archaeology and heritage, in particular the most appropriate methods and techniques of excavation, conservation and management of archaeological sites
- to conduct joint research on some of the most pressing heritage and archaeological problems facing China
- to facilitate the dissemination of the maximum knowledge possible to be gained about China's rich cultural heritage

Founded in 2003 by UCL and Peking University, the ICCHA has a joint management body with offices and activities in both London and Beijing.

AHRC Centre for the Evolution of Cultural Diversity (CECD)

RESEARCH AIMS

- to advance understanding of human cultural diversity, involving a large national and international network
- to focus on the relation between cultural and linguistic diversity, as these influence and respond to variation in the size and structure of human populations
- to adapt methodological and theoretical advances in evolutionary biology and apply them to a wide range of case studies in cultural history

The CECD is accelerating the development of the new discipline of cultural evolutionary studies. This is emerging in the interstices of several existing fields, including archaeology, anthropology, linguistics, human genetics and mathematical modelling, with the aim of understanding the evolution of human cultural diversity.

JUSTICE, ETHICS & HUMAN RIGHTS



Research in this theme involves disciplines such as law, political science, social sciences, philosophy and biomedical science. It includes, but is not limited to, human rights, minority rights, health and justice, legal studies, trade law, intellectual property rights and jurisdiction, ethics and law, professional ethics, medical ethics, reproductive ethics, bioethics, right-to-life, assisted suicide, access to health, and the history and philosophy of ethics.

SEE ALSO

- UCL European Institute – page 42
- UCL Centre for Philosophy, Justice & Health – page 49
- Public Policy & Governance Research Theme – page 64
- UCL Centre for Criminal Law – page 66

UCL Institute for Human Rights (IHR)

RESEARCH AIMS

- to advance and disseminate knowledge regarding issues of moral justification, legal interpretation and practical implementation of human rights, both domestic and international

- to develop models of accountability for different types of human rights, equality and social-justice claims
- to provide innovative, workable solutions to domestic and international human-rights problems by bringing together UCL's immense multidisciplinary wealth of intellectual capital, international collaborations and commitment to advancements in human rights
- to equip students studying human rights with the knowledge and skills that will enable them to contribute to the human-rights movement, be it through civil society, governmental institutions or legal practice

The UCL IHR treats the task of continuing to research and develop the ideal of human rights as ongoing. The institute was established to bring the university's multidisciplinary expertise (eg in law, the humanities, and social and medical sciences) to bear on human rights. The UCL IHR will play a prominent role as facilitator to bring together stakeholders and researchers and to develop new working partnerships in the advancement of human rights.

UCL Centre for Ethics & Law

RESEARCH AIMS

- to advance research and teaching in the areas of professional ethics, ethics of risk and distributive justice
- to provide a focal point for intellectual leadership and the exchange of ideas between academics, practitioners, industry and others through a conference, seminar and lecture programme
- to encourage ethical reflection and awareness for international corporate citizens, given current national and international focus on ethics in business activity
- to establish a tracking system for international legal developments in the area of ethics and regulation and the

harmonisation of international law in response to the current ethical crisis

- to provide training in ethics and compliance issues
- to disseminate research output through publication

The UCL Centre for Ethics & Law has been established to reflect the growing need for enhanced collaboration between academics, practising lawyers and industry, given the fast changing and increasingly interdisciplinary nature of the global issues lying at the intersection between law and ethics. The work of the centre is resolutely multidisciplinary and practice-oriented.

UCL Centre for International Courts & Tribunals

RESEARCH AIMS

- to facilitate access to and transparency in the work of international courts and tribunals
- to enhance the effectiveness of international courts and tribunals
- to promote greater knowledge about international courts and tribunals
- to promote international peace through international justice and rule of law

The UCL Centre for International Courts & Tribunals was established against the background of an increase in the number of international courts and tribunals at global and regional levels, and in response to a sharp increase in their caseloads.

LAW & ENTERPRISE



Research in this theme includes, but is not limited to, intellectual-property law, international commercial law, competition law and industry regulation.

UCL Institute of Brand & Innovation Law

RESEARCH AIM

- to build bridges in the field of intellectual property (IP) between academics, practitioners, industry, the judiciary, policymakers and the student community worldwide

The UCL Institute of Brand & Innovation Law facilitates opportunities for dialogue through hosting events which combine critical analysis with practical relevance, and through producing research of the highest standards of scholarly rigour and real-world significance. Its three key research themes are: IP and European integration; comparative trademark law; and IP and the life sciences.

UCL Centre for Commercial Law

RESEARCH AIM

- to promote excellence in the research and teaching of international commercial law, bridging the gap between academic law and its practical application

The UCL Centre for Commercial Law explores the socio-economic, political and theoretical importance of commercial law, bringing coherence and theoretical direction to a subject traditionally viewed as merely an amorphous category or convenient umbrella term. It views commercial law as a fundamental bedrock of principles underpinning otherwise

diverse areas of private and public law, thus challenging traditional subject boundaries (such as contract or restitution), drawing upon UCL Laws' jurisprudential strengths to develop a solid unifying theoretical framework.

UCL Jevons Institute for Competition Law & Economics

RESEARCH AIMS

- to stimulate research and debate concerning the application of competition law and industry regulation to the marketplace
- to promote interaction among academic scholars in law and economics, policymakers and enforcement officials, the judiciary, practitioners and business leaders

The UCL Jevons Institute for Competition Law & Economics' approach to legal doctrine and research in law and policy is based on a strong interaction between legal principles and analysis and applied economic theory and empirics, and the use of comparative teaching and research methodologies involving competition policy in developed and developing market economies.

UCL Centre for Law & Economics

RESEARCH AIMS

- to apply economic analysis to the understanding of law and legal issues
- to develop empirical and analytical approaches for the understanding of legal processes
- to evaluate and assess legal institutions at national and international levels

The UCL Centre for Law & Economics applies economic analysis to problems of regulation, competition and institutional development. It looks at a wide range of sectors, from financial and corporate law to

environmental and industrial regulation. It undertakes research programmes funded by EU and international institutions.

MATERIALS



Research in this theme encompasses: biomaterials research and healthcare engineering; materials modelling (such as chemical catalysis, gas sensing, energy and the environment); physical and functional materials (discovery and application, structural materials, flow-materials engineering and materials-characterisation techniques); and materials for energy application.

SEE ALSO

- UCL Centre for Computational Science – page 37
- Thomas Young Centre at UCL – page 38
- UCL Energy Institute – page 40
- UCL Centre for Museums, Heritage & Material-Culture Studies – page 51
- UCL Centre for Sustainable Heritage – page 52

UCL Centre for Materials Research (CMR)

RESEARCH AIMS

- to provide a focal point for materials research at UCL
- to raise awareness of the extent and range of materials science at UCL
- to provide coordination and large-scale planning, for example for use of facilities and large equipment
- to provide communication between research groups, projects and programmes, and act as a forum for meetings and colloquia

The UCL CMR brings together more than 100 senior investigators from four UCL faculties who are internationally regarded for their research activities. Key strengths

at UCL include: computational materials science, materials chemistry, nano- and functional materials, materials for energy applications, biomaterials and technology for healthcare engineering.

UCL Materials Chemistry Centre

RESEARCH AIM

- to provide an integrated environment for research at the interface of chemistry and chemical engineering at UCL

Research initiatives within the UCL Materials Chemistry Centre combine experimental studies and computational materials science, for synthesis, characterisation and testing of new materials and processes, and prediction and evaluation of their structures and properties.

Control & Prediction of the Organic Solid State (CPOSS)

RESEARCH AIM

- to develop a computational technology for the prediction of the crystal structure(s) of organic molecules, that could be used even prior to the synthesis of the compound

CPOSS is developing the complementarity of computational 'prediction' of organic crystal structures and experimental polymorph screening, including characterisation, of the organic solid state.

MEDIA, COMMUNICATIONS & INFORMATION



Research in this theme involves disciplines such as information studies, computer science, anthropology and languages. It includes, but is not limited to, digital humanities, science communication, film production, film studies, knowledge flow and exchange, digital resources and collections, and usage of digital media such as the internet and blogs.

UCL Centre for Digital Humanities

RESEARCH AIM

- to draw on UCL's diverse expertise at the intersection of digital technologies and computational techniques with humanities and cultural heritage

The UCL Centre for Digital Humanities aims to produce computational applications and models which make possible new kinds of research both in humanities disciplines and in computer science. It studies the impact of these new techniques on cultural heritage, memory institutions, libraries, archives and digital culture. It addresses areas such as: knowledge organisation, simulation and modelling; the creation and use of digital resources in the humanities, including digital imaging and text analysis; knowledge of the use of such materials and financial models for their creation; and the preservation and archiving of data and records.

UCL Centre for Publishing

RESEARCH AIM

- to lead the world in research, scholarship and teaching of publishing in all media and for all audiences

Research-driven and with a commitment to knowledge transfer, the UCL Centre for Publishing informs the publishing industry and the broader world of information management and communication. It offers scholars and publishers vibrant ideas, insights and evidence to ensure success in a digital networked world.

UCL Slade Centre for Electronic Media in Fine Art (SCEMFA)

RESEARCH AIMS

- to provide a context for practice-based electronic-media research within fine art, and to contribute to new-media debate on a national and international level
- to foster practice-led research focusing on the questions and opportunities for new forms and structures of thinking emerging as a result of technological progress, and to do this within a multidisciplinary fine art context

UCL SCEMFA has been at the foreground of artists' streaming media since 1997 and has supported a wide range of artists' projects. Current research developments centre on works that co-exist in both digital and physical space and which seek to extend understanding of networked, live and transmitted data in relation to physical, material and archival structures.

UCL Cultural Informatics Research Centre for the Arts & Humanities (CIRCAh)

RESEARCH AIM

- to undertake research on the application of computing and digital technologies to the arts and humanities

UCL CIRCAh brings together expertise in digital humanities, user studies, digital libraries, human-computer interaction and e-science. Its location within UCL Information Studies allows for collaboration with colleagues in library and archive studies. Current research projects include studying the use of IT by field archaeologists, the use of e-science techniques to study ancient documents and user-testing of innovative interfaces for the Orlando Project, a digital resource on women writers.

UCL International Centre for Archives & Records-Management Research & User Studies (ICARUS)

RESEARCH AIMS

- to develop knowledge and enhance understanding of the creation, management and use of records and their role in society
- to map, monitor and evaluate significant changes in the archives and records domain using robust evidence-based methods

UCL ICARUS was established in recognition of the need to develop a significant body of research which seeks to identify, understand and meet the rapid social, technological and intellectual changes sweeping through the archives and records-management discipline.

UCL Centre for Information Behaviour & the Evaluation of Research (CIBER)

RESEARCH AIM

- to map, monitor and evaluate digital-information systems, platforms, services and environments, using robust, 'big picture' and innovative research methods that provide strategic data for policymakers

CIBER is policy-led, consumer-driven, interdisciplinary and independent. Its expertise lies in the mapping, monitoring and evaluating of digital information systems, platforms, services, roll-outs and environments, using robust, big picture and innovative research methods, especially deep-log analysis.

that build on the diversity of expertise within UCL

- to develop and deliver high-quality interdisciplinary postgraduate teaching programmes in migration that actively engage with contemporary policy debates
- to highlight the high-quality research and teaching in migration undertaken at UCL to a wider academic and general public audiences
- to position UCL as a key informant to governments, business and the community about matters relating to global migration

The UCL Global Migration Network brings together experts from the medical, social and physical sciences, along with the arts and humanities, to explore the many-sided dynamics of global migration.

UCL Centre for Research & Analysis of Migration (CReAM)

RESEARCH AIM

- to inform the public debate on migration in the UK and in Europe by providing new insights, helping to steer the current policy debate in a direction that is based on carefully researched evidence without partisan bias

UCL CReAM, an independent and interdisciplinary research centre in UCL Economics, focuses on the causes, patterns and consequences of international population mobility and movements affecting the UK and Europe and on associated global processes. Its research programme is divided into four major themes: forms of population movement and mobility; the non-migrant experience (effects of migration on importing and exporting countries); the migrant experience (integration, adaptation and exclusion); and perception of migrants within receiving countries (identity and aspects of social cohesion).

UCL Migration Research Unit (MRU)

RESEARCH AIMS

- to contribute to knowledge on patterns and trends in migration at the national, European and global levels
- to increase understanding of the interrelationships between public policy and patterns of migration at each level
- to develop new conceptual approaches to the study of migration
- to explore the geographical dynamics of new migration processes, particularly in the context of new diasporas
- to provide a supportive and dynamic environment for multidisciplinary work on migration for graduate students

The UCL MRU, based in UCL Geography, carries out research – independently or in collaboration with others – designed to increase knowledge and understanding of migration issues. It has an established reputation for research on national and European migration trends and migration policy, with new interests in transnationalism and diasporas, as well as engagement with new geographical areas, particularly Africa.

NANOTECHNOLOGY

Nanotechnology is rapidly acquiring recognition as an interdisciplinary core competence, engaging engineers, medical professionals and physical scientists to solve major problems facing the world, ranging from climate change to healthcare. It represents the ability to image, manipulate and model functionalities on the nanometer scale, as well as the associated systems-integration skills to provide solutions on the macro scale.

London Centre for Nanotechnology (LCN)

RESEARCH AIM

- to solve major problems in healthcare, planet care and information technology using the tools provided by nanotechnology

A postgraduate research department with a turnover (at UCL) approaching £10 million, the LCN is now recognised as the major centre dedicated to nanotechnology in the UK. A partnership with Imperial College London, the LCN has a unique operating model that accesses and focuses the combined skills of chemistry, physics, materials, medicine, electrical and electronic engineering, mechanical engineering, chemical engineering, biochemical engineering and earth sciences. The UCL part of the centre is housed in a dedicated building (with capitalisation of construction and equipment in excess of £25 million and opened in 2006) in Bloomsbury with extensive scan-probe and optical-microscopy suites, as well as two state-of-the-art clean rooms containing a full suite of modern optical, electron- and ion-beam lithography facilities, all of which

MIGRATION

Research in this theme addresses a wide range of significant issues, including identity, social cohesion and cultural diversity, and integration and exclusion.

SEE ALSO

- UCL Centre for Genetic Anthropology – page 47
- UCL Centre for Transnational History – page 52
- UCL Urban Laboratory – page 68

UCL Global Migration Network

RESEARCH AIMS

- to encourage dialogue and debate across the many areas of expertise of UCL involved in migration
- to open innovative opportunities for researchers to develop groundbreaking, challenging and crossdisciplinary academic projects focused on migration

are available to the entire UCL and Imperial College nanotechnology communities.

UCL Centre for Nanotechnology, Biomaterials & Tissue Engineering (CNBTE)

RESEARCH AIM

- to facilitate the increasing interdisciplinary nature of research and teaching involving basic scientists, materials scientists, engineers and clinicians

The CNBTE at UCL carries out research and development in nanotechnology, nanomaterial and tissue engineering. Biomedical applications includes the development of cardiovascular implant, abdominal organs, tissue engineering material for first transplant and nanoparticles for cancer localisation and treatment. It has commercialised a number of products including vascular bypass grafts, biological glue and nanocomposite materials.

NEUROSCIENCE



Research in this theme encompasses a spectrum of activities in both basic and clinical neuroscience, from molecular and genetic studies of neurotransmitter receptors, intracellular signalling pathways, ion channels and transporters, concentrating on their structure–function and roles in neurophysiology, to the cellular level, dealing with signalling both within and between neurons and also glia, synaptic transmission and the development of neural tissues, the function of neuronal networks and their relationships to higher-order cognitive processing and behaviour, and modelling the behaviour of neuronal networks.

Neurological Disorders is also a theme in UCL Partners (page 17), which will be Europe's leading health-research powerhouse.

Neurodegeneration, Neurodiagnostics, Neuroimaging – Future Impact on Patient Care and Neurotherapeutics are also themes of the University College London Hospitals NHS Foundation Trust/UCL Comprehensive Biomedical Research Centre (page 18).

SEE ALSO

- UCL Centre for Ageing & Mental-Health Sciences – page 23
- UCL Centre for Neuroimaging Techniques – page 26
- Wellcome Trust Centre for Neuroimaging – page 26
- Centre for Neuroimaging – page 26
- UCL Centre for Computational Statistics & Machine Learning – page 37
- UCL Consortium for Mitochondrial Research – page 45
- UCL Genetics Institute – page 46

UCL Neuroscience

RESEARCH AIMS

- to tackle the most important questions about how the brain and nervous system work
- to teach and train the next generation of scientists and clinicians
- to transform the ability to diagnose and treat neurological and psychiatric disease

UCL Neuroscience is an interdisciplinary cross-cutting theme that brings together more than 400 principal investigators spanning the entire spectrum of brain sciences, from molecules to humans, in seven research themes: molecular neuroscience, developmental neuroscience, cellular neuroscience, systems neuroscience, cognitive neuroscience and computational neuroscience.

UCL Centre for Developmental Cognitive Neuroscience (CDCN)

RESEARCH AIMS

- to facilitate collaborations between experimental and clinical neuroscientists and translate research output to benefit health and welfare of the young throughout development and across the lifespan
- to identify the risk factors that predispose the young brain to disorders of learning, thinking and behaviour, and understand the mechanisms of recovery and compensation after disease or injury of the young brain as seen in epilepsy, stroke, attention deficit hyperactivity, visual and hearing impairments, and traumatic brain damage
- to enhance the visibility and international recognition of UCL-led developmental cognitive neuroscience research
- to provide multidisciplinary training and education for a new generation of developmental neuroscientists

Launched in 2009, the UCL CDCN brings together researchers and clinicians from many different disciplines across UCL faculties and NHS partner organisations, to develop new research programmes that will transform our understanding of the origins and development of brain and behaviour from birth to maturity.

UCL Institute of Behavioural Neuroscience

RESEARCH AIM

- to form a research community for UCL's behavioural neuroscientists

The UCL IBN is a virtual community for UCL's behavioural neuroscientists, who are interested in how low-level neural processes such as the actions of genes, proteins, neurons and neural circuits collectively translate to high-level processes such as behaviour, thinking, emotion and consciousness.

UCL Institute of Cognitive Neuroscience (ICN)

RESEARCH AIM

- to bring together different disciplines with common interests in the human mind and brain, in both health and disease

The UCL ICN uses the following research techniques, often in combination: autonomic bodily responses, computational modelling, cross-cultural studies, developmental psychology, electroencephalography, functional magnetic resonance imaging, lesion analysis, magnetoencephalography, multisensory analysis, neuropsychology, near infra-red spectroscopy, positron emission tomography, psychophysics, retinotopic mapping, transcranial magnetic stimulation and virtual reality.

UCL Developmental Cognitive Neuroscience Unit (DCNU)

RESEARCH AIM

- to understand the relationship between brain and behaviour in health and disease in children

Adopting an interdisciplinary approach and uses various brain-imaging techniques, the UCL Institute of Child Health's DCNU is a team of clinical and experimental cognitive neuroscientists working closely with medical experts at Great Ormond Street Hospital for Children to conduct translational research to benefit the health and wellbeing of children.

UCL Institute of Movement Neuroscience

RESEARCH AIM

- to bring together key researchers with a common interest in movement control

UCL Institute of Movement Neuroscience has experts in a wide range of fields applicable to the study of the neural control of movement and combines clinical, physiological, neuroimaging, developmental, psychophysical and computational approaches.

Gatsby Computational Neuroscience Unit

RESEARCH AIMS

- to construct theories and models of neural information processing associated with perception, cognition, decision and action
- to invent and study statistically and computationally rich models for representing and learning about the underlying structure of data

The interdisciplinary wing of the unit builds and applies theories from statistics, computer science, operations research,

engineering and physics to account for neural and psychological data on the nature and form of processing and interactions across a range of systems in the brain. Its work is largely theoretical, but is conducted in close collaboration with experimental colleagues studying everything from the biophysics of neural computation, through sensory processing in audition, to affectively charged decision making.

Reta Lila Weston Institute of Neurological Studies, UCL

RESEARCH AIM

- to further knowledge about stroke and neurodegenerative disorders

The Reta Lila Weston Institute of Neurological Studies at UCL is linked with the UCL Institute of Neurology, the Queen Square Brain Bank, the Sara Koe PSP Research Centre and the National Hospital of Neurology & Neurosurgery, and carries out collaborative and interdisciplinary research combining clinico-pathological, genetic and cell biological approaches.

MRC Prion Unit

RESEARCH AIMS

- to target areas of pressing public health concern rapidly
- to take a long-term approach to the understanding of prion disease and its wider relevance in pathobiology

The MRC Prion Unit, UCL, plays a key role in linking basic science to clinical research and focuses principally on human prion diseases. The unit's research strategy is aimed at both rapid developments to target areas of pressing public health concern and a long-term approach to the understanding of prion disease and its wider relevance in pathobiology. Research programmes include

molecular genetic studies of human prion disease susceptibility, transgenic modelling of human prion diseases, studies of species barriers to prion transmission, normal cellular function of prion protein, molecular and phenotypic analysis of human prion strains, structure of normal and mutant prions and the development of human diagnostics and therapeutics.

Centre for Educational Neuroscience (CEN)

RESEARCH AIMS

- to generate basic and applied research that will provide a new transdisciplinary account of the biological, cognitive and social dimensions of learning
- to provide translational research and applications using developmental psychology as a bridging framework, so that relevant aspects of neuroscience can make practical contributions to learning and teaching in educational settings
- to use learning and teaching processes and results in those settings to influence and test theory in neuroscience and the learning sciences more widely

A joint initiative with Birkbeck College and the Institute of Education, the CEN conducts research on: emotional development; neuroscientific methods; computational modelling of learning and teaching; conceptual development; social development; language development; mathematical development; and attention and executive development.

ORIGINS



Research in this theme, coordinated by the UCL Institute of Origins, examines the most fundamental questions regarding the existence and evolution of the universe.

UCL Institute of Origins

RESEARCH AIM

- to promote world-leading research into the origins and evolution of the universe, the basis of life and how humans came to exist

The UCL Institute of Origins aims to bring together under one umbrella the rich and highly respected multidisciplinary expertise that UCL has built up over several decades to research topics spreading in scale from the microscopic to the cosmological. The institute focuses on four themes: neutrino physics, mathematical foundations of origins, planetary science and galaxy evolution.

UCL Centre for Cosmic Chemistry & Physics

RESEARCH AIM

- to characterise fundamental chemical and physical processes which are thought to be important in the interstellar medium

The UCL Centre for Cosmic Chemistry & Physics uses a unique combination of theoretical and experimental techniques, comparing laboratory results with astronomical models and observations.

Centre for Planetary Sciences (CPS)

RESEARCH AIMS

- to act as an interdisciplinary centre of excellence for the planetary sciences at UCL and Birkbeck College
- to conduct research activities covering the interiors, surfaces, atmospheres and magnetospheres of planets, moons and small bodies in our solar system, as well as those around other stars, and to investigate the habitability of various planetary environments to coordinate the planetary science activities of the UCL Institute of Origins

The CPS is encouraging and coordinating strong research activities in the planetary sciences, primarily in UCL Earth Sciences, UCL Physics & Astronomy and the UCL Mullard Space Science Laboratory and the Birkbeck School of Earth Sciences. The research is pursued through remote and in situ observations, and theoretical, simulation and experimental studies. The in situ observations result from an established programme to develop and build instruments for space missions, with several successful experiments currently in operation on European- and US-led missions to Venus, Mars, and Saturn, with more currently under development.

PUBLIC POLICY & GOVERNANCE



Research in this theme includes, but is not limited to, constitutional developments, legal systems, international courts and tribunals, and global law.

SEE ALSO

- ESRC Centre for the Microeconomic Analysis of Public Policy – page 38
- Centre for the Evaluation of Development Policies – page 39
- ESRC Centre for Microdata Methods and Practice – page 39
- UCL Centre for Law & the Environment – page 41
- UCL European Institute – page 42
- UCL Centre for European Politics, Security & Integration – page 43
- UCL Centre for Law & Governance in Europe – page 43
- UCL Institute for Global Health – page 47
- UCL Centre for Commercial Law – page 54
- UCL Jevons Institute for Competition Law & Economics – page 55
- UCL Jill Dando Institute – page 66

UCL Constitution Unit

RESEARCH AIMS

- to be the UK's leading research centre on constitutional reform and comparative constitutional studies
- to maintain a strong forward-looking research programme, and influence future constitutional developments
- to provide a clear and independent analysis of constitutional issues for policymakers, practitioners, scholars and the wider public
- to develop international and comparative work, building on wide networks of international experts

The UCL Constitution Unit is independent and non-partisan, and the centre of a wide network of national and international experts. Its current major areas of research are: freedom of information and data protection; devolution and territorial politics; and parliament and parliamentary reform.

UCL Centre for Empirical Legal Studies

RESEARCH AIMS

- to bring together experts across a range of social-science disciplines to engage in interdisciplinary research with a bearing on law
- to be a world leader of methodological innovation in empirical legal studies
- to build research capacity in the United Kingdom
- to promote the evidence-led evolution of justice systems around the world

The UCL Centre for Empirical Legal Studies is able to draw upon expertise in fields as diverse as law, economics, sociology, criminology, statistics, psychology and political science, to bring new perspectives to bear upon the study of law, legal institutions and legal professionals. The work of the centre is concerned with: the role and function of law; compliance with law; resistance to law; the use and experience of law; the work of legal professionals; decision-making in the legal field; the impact of law; and the character of law itself.

UCL Institute of Global Law

RESEARCH AIMS

- to advance the understanding of the existing similarities of and differences between national legal systems, in order to facilitate a global legal academic discourse

- to compare the relative advantages and disadvantages between the solutions provided by national legal systems, in order to inform the national legal discourse
- to analyse the possibilities of, developments of, and limits to European and international legal harmonisation
- to apply a wide range of methodologies to issues of global and transnational law, such as economic, sociological, anthropological and philosophical approaches

The UCL Institute of Global Law builds upon UCL's existing expertise in French, German, Hispanic, Italian, Japanese, Russian, European and international law, and explores the economic and social foundations underlying these legal systems as well as the scope for mutual learning.

RISK & SECURITY



Research in this theme involves disciplines such as security and crime science, computer science, geography, and civil, environmental and geomatic engineering. It includes, but is not limited to, information security, hazard and disaster work, geological hazards, meteorological hazards, disaster studies, disaster management, food security, crime, crime prevention, terrorism, prevention of terrorism, social unrest and conflicts.

SEE ALSO

- UCL Energy Institute – page 40
- UCL Centre for European Politics, Security & Integration – page 43

UCL Institute for Risk & Disaster Reduction

RESEARCH AIMS

- to address the global challenges of natural hazards, pandemics, technological hazards and extremes induced by climate change
- to cohere research from across the domains of risk and hazard science, health and biomedicine, engineering, disaster-risk reduction, community resilience, law and ethics
- to set up interdisciplinary research foci on cross-cutting research themes in risk and disaster reduction
- to set up partnerships with research councils, City firms and NGOs to foster engagement with practitioners and policymakers

Natural hazards such as earthquakes, tsunamis, floods and storms destroy lives and damage economies across the globe; pandemics have the potential to bring death and suffering on an unprecedented scale; and climate change may increase the severity of both natural and health disasters. How society sees risk, how to link understanding of the causative mechanics to statistical approaches, and how to increase resilience and reduce the risk of disasters are common themes cutting across research in natural, environmental, health and technological hazards are issues which the institute will address.

UCL Jill Dando Institute (JDI)

RESEARCH AIM

- to change crime policy and practice, by bringing together politicians, scientists, designers and those in the front line of fighting crime, to examine patterns in crime and to find practical methods to disrupt these patterns

The UCL JDI's research is concentrated on new ways to cut crime, drawing upon

UCL's vast experience in related disciplines, including architecture, economics, engineering, geography, medicine, psychology, statistics and town planning. It has established close working relationships with businesses, law-enforcement agencies and policymakers to ensure that teaching and research are focused on practical, real-world problems and solutions.

UCL Centre for Criminal Law

RESEARCH AIMS

- to explore the role and effectiveness of criminal law in meeting the needs of national and international communities
- to promote greater understanding of the importance of justice and human rights in the creation and implementation of criminal law
- to make leading contributions to the cause of national and international criminal law reform

The UCL Centre for Criminal Law promotes excellence in research and teaching in criminal law and related subjects by bringing together scholars from UCL Laws and other UCL departments in a varied programme of research and events which engage with a wide range of academics, criminal-justice professionals and other groups and individuals with interests in this area of law of fundamental social importance.

Aon Benfield UCL Hazard Research Centre (ABUHRC)

RESEARCH AIM

- to provide a conduit for the transfer of cutting-edge natural hazard and risk research, practice and innovation from the academic environment to the business world and government and international agencies, facilitating the improvement of

natural hazard and risk assessment and the reduction of exposure to natural catastrophes

The ABUHRC comprises three groups:

geological hazards, climate extremes, and disaster studies and management. The intellectual products of the ABUHRC are: strategic, curiosity-driven research into natural hazards, the mechanisms that drive them, and the processes that underpin them; and applied studies targeted at reducing the impact of natural hazards on society.

SYSTEMS ENGINEERING



Research in this theme has a strong industry focus, and includes modelling, methodology, performance testing, lifecycle studies and instrumentation.

SEE ALSO

- UCL Innovative Manufacturing Research Centre in Bioprocessing – page 27
- UCL Bioconversion-Chemistry-Engineering Interface Programme – page 27
- UCL Interaction Centre – page 37
- London Software Systems – page 37

UCL Centre for Systems Engineering

RESEARCH AIMS

- to provide a focus for research, education, training and technology transfer in systems engineering
- to act as a first point of contact for industry and other external organisations seeking to take advantage of UCL expertise in systems engineering
- to support the development of a coherent and industrially relevant research

programme in systems engineering

- to engage with systems-engineering activities within UCL and promoting maturity of systems-engineering practice
- to support transfer of research in systems engineering into active and productive use

The UCL Centre for Systems Engineering provides multidisciplinary teams, drawn from the pool of world-class academics and researchers from departments throughout UCL, to tackle difficult systems-engineering issues that are industrially focused, including: lifecycle, requirements capture, design, modelling and performance testing, integrity, advanced instrumentation, spacecraft, defence, telecommunication, radar and sonar, air traffic control, naval architecture and marine engineering, software, human interactions with machines and systems, chemical engineering, oil and gas, and transport.

UCL Centre for Advanced Instrumentation Systems (CAIS)

RESEARCH AIM

- to promote and encourage interaction between industry and UCL researchers working in the area of advanced instrumentation

UCL CAIS has formed the Specialised Instrumentation Group, which has about 40 small- and medium-sized companies as members, providing seminars and forums covering topics of interest.

Centre for Process Systems Engineering (CPSE)

RESEARCH AIM

- to perform research and develop integrated models, methodologies and tools to exploit complex, multi-scaled physical, engineering and industrial

systems through requirements and functional analysis, modelling and design, simulation, optimisation, experimentation and visualisation

A partnership with Imperial College London, CPSE is an international research leader in process-systems engineering, concerned with the management of complexity in uncertain systems, modelled across many time and scale lengths, with relevance primarily to a range of industries including the oil and gas, petrochemicals, pharmaceuticals, fine chemicals, polymers, food and beverage, and consumer sectors.

URBAN & SPATIAL STUDIES



Research in this theme draws on disciplines including, but not limited to, philosophy, epidemiology, urban planning, economics, security studies, transport, materials science, history, environmental law, anthropology, history, architecture, philosophy, computer science, archaeology, energy studies, planning and transport.

Sustainable Cities is one of the UCL Grand Challenges (page 15).

SEE ALSO

- UCL Accessibility Research Group – page 24
- Energy, Environment & Transport Research Theme – page 39
- UCL Centre for Museums, Heritage & Material-Culture Studies – page 51
- UCL Centre for Sustainable Heritage – page 52

UCL Urban Laboratory

RESEARCH AIM

- to bring together the best urban teaching and research at UCL across the arts and sciences

The UCL Urban Laboratory encourages thinking and research that is critical, independent and interdisciplinary. Initially, its key themes are: social cohesion, urban infrastructure and the public realm; cosmopolitanism and new forms of urban citizenship; and urban landscape and design in the post-industrial metropolis.

UCL Space Group

RESEARCH AIMS

- to develop theories and to test these by studying the effects of spatial design on aspects of social, organisational and economic performance of buildings and urban areas
- to integrate computational approaches at the heart of the design process, including structural, societal and environmental analysis, as well as the generation of design solutions that combine machine learning, optimisation and technological innovation
- to research, develop and disseminate ways of designing, producing and operating buildings and urban areas using virtual-reality techniques

The UCL Space Group is the international centre of the theory and methodology known as ‘space syntax’. The Space Syntax Laboratory is the central hub of the research within the group. It studies the effects of spatial design on aspects of social, organisational and economic performance of buildings and urban areas. The group also comprises the VR Centre for the Built Environment, whose role is to bring the full range of computer graphics, interaction and digital data to the virtual building that

currently drives the design–development–operation cycle. In addition, the group is associated with Space Syntax Limited, a UCL spinout applied-research and technology-transfer firm, which works on a range of live projects from end user organisations in industry and local government.

UCL Complex Built Environment Systems (CBES) Group

RESEARCH AIMS

- to enhance design, maintenance and operation of the built environment while minimising the emissions of greenhouse gases
- to adapt the environment, fabric and services of existing and new buildings to climate change
- to improve the environment in and around buildings to provide better health, comfort, security and productivity

The UCL CBES Group comprises building scientists who research environmental problems and are primarily interested in developing solutions to the practical problems of designing, constructing and managing appropriate environments within and around buildings. The group’s expertise spans sustainable heritage, energy, environment and health, light and lighting, and workplace innovation.

UCL Centre for Advanced Spatial Analysis (CASA)

RESEARCH AIM

- to develop emerging computer technologies in several disciplines which deal with geography, space, location and the built environment

As an interdisciplinary research centre, UCL CASA’s expertise is drawn from archaeology, architecture, cartography,

computer science, environmental science, geography, planning, remote sensing, geomatic engineering and transport studies. Its focus is the development of spatial analytic theories and tools for understanding urban structure and accessibility. UCL CASA tracks movement in cities, measuring geodemographic population concentrations and examining retail structures. An emerging focus of UCL CASA is in sensing technologies which provide movement in geographic environments such as tracking pedestrians and flows of pollution which can be visualised in real time through web browser mapping.

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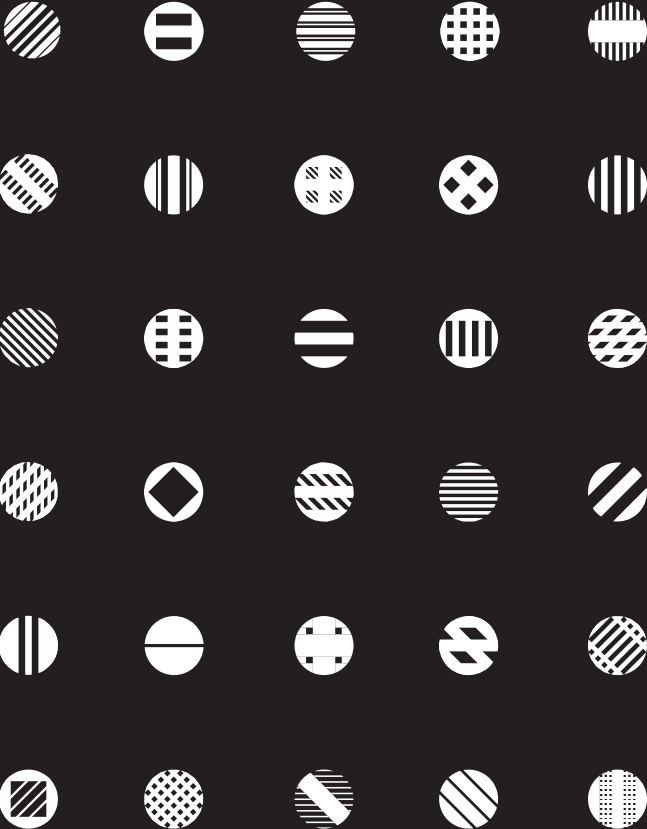
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